



Causal CCF Parameter Estimations 2020

May 2023

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**Prepared for the
Division of Risk Analysis
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
NRC Agreement Number 31310019N0006
Task Order Number 31310019F0022**

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ABSTRACT

This report documents the quantitative results of the causal common-cause failure (CCF) parameter estimations for the failure cause groups “component,” “design,” “environment,” “human,” and “other,” based on CCF data through 2020 in the U.S. Nuclear Regulatory Commission (NRC) CCF database: <https://rads.inl.gov/Pages/CCF.aspx>.

This report utilizes the same data period (2006–2020) and CCF templates as INL/EXT-21-62940, Revision 1, *CCF Parameter Estimations, 2020 Update*. The 2015 causal CCF prior distributions for the specific failure cause groups (instead of the 2015 generic CCF prior distributions) were used in this report to estimate the associated causal CCF parameters. All the 2015 causal CCF prior distributions and generic CCF prior distributions were developed in INL/EXT-21-43723, *Developing Generic Prior Distributions for Common Cause Failure Alpha Factors and Causal Alpha Factors*, using CCF data from 1997 to 2015.

These quantitative results were developed to support the causal alpha factor model and should be used as appropriate in probabilistic risk assessment (PRA) studies such as the NRC Significance Determination Process for commercial nuclear power plants in the United States.

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ACKNOWLEDGMENTS

The authors wish to thank Corwin Atwood and John Schroeder (both retired from Idaho National Laboratory) for their invaluable assistance and input throughout the course of this study. We also wish to thank John Lane and Chris Hunter from the U.S. Nuclear Regulatory Commission for their guidance and technical input, and Sai Zhang, Michael Calley, John Shaver, and Judy Fairchild from Idaho National Laboratory for their review and technical editing of this report.

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ACRONYMS

ACP	alternating current power
AFM	alpha factor model
ANS	American Nuclear Society
AOV	air-operated valve
ASME	American Society of Mechanical Engineers
BAT	battery
BCH	battery charger
CAFM	causal alpha factor model
CC	fail to open
CCCG	common-cause component group
CCF	common-cause failure
CCW	component cooling water
CKV	check valve
CLN	clean
CRB	circuit breaker
CS	containment spray
CSS	containment spray system
CWS	circulating water system
DCP	direct current power
ECA	event and condition assessment
EE	extreme environmental
EPIX	Equipment Performance and Information Exchange
EPS	emergency power supply
FC	fail to control
FH	first hour
FHRH	first hour remaining hours
FR	fail to run
FS	fail to start
FTC	fail to close
FTCL	fail to close after passing liquid
FTFR	failure to transfer
FTLR	fail to load and run
FTO	fail to open
FTOC	fail to open or close
FTOP	fail to operate
FTR>1H	fail to run after 1 hour of operation
FTR≤1H	fail to run for 1 hour of operation
HCI	high-pressure coolant injection
HPI	high-pressure safety injection

HTX	heat exchanger
INL	Idaho National Laboratory
INPO	Institute of Nuclear Power Operations
IRIS	Industry Reporting and Information System
LCI	low-pressure coolant injection
LCS	low-pressure core spray
LER	licensee event report
LK	leakage
LPI	low-pressure injection
LR	fail to load and run
MDC	motor-driven air compressor
MDP	motor-driven pump
MFW	main feedwater
MGL	multiple Greek letter
MLE	maximum likelihood estimation
MOV	motor-operated valve
MSIV	main steam isolation valve
MSS	main steam system
MSSV	main steam stop valve
NE	non-extreme environment
NPRDS	Nuclear Plant Reliability Database System
NR	normally running
NRC	U.S. Nuclear Regulatory Commission
NUCLARR	Nuclear Computerized Library for Assessing Reactor Reliability
OO	fail to close
OOS	out of specification
PDP	positive displacement pump
PG	plug
PMP	pump volute
PORV	power-operated relief valve
PRA	probabilistic risk assessment
RADS	Reliability and Availability Database System
RCIC	reactor core isolation cooling
RCS	reactor coolant system
RH	remaining hours
RPS	reactor protection system
RTB	reactor trip breaker
SCSS	Sequence Coding and Search System
SDP	Significance Determination Process
SLC	standby liquid control
SMP	sump

SO	spurious operation
SPAR	standardized plant analysis risk
SRV	safety relief valve (dual actuation)
SSW	standby service water system
STR	strainer
SVV	safety valve (single acting)
SW	service water
SWN	normally running service water system
SWS	service water system
TDP	turbine-driven pump
TSA	traveling screen assembly
VAC	vacuum breaker
UA	unavailability

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1. INTRODUCTION

1.1 Background

A general conclusion from probabilistic risk assessments (PRAs) of commercial nuclear power plants is that common-cause failures (CCFs) are significant contributors to the loss of functions of safety systems. Since the 1980s, a series of U.S. Nuclear Regulatory Commission (NRC) reports, including those prepared by NRC contractors, has been published in various areas:

- Provide guidelines on CCF event data analysis and CCF modeling in PRA (e.g., NUREG/CR-4780, “Procedures for Treating Common Cause Failures in Safety and Reliability Studies,” [1] and NUREG/CR-5485, “Guidelines on Modeling Common-Cause Failures in Probabilistic Risk Assessment,” [2]).
- Provide methods and guidance for collecting industry failure data, identifying and characterizing CCF events, and estimating CCF parameters and uncertainties (e.g., NUREG/CR-6268, Revision 1, “Common Cause Failure Database and Analysis System, Event Data Collection, Classification, and Coding,” [3]).
- Provide periodically updated CCF parameter estimates (e.g., NUREG/CR-5497, “Common-Cause Failure Parameter Estimations” [4], with data covering the time period of 1980–1995; “CCF Parameter Estimations, 2015 Update” [5], with data covering the time period of 1997–2015; and INL/EXT-21-62940, Revision 1, “CCF Parameter Estimations, 2020 Update” [6], with data covering the time period of 2006–2020).

Since 2014, CCF-related research activities conducted by NRC and Idaho National Laboratory (INL) have focused on the development of alternative CCF models in the area of event assessment; the development of new generic, causal-specific, and component-specific CCF prior distributions; and critical review of the existing CCF parameter estimation method and process. References [7],[8] summarize these more recent research activities. The primary reports are as follows:

- INL/EXT-21-33376, “Feasibility Study of Developing Alternative Common-Cause Failure Model for Event Assessment,” [9] is based on a 2014 study that evaluated two alternative CCF models: the Causal Alpha Factor Model (CAFM) and the General Dependence Model,^a which was developed by the University of Maryland [10] for event and condition assessments (ECAs). In this feasibility study, the CAFM was recommended as an alternative to the state-of-the-practice Alpha Factor Model (AFM) when performing NRC ECAs.
- INL/EXT-21-43723, “Developing Generic Prior Distributions for Common Cause Failure Alpha Factors and Causal Alpha Factors,” [11] developed new CCF generic prior distributions (using 1997–2015 data) to replace the older ones (which used 1991–2005 data) for performing CCF alpha factor estimates. Causal CCF prior distributions for five failure cause groups (i.e., component, design, environment, human, and “other”) were also developed in tandem with the new CCF generic prior distributions [11],[12].
- INL/EXT-21-65527, “Developing Component-Specific Prior Distributions for Common Cause Failure Alpha Factors,” [13] developed component-specific CCF prior distributions for five component types—pump, valve, strainer, generator, and “other”—after a study conducted during the development of the new CCF prior distributions in 2017 determined that different component types can have drastically different alpha factors and should thus be analyzed separately.

^a The report refers to the CAFM as the Partial Alpha Factor Model.

- NUREG-2225, “Basis for the Treatment of Potential Common-Cause Failure in the Significance Determination Process” [14], presents the basis for NRC’s treatment of the CCF potential at the performance deficiency level in quantitative risk assessments conducted as part of the Significance Determination Process (SDP).

Per INL/EXT-21-33376, while the state of practice is to use the AFM when performing CCF analysis, industry has expressed concerns that the AFM does not explicitly incorporate the failure causes into the model; therefore, using conditional CCF probabilities with the AFM in ECA would include all causes in the CCF probabilities, including causes that did not result in the observed failure(s). To address this issue, NRC investigated new, alternative CCF models, with the CAFM being identified as having the potential to replace the AFM in the NRC ECAs [9],[10].

As part of implementing the CAFM, this report provides causal CCF parameter estimations for five different failure cause groups: component, design, environment, human, and “other.” Table 1-1 shows the different component failure causes (as well as the cause codes and descriptions) included within each cause group, as categorized in the NRC CCF database.^b

Table 1-1. Component failure causes within the five cause groups.

Cause Group	Cause Code	Cause	Description
Component	IC	Internal to component; piece part	A failure results from a failure internal to the component that failed due to reasons other than aging or wear; this applies to erosion/corrosion, equipment fatigue, and internal contamination.
	IQ	Setpoint drift	A failure results from setpoint drift or adjustment.
	IW	Age or wear	A failure results from a failure internal to the component that failed due to aging or wear.
Design	DC	Construction or installation error or inadequacy	A construction or installation error was made during the original or modification installation (e.g., installation of an incorrect component or material, or specifying an incorrect component or material).
	DE	Design error or inadequacy	A design error was made.
	DM	Manufacturing error or inadequacy	A manufacturing error was made when manufacturing the component.
Environment	EA	Ambient environmental stress	A failure results from an environmental condition at the component location; this applies to: <ul style="list-style-type: none"> • Chemical reactions • Electromagnetic interference • Fire/smoke • Impact loads • Acts of nature • Radiation (irradiation) • Temperature (abnormally high or low) • Vibration loads (excluding seismic events).

^b Note that this table represents the current categorizations in the NRC CCF database (accessible by NRC staff and INPO members via <https://rads.inl.gov/Pages/CCF.aspx>) and may slightly differ from the original version in NUREG/CR-6268, Revision 1, published in 2007.

Table 1-1. (continued).

Cause Group	Cause Code	Cause	Description
	EE	Extreme environmental stress	A failure results from an environmental condition that is transitory in nature and places a higher-than-expected load on the equipment.
	IE	Internal environment	A failure results from an internal environment condition; this applies to: <ul style="list-style-type: none"> • Debris • Foreign material • Operating medium chemistry issue.
Human	HA	Accidental human action	A human error incurred when performing an operational activity results in an unintentional or undesired action.
	HM	Inadequate maintenance	A human error incurred when performing a maintenance activity results in an unintentional or undesired action.
	HP	Human action procedure	The correct procedure was not followed; this applies to: <ul style="list-style-type: none"> • Calibration/test staff • Construction/installation/modification staff • Maintenance staff • Operations staff • Other plant staff.
	PA	Inadequate procedure	A failure results from an inadequate procedure; this applies to: <ul style="list-style-type: none"> • Calibration/test procedures • Construction/installation/modification procedures • Maintenance procedures • Operational procedures • Administrative procedures • Other procedures.
Other	EC	State of another component	A failure results from a component state not associated with the component that failed. One example would be that the diesel generator failed due to having no fuel in the fuel storage tanks.
	OT	Other	The failure cause is provided but does not meet any one of these descriptions.
	OK	Unknown	The failure cause is not known.

The causal CCF parameter estimations utilized the same database and CCF templates as the 2020 CCF parameter estimates (INL/EXT-21-62940, Revision 1 [6]), though the failure data were filtered by cause and the 2015 causal CCF prior distributions were used when estimating causal CCF parameters. Furthermore, a normalization process was incorporated into the overall estimation process in order to provide any needed adjustments.

Most of the above NRC and INL CCF reports can be located on the NRC operating experience results website: https://nrcoe.inl.gov/ccf_pe/.

1.2 Alpha Factor Model and Causal Alpha Factor Model

1.2.1 Alpha Factor Model

In the NRC Standardized Plant Analysis Risk (SPAR) models, the AFM is used to calculate CCF event probabilities for redundant components within a system. The parametric AFM was chosen over several other parametric models (e.g., the Beta Model and the Multiple Greek Letter Model) because it (1) is a multi-parameter model that can handle any redundancy level, (2) is based on ratios of failure rates that make assessment of its parameters easier when no statistical data are available, and (3) is a simpler statistical model that produces point estimates and uncertainty distributions that are more accurate than those generated by other parametric models featuring the first two characteristics [2],[3].

The AFM estimates CCF frequencies from a set of ratios of failures and the total component failure rate. For a system of m components, or a common-cause component group (CCCG) of m , the following symbols are used:

Q_t = total failure frequency/probability of each component, due to all independent and common-cause events

α_k = fraction of the total frequency of failure events that occur in the system and involve the failure of k components due to a common cause.

The frequency of a CCF basic event that involves the failure of k components in a system of m components, $Q_k^{(m)}$, is given by NUREG/CR-5485 [2], based on the system testing scheme employed.

- For a staggered testing scheme in which the system components are individually tested at fixed time intervals:

$$Q_k^{(m)} = \binom{m-1}{k-1}^{-1} \cdot \alpha_k \cdot Q_t \quad (1)$$

- For a non-staggered testing scheme in which the system components are tested simultaneously:

$$Q_k^{(m)} = k \binom{m-1}{k-1}^{-1} \cdot \frac{\alpha_k}{\alpha_t} \cdot Q_t \quad (2)$$

where the binomial coefficient is given by $\binom{m-1}{k-1} = \frac{(m-1)!}{(k-1)!(m-k)!}$ and $\alpha_t = \sum_{k=1}^m k \alpha_k$.

The alpha factor can be estimated using the maximum likelihood estimation (MLE), as per:

$$\hat{\alpha}_k = \frac{n_k}{\sum_{j=1}^m n_j} = \frac{n_k}{n_t} \quad (3)$$

where

α_k = The alpha factor that represents the ratio of system failure events that resulted in k components failing within a CCCG size of m ($1 \leq k \leq m$) to the total number of failure events

n_k = The number of failure events that resulted in k components failing within a CCCG size of m ($1 \leq k \leq m$)

$n_t = \sum_{j=1}^m n_j$, the total number of failure events.

The sum of the alpha factors would be equal to one:

$$\sum_{k=1}^m \alpha_k = 1 \quad (4)$$

1.2.2 Causal Alpha Factor Model

While the state of practice is to use the AFM when performing CCF analysis, industry has expressed concerns that the AFM does not explicitly incorporate the failure causes into the model; therefore, using conditional CCF probabilities with the AFM in ECA would include all causes in the CCF probabilities, including causes that did not result in the observed failure(s). To address this issue, NRC investigated new, alternative CCF models, with the CAFM being identified as having the potential to replace the AFM in the NRC ECAs [9],[10].

The CAFM can be viewed as a subset or extension of the AFM. They both begin by determining the failure of k components out of m components within a CCCG. The difference is that, in the CAFM, the alpha parameters are broken into coupling factors (or failure causes, when the failure cause taxonomy is defined such that each cause could only propagate through one coupling factor) that provide additional insights and help in performing ECAs.

The CAFM uses the same equations as the AFM, but calculates a different alpha parameter for each identified failure cause. For example, if three different failure causes have been identified as leading to the failure of multiple redundant components, the alpha parameter (α_k) used in the equations will be replaced with the causal alpha parameter based on each of the failure causes, $\alpha_{k,i}$. In this manner, three causal alpha parameters are calculated using the obtained data.

The MLE for a causal alpha factor can be determined as follows:

$$\hat{\alpha}_{k,i} = \frac{n_{k,i}}{n_{t,i}} \quad (5)$$

where

$\alpha_{k,i}$ = The causal alpha factor that represents the ratio of system failure events that resulted in k components failing due to failure cause i within a CCCG of size m ($1 \leq k \leq m$) to the total number of failure events due to the same failure cause i , where $i \in \{1,2,3,\dots,w\}$

$n_{k,i}$ = The number of failure events that resulted in k components failing within a CCCG of size m ($1 \leq k \leq m$), due to failure cause i , where $i \in \{1,2,3,\dots,w\}$

$n_{t,i}$ = $\sum_{k=1}^m n_{k,i}$, the total number of failure events due to failure cause i , where $i \in \{1,2,3,\dots,w\}$.

The CAFM applies a weighting factor, γ , to each causal alpha parameter. This weighting factor encodes the strength of the correlation among the identified failure causes for the redundant components. The gamma parameter, γ_i , is calculated based on the number of failure events stemming from cause i to the total number of failure events, n_t , stemming from all causes. The gamma parameter is determined via the classical estimation approach:

$$\gamma_i = \frac{n_{t,i}}{n_t} \quad (6)$$

where apparently, $\sum_{i=1}^w \gamma_i = 1$.

The assessed alpha factor, calculated via the equation below, can be incorporated into Eqs. 1 and 2 to calculate the $Q_k^{(m)}$ term in the CAFM:

$$\alpha'_k = \sum_{i \in r} \gamma_i \hat{\alpha}_{k,i} \quad (7)$$

where

- r = causes shared by the components within the CCCG being analyzed, $r \subseteq \{1, 2, 3, \dots, w\}$
- α'_k = assessed alpha factor (this is the system alpha factor that considers all failure causes identified for the components within the CCCG, where $2 \leq k \leq m$).

The assessed alpha factor for independent failure, α'_1 , is calculated as follows:

$$\alpha'_1 = 1 - \sum_{k=2}^m \hat{\alpha}'_k \quad (8)$$

The assessed alpha factors from the CAFM would be equal to their counterparts from the AFM:

$$\alpha'_k = \hat{\alpha}_k \quad (9)$$

1.3 General CCF Parameter Estimation Process

Due to the rarity of CCF event occurrences, two techniques are introduced in [1–3] for facilitating CCF event characterization and CCF parameter estimations: the CCF event impact vector and the mapping of the CCF event impact vector. Furthermore, the Bayesian update process is used to develop uncertainty distributions of CCF parameters. Though details on the above techniques and process are given in [1–3], a brief description is also provided below.

1.3.1 CCF Event Impact Vector

The event impact vector technique is applied at the CCF event characterization stage. Each CCF event is represented by a numerical impact vector. For a component group of size m , the impact vector has $m+1$ elements. The $(k+1)th$ element, denoted by F_k , equals 1 if failure of exactly k components has occurred, and 0 otherwise. If there are no uncertainties existed when classifying an event, the event impact vector should have one—and only one— F_k that equals 1, with all others being equal to zero. For example, when considering a component group of size 3, the following are possible impact vectors:

- $[1, 0, 0, 0]$ or $F_0 = 1$ No components failed.
- $[0, 1, 0, 0]$ or $F_1 = 1$ One—and only one—component failed.
- $[0, 0, 1, 0]$ or $F_2 = 1$ Two components failed due to a shared cause.
- $[0, 0, 0, 1]$ or $F_3 = 1$ All three components failed due to a shared cause.

Since the values of F_0 do not matter in the CCF parameter estimations, the above original event impact vectors are often shortened by removing the first element F_0 (e.g., for a component group of size 3, $[1, 0, 0]$ is annotated when one—and only one—component has failed, and $[0, 0, 1]$ is annotated when all three components have failed).

For many events, assigning the above unit-only impact vectors is impossible due to various sources of uncertainty stemming from the event's own characteristics or the potential lack of critical information in the event descriptions. The following three types of uncertainties are considered in the CCF event characterization process:

- *Component degradation value (or P_Value)*, indicating the extent of each component failure as a probability that the degree of degradation would have led to failure during system operation. This value is 1.0 when the component has completely failed and cannot perform its specific function, 0.5 when it is highly degraded but can nonetheless perform some portion of the safety function, and 0.1 when it is only slightly degraded but the component safety function is impacted.
- *Time delay factor*, measuring how close together in time multiple failures occurred. For example, the time delay factor is 1.0 when the component events are separated by no more than the PRA mission time; 0.5 when they are separated by more than the PRA mission time but less than double the PRA mission time; 0.1 when they are separated by more than double the PRA mission time and less than triple the PRA mission time, and “not CCF” if they are separated by more than triple the PRA mission time.
- *Shared cause factor (or coupling factor strength)*, measuring the uncertainty pertaining to whether multiple failures resulted from the same cause or different causes. This means the analyst must sometimes subjectively assess on the possibility of there being a shared cause. The value is 1.0 when the analyst believes that the multiple failures were due to the same cause, often resulting in the same failure/degradation mechanism and affecting the same piece parts in each of the components; 0.5 when the event description does not directly indicate that the multiple failures resulted from the same cause, involved the same failure mechanism, or affected the same piece parts but there is evidence that the underlying root cause of the multiple failures is the same; and 0.1 when the event description indicates that the multiple failures resulted from different causes, involved different failure mechanisms, or affected different piece parts but there is still some evidence that the underlying root cause of the multiple failures is the same.

Section 7.2 of NUREG/CR-6268, Revision 1 [3] shows how the CCF event degraded states, time delay, and uncertainty regarding the existence of a shared cause would be used in the CCF event impact vector assessment. Below is an example using CCF event 237-1998-0219 (where two battery chargers failed in 1998) for the calculation. The component degradation values are 1 and 0.5 for the two components, respectively. Table 7-1 of [3] shows that for this component group size of two, the elements of the impact vector would be:

$$F_1 = p_1(1 - p_2) + p_2(1 - p_1) = 0.5$$

$$F_2 = p_1p_2 = 0.05$$

The time delay factor of this CCF event, q , is 0.1 and the shared cause factor, c , is 0.5. Using Eq. 7-14 from [3], the average impact vector for this CCF event is assessed to be [1.45, 0.025]:

$$F'_1 = cqF_1 + (1 - cq)p_1 + (1 - cq)p_2 = 1.45$$

$$F'_2 = cqF_2 = 0.025$$

1.3.2 Mapping of the CCF Event Impact Vector

Mapping of the CCF event impact vector, which is the quantitative adjustment step of the impact vector specialization introduced in [1–3], is the technique used in the CCF parameter estimations to modify and apply the original impact vectors from the source plant (or system) to the target plant (or system), reflecting the likelihood of a CCF event that would occur in the plant of interest (i.e., the target plant), as well as its potential degree of impact.

Depending on the sizes of the CCCGs in both the original and the target system, the original impact vectors may be “mapped down” when the component group size in the original system exceeds that in the target system, “mapped up” when the component group size in the original system is smaller than that in the target system, or “kept unchanged” when the component group sizes in the original and target systems are identical. Appendix C of NUREG/CR-5485 [2] provides a basis for how the impact vectors of one

component group size could be interpreted to the impact vectors of a different component group size. Table 7-3 of NUREG/CR-6268, Revision 1 [3] presents the formulae for mapping down CCF event impact vectors. Table 7-4 of [3] presents the formulae for mapping up CCF event impact vectors for nonlethal shocks.^c An example of the CCF event impact vector mapping process is provided below.

CCF event 482-2018-0526, in which three station blackout diesel generators (DGs) failed to load and run back in 2018, carries a component degradation value of 0.5 for all three DGs. Both the time delay factor and the shared cause factor are 1.0. The event impact vector was assessed to be $[F_1^{(3)}, F_2^{(3)}, F_3^{(3)}] = [0.375, 0.375, 0.125]$. During the CCF parameter estimation process, this original impact vector could be mapped up or down to other component group sizes. The mapped-down impact vector for a component group size of two would be:

$$F_1^{(2)} = \frac{2}{3}F_1^{(3)} + \frac{2}{3}F_2^{(3)} = \frac{2}{3} * 0.375 + \frac{2}{3} * 0.375 = 0.5$$

$$F_2^{(2)} = \frac{1}{3}F_2^{(3)} + F_3^{(3)} = \frac{1}{3} * 0.375 + 0.125 = 0.25$$

The mapped-up impact vector for a component group size of four would be:

$$F_1^{(4)} = \frac{4}{3}(1 - \rho)F_1^{(3)}$$

$$F_2^{(4)} = \rho F_1^{(3)} + (1 - \rho)F_2^{(3)}$$

$$F_3^{(4)} = \rho F_2^{(3)} + (1 - \rho)F_3^{(3)}$$

$$F_4^{(4)} = \rho F_3^{(3)}$$

The mapping-up parameter ρ in the above calculations represents the probability that the non-lethal shock or cause would have failed a single component added to the system. Eq. 7-16 of NUREG/CR-6268, Revision 1 [3] presents a method for estimating ρ , which carries a maximum value of 0.85, based on engineering judgement. It also suggests that for a complete CCF event^d with non-lethal shock, 0.5 is a good choice for the mapping-up parameter ρ .

Reference [3] also presents the equations for mapping independent events and lethal shocks. The number of independent events, F_I , will be added to F_1 from the impact vectors as the number of single-component failures in the CCF parameter estimations, as described in the following section.

1.3.3 Estimation of CCF Parameters from Impact Vectors

After the impact vectors for all the events in the CCF database are assessed for the system being analyzed or for the CCF template (a combination of component type and failure mode for specific or pooled systems related to the basic event in a SPAR or PRA model, e.g., ALL-MDP-FS representing all systems' motor-driven pumps [MDPs] failing to start), the number of events in each impact category can be calculated by totaling up the corresponding elements of the adjusted impact vectors from all CCF events.

$$n_k = \sum_{i=1}^Z \bar{F}_k(i) \quad (10)$$

^c Appendix D of INL/EXT-21-43723 presents a general mapping-up formula usable for CCF parameter estimations.

^d A complete CCF event is an event in which all redundant components are failed simultaneously as a direct result of a shared cause (i.e., the component degradation value equals 1.0 for all components, and both the timing and shared cause factors are equal to 1.0).

where

n_k = The total number of failure events that resulted in k components failing within a CCG size of m ($1 \leq k \leq m$) from all Z CCF events

$\bar{F}_k(i)$ = The k^{th} element of the adjusted impact vector for event i , with $i \in \{1, 2, 3, \dots, Z\}$.

Note that for the number of failure events that resulted in a single component failing, the number of independent failures, n_l , should be added to the n_1 value calculated via the above equation.

Eqs. 3 and 5 can then be used to calculate the MLEs of alpha factors and causal alpha factors, respectively. However, the state of practice is to use the Bayesian estimate procedure described in Section 5.4.3 of NUREG/CR-5485 [2] to develop an uncertainty distribution of the CCF parameter, with the n_k values serving as the observation data. A critical element in this procedure is the choice of prior distribution for the CCF parameters. The prior distribution could be based on the analyst's subjective judgement or on the observed ranges of parameter variation. To estimate causal CCF parameters, the present report uses the 2015 causal CCF prior distributions developed in INL/EXT-21-43723 [11].

Using a prior distribution of beta($a_1^{\text{prior}}, b_1^{\text{prior}}$) and the observed n_k values, the posterior distribution parameters can be calculated as follows:

$$a_k^{\text{posterior}} = a_k^{\text{prior}} + n_k \quad \text{for } 2 \leq k \leq m \quad (11)$$

$$b_k^{\text{posterior}} = b_k^{\text{prior}} + n_t - n_k \quad \text{for } 2 \leq k \leq m \quad (12)$$

$$a_1^{\text{posterior}} = a_1^{\text{prior}} + (n_l + n_1) \quad (13)$$

$$b_1^{\text{posterior}} = b_1^{\text{prior}} + n_t - (n_l + n_1) \quad (14)$$

The mean value of the alpha factors (or causal alpha factors) can be determined as:

$$\alpha_{\text{mean}}^{\text{posterior}} = a^{\text{posterior}} / (a^{\text{posterior}} + b^{\text{posterior}}) \quad (15)$$

1.4 Causal CCF Parameter Estimation and Normalization

Causal CCF parameter estimation follows the same general process and calculations discussed in Section 1.2.2. However, an additional normalization process must be introduced to obtain proper estimates for causal CCF parameters. In Section 1.2.1, we mentioned that the estimate of the assessed causal alpha factor from the CAFM would be equal to its counterpart generic alpha factor from the AFM, as can be deduced from the definitions of the associated terms:

$$\widehat{\alpha}_k^{\text{causal}} = \sum_{i \in r} \gamma_i \widehat{\alpha}_{k,i} = \sum_{i \in r} \frac{n_{t,i}}{n_t} * \frac{n_{k,i}}{n_{t,i}} = \sum_{i \in r} \frac{n_{k,i}}{n_t} = \frac{n_k}{n_t} = \widehat{\alpha}_k^{\text{generic}}$$

However, with the Bayesian update process for both causal alpha factors and their associated generic alpha factor, the assessed causal alpha factor would normally no longer be equal to the associated generic alpha factor. A normalization process was thus developed and incorporated into NRC's web-based

This process determines the normalization factor and adjusts the mean value of the causal alpha factors so that the normalized assessed alpha factor would be equal to the mean value of the associated generic alpha factor.

Figure 1-1 presents a portion of Section 2.1.1.1, ALL-MDP-FS, of this report as a preview of the parameter estimate reporting structure for a CCF template. Explanatory notes were added (in red) to the figure to help foster clarity.

1. Figure 1-1(a): The CCF parameter estimate section starts with a block of information for the CCF template and the estimations, which could include the component type, failure mode, plant type, system, date range for the observed failure data, and the CCF prior distributions used in the Bayesian estimate process. The “Default 2015” prior refers to the 2015 generic CCF prior distributions developed in INL/EXT-21-43723 [11], which also implies that the results in this subsection pertain to generic CCF parameters rather than causal CCF parameters. After the first block, a second block shows the total number of independent failure events and the number of CCF events from all causes. Multiple tables then present the alpha factor distribution results for CCCG sizes two through eight.
2. Figure 1-1(b): After the tables for alpha factor comes a table of generic alpha factor mean values, a table of Multiple Greek Letter (MGL) parameter estimates derived from the alpha factor mean values and a table showing the adjusted independent failure event counts (in the row of “Adj. Ind”) and adjusted impact vector results for CCCG sizes two through eight (in the rows “N₁” to “N₈”) for the CCF template. These values, along with the related CCF prior distribution parameters, can be used to manually calculate the alpha factor parameters via Eqs. 11–15, and to verify them against with the RADS-calculated generic alpha factor mean values.
3. Figure 1-1(c): Following the above generic CCF parameter estimates are five subsections for the causal CCF parameter estimates: component, design, environment, human, and “other.” Each subsection starts with the subsection title (e.g., “Component Causal CCF Parameters” indicating that the results in this subsection pertain to the component causal CCF parameter estimates). The value in the “Prior” statement indicates which causal CCF prior distributions developed in INL/EXT-21-43723 [11] are used in the causal CCF parameter estimates for the subsection (e.g., “Prior: Component” refers to the 2015 component causal prior distributions, and the subsection provides the component cause group CCF parameters). The total numbers of independent failure events and that of CCF events due to the specific failure cause group are provided. Following that are multiple tables for causal alpha factor distribution results for the cause group. These causal alpha factors are normalized through the process explained below. The gamma factors and normalization factors are included in the tables.
4. Figure 1-1(d): Similar to the generic CCF parameter subsection, at the end of each causal CCF parameter subsection, the tables of causal alpha factor mean values, derived causal MGL parameter estimates, and adjusted independent failure event counts and adjusted impact vector results for the CCF template are provided. These values, along with the related causal CCF prior distribution parameters, can be used to manually calculate the alpha factor parameters via Eqs. 11–15, and to verify them against with the RADS calculated causal alpha factor mean values.

^e NRC’s web-based RADS is only available to NRC staff and INPO members, due to the proprietary information included in the system.

2.1 Motor-Driven Pumps

⇒ Level 2 Section Number for Component Type

2.1.1 Pooled Motor-Driven Pumps

⇒ Level 3 Section Number for Specific System or All Systems

2.1.1.1 ALL-MDP-FS: All Systems Motor-Driven Pumps Fail to Start

⇒ Level 4 Section Number for CCF Template

Generic CCF Parameters

⇒ Subsection for **Generic** CCF Parameters

Component Group: Pump
 Component Type: Motor Driven Pump
 Component Subtype: Centrifugal
 Failure Mode: Fail to Start

⇒ Details for CCF Template, e.g., Component Type/Subtype, System, Failure Mode

Date Range: 2006 through 2020
 Prior: Default 2015

⇒ Date Range of Observed Data for Bayesian Update

⇒ The priors used for Bayesian Update; "Default 2015" Refers to the 2015 Generic CCF Priors

Total Number of Independent Failure Events: 342.9
 Total Number of Common-Cause Failure Events: 4

⇒ Raw Counts of Independent Failure Events and CCF Events (Not Used in the Calculations)

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9740223	0.9893215	0.9911700	0.9983098	0.9908411	1.686E+02	1.820E+00
α_2	1.69E-03	1.07E-02	8.83E-03	2.60E-02	9.16E-03	1.820E+00	1.686E+02

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9779286	0.9895111	0.9906518	0.9971814	0.9918165	2.766E+02	2.932E+00
α_2	6.66E-04	5.47E-03	4.35E-03	1.41E-02	3.08E-03	1.530E+00	2.780E+02
α_3	5.26E-04	5.02E-03	3.90E-03	1.33E-02	5.10E-03	1.402E+00	2.781E+02

⇒ Posterior Distributions of Alpha Factors for the CCF Template (from CCCG Size of Two to Size of Eight)

(a)

ALPHA FACTOR and MGL PARAMETERS							
Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.90E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01	9.90E-01
α_2	1.07E-02	5.47E-03	5.81E-03	5.35E-03	4.29E-03	3.95E-03	3.47E-03
α_3		5.02E-03	2.99E-03	3.03E-03	2.71E-03	2.49E-03	2.01E-03
α_4			2.06E-03	1.85E-03	1.83E-03	1.85E-03	1.60E-03
α_5				6.39E-04	1.03E-03	1.25E-03	1.27E-03
α_6					3.75E-04	5.59E-04	7.89E-04
α_7						1.18E-04	3.02E-04
α_8							1.33E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.90E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01	9.90E-01
Beta	1.07E-02	1.05E-02	1.09E-02	1.09E-02	1.02E-02	1.02E-02	9.58E-03
Gamma		4.78E-01	4.65E-01	5.08E-01	5.81E-01	6.14E-01	6.37E-01
Delta			4.08E-01	4.52E-01	5.44E-01	6.02E-01	6.71E-01
Epsilon				2.56E-01	4.35E-01	5.09E-01	6.09E-01
Mu					2.66E-01	3.52E-01	4.91E-01
Omega						1.75E-01	3.55E-01
Sigma							3.05E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	144.38	216.57	288.76	360.95	433.14	505.33	577.52
N_1	1.7976	2.0179	2.0357	2.0908	2.0997	2.0674	1.9958
N_2	1.3512	0.6786	0.9821	1.0744	1.1620	1.2624	1.3810
N_3		1.1250	0.7500	0.6458	0.6042	0.5848	0.5779
N_4			0.5625	0.6563	0.6233	0.5628	0.5040
N_5				0.2813	0.4688	0.5414	0.5397
N_6					0.1406	0.3047	0.4223
N_7						0.0703	0.1875
N_8							0.0352

Mean Values of Alpha Factors and Related Multiple Greek Letter (MGL) Parameters

Adjusted Independent Failure Event Counts, Ω_1

Adjusted Impact Vectors, $\Omega_1, \Omega_2, \dots, \Omega_8$

(b)

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Subsection for **Causal** CCF Parameters

The Prior of "Component" refers to the 2015 Component Causal CCF Priors

Total Number of Independent Failure Events: 135.2

Total Number of Common-Cause Failure Events: 0

Raw Counts of Independent Failure Events and CCF Events with "Component" being the Failure Cause

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.386

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9847816	0.9960793	0.9982610	0.9999871	1.228E+02	4.834E-01	--
α_2	1.29E-05	3.92E-03	1.74E-03	1.52E-02	4.834E-01	1.228E+02	0.821

CCCG = 3, Gamma = 0.387

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9885317	0.9958814	0.9969251	0.9996650	2.964E+02	1.226E+00	--
α_2	1.40E-04	2.88E-03	1.98E-03	8.70E-03	9.769E-01	3.378E+02	0.638
α_3	1.97E-08	1.24E-03	2.14E-04	5.99E-03	2.487E-01	2.011E+02	1.074

Normalized Posterior Distributions of Causal Alpha Factors for the CCF Template (from CCCG Size of Two to Size of Eight)

Gamma Factor at the top of each alpha factor table is the weighting factor in the Causal Alpha Factor Model (CAFM) that represents the strength of the correlation among the identified failures causes for the redundant components. It is calculated by dividing the number of failure events due to a specific cause by the total number of failure events from all causes.

Norm. Factor is the normalization factor in the normalization process that adjusts the Bayesian updated causal alpha factors so that the assessed alpha factors from the CAFM would equal to the corresponding generic alpha factor from the Alpha Factor Model.

(c)

ALPHA FACTOR and MGL PARAMETERS							
Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.96E-01	9.95E-01	9.94E-01	9.94E-01	9.94E-01	9.95E-01
α_2	3.92E-03	2.88E-03	3.22E-03	3.34E-03	2.77E-03	2.56E-03	2.10E-03
α_3		1.24E-03	1.25E-03	1.55E-03	1.44E-03	1.52E-03	1.24E-03
α_4			7.05E-04	7.95E-04	8.57E-04	1.01E-03	9.14E-04
α_5				1.93E-04	4.31E-04	5.92E-04	6.50E-04
α_6					2.03E-04	2.57E-04	3.46E-04
α_7						3.86E-05	1.43E-04
α_8							8.38E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.96E-01	9.95E-01	9.94E-01	9.94E-01	9.94E-01	9.95E-01
Beta	3.92E-03	4.12E-03	5.17E-03	5.87E-03	5.70E-03	5.98E-03	5.47E-03
Gamma		3.00E-01	3.78E-01	4.32E-01	5.14E-01	5.71E-01	6.16E-01
Delta			3.61E-01	3.90E-01	5.08E-01	5.56E-01	6.33E-01
Epsilon				1.96E-01	4.25E-01	4.67E-01	5.72E-01
Mu					3.21E-01	3.33E-01	4.68E-01
Omega						1.31E-01	3.96E-01
Sigma							3.70E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	56.93	85.39	113.85	142.32	170.78	199.24	227.71
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_4			0.0000	0.0000	0.0000	0.0000	0.0000
N_5				0.0000	0.0000	0.0000	0.0000
N_6					0.0000	0.0000	0.0000
N_7						0.0000	0.0000
N_8							0.0000

Mean Values of Causal Alpha Factors and Related MGL Parameters

Adjusted Independent Failure Event Counts for Failure Cause i , $\Omega_{I,i}$

Adjusted Impact Vectors for Failure Cause i , $\Omega_{1,i}, \Omega_{2,i}, \dots, \Omega_{8,i}$

(d)

Figure 1-1. Example RADS outputs for causal CCF parameter estimations (with notations in red): (a) CCF template descriptions and subsection for generic alpha factors; (b) MGL parameters and adjusted independent failure counts and impact vectors for generic alpha factor estimations; (c) subsection for causal alpha factors, and (d) MGL parameter and adjusted independent failure counts and impact vectors for causal alpha factor estimations.

Regarding the generic CCF parameter estimation subsection in Figure 1-1 (a) and (b), note that because the NRC failure event and CCF databases that drive the web-based RADS application are “live,” meaning that the failure event and CCF identification/characterization are continuous, as are the inputs from the Institute of Nuclear Power Operation (INPO) Industry Reporting and Information System (IRIS), data pertaining to the same CCF template and date range may slightly differ when comparing this report to INL/EXT-21-62940, Revision 1 [6]. For example, for ALL-MDP-FS, this report shows 342.9 independent failure events and an adjusted 216.57 independent failure events for a CCCG size of three, whereas Reference [6] shows 339.9 independent failure events and an adjusted 214.57 independent failure events for a CCCG size of three. This would lead to minute changes in the CCF parameter estimates (e.g., 1.07E-2 vs. 1.08E-2 for the mean value of α_2 in a CCCG size of two, and 5.02E-3 vs. 5.05E-3 for the mean value of α_3 in a CCCG size of three).

Now let us examine the normalization process conducted as part of the causal alpha factor estimation, using ALL-MDP-FS and a CCCG size of three as an example. The process consists of the following steps:

- **Step 1:** Obtain the adjusted independent failure event counts and impact vectors from the AFM and each cause group of CAFM. Table 1-2 shows the results for ALL-MDP-FS and a CCCG size of three. The first two rows, “Total Ind.” and “Total CCF,” are not used in the calculation, but rather to confirm that the total number of independent failure events and CCF events in the CAFM is identical to that in the AFM.
- **Step 2:** Confirm that the alpha factor MLE from the AFM would equal its associated assessed alpha factor from the CAFM.
 - **Step 2.1:** For the AFM, calculate the number of total failure events, n_t , and the alpha factor MLE, $\hat{\alpha}_k$, by using Eq. 3.
 - **Step 2.2:** For the CAFM, calculate the number of total failure events, $n_{t,i}$, and the causal alpha factor MLE, $\hat{\alpha}_{k,i}$, for each cause group by using Eq. 5.
 - **Step 2.3:** Calculate the gamma factor, γ_i , by using Eq. 6.
 - **Step 2.4:** Calculate the assessed alpha factor by using Eq. 7. (See Table 1-2 for the calculation results, which show that $\alpha'_k = \hat{\alpha}_k$, $1 \leq k \leq m$.)

Table 1-2. Alpha factor classical estimators for ALL-MDP-FS and a CCCG size of 3.

ALL-MDP-FS CCCG = 3	AFM	CAFM					
		Component	Design	Environment	Human	Other	Total
Total Ind.	342.9	135.2	63	8.5	87.2	49	342.90
Total CCF	4	0	2	0	1	1	4.00
Adj. Ind. (or n_i)	216.570	85.390	39.790	5.370	55.070	30.950	216.570
$N1$ (or n_1)	2.018	0.000	1.375	0.000	0.000	0.643	2.018
$N2$ (or n_2)	0.679	0.000	0.625	0.000	0.000	0.054	0.679
$N3$ (or n_3)	1.125	0.000	0.125	0.000	1.000	0.000	1.125
n_i or $n_{t,i}$	220.392	85.390	41.915	5.370	56.070	31.647	220.392
$\hat{\alpha}_1$ or $\hat{\alpha}_{1,i}$ $= \frac{n_1 + n_1}{n_t}$	9.92E-01	1.00E+00	9.82E-01	1.00E+00	9.82E-01	9.98E-01	—
$\hat{\alpha}_2$ or $\hat{\alpha}_{2,i} = \frac{n_2}{n_t}$	3.08E-03	0.00E+00	1.49E-02	0.00E+00	0.00E+00	1.69E-03	—

ALL-MDP-FS CCCG = 3	AFM	CAFM					
		Component	Design	Environment	Human	Other	Total
$\hat{\alpha}_3$ or $\hat{\alpha}_{3,i} = \frac{n_3}{n_t}$	5.10E-03	0.00E+00	2.98E-03	0.00E+00	1.78E-02	0.00E+00	—
$\gamma_i = \frac{n_{t,i}}{n_t}$	—	0.3874	0.1902	0.0244	0.2544	0.1436	1.00
Assessed $\alpha'_2 = \sum \gamma_i \hat{\alpha}_{2,i}$	—	—	—	—	—	—	3.08E-03
Assessed $\alpha'_3 = \sum \gamma_i \hat{\alpha}_{3,i}$	—	—	—	—	—	—	5.10E-03
Assessed $\alpha'_1 = 1 - \alpha'_2 - \alpha'_3$	—	—	—	—	—	—	9.92E-01

- **Step 3:** Develop uncertainty distributions for alpha factors and causal alpha factors, using the Bayesian estimate procedure.
 - **Step 3.1:** Obtain the 2015 generic CCF prior distributions and the 2015 causal CCF prior distributions developed in INL/EXT-21-43723 [11]. Section 3 of this report also includes a copy of these prior distributions. Using a CCCG size of three as an example, Table 1-3 shows the beta distribution parameters beta(a₁, b₁) for α₁, beta(a₂, b₂) for α₂, and beta(a₃, b₃) for α₃ from the 2015 generic and causal prior distributions.
 - **Step 3.2:** Calculate posterior distribution parameters with the adjusted independent failure event counts and impact vectors in **Step 1** and the prior distribution parameters in **Step 3.1**, using Eqs. 11–14. Table 1-4 shows the posterior distribution parameters for ALL-MDP-FS, CCCG = 3 calculated from the observed failure event data in Table 1-2 and prior parameters in Table 1-3.
 - **Step 3.3:** Calculate the mean values of the alpha factors and causal alpha factors by using Eq. 15. Table 1-5 shows the calculation results for ALL-MDP-FS, CCCG = 3.

Table 1-3. 2015 CCF prior distribution parameters for CCCG = 3.

Priors	CCF Prior Distribution Parameters					
	a_1^{prior}	b_1^{prior}	a_2^{prior}	b_2^{prior}	a_3^{prior}	b_3^{prior}
2015 Generic	58.00	1.13	0.85	58.30	0.28	58.80
2015 Component	129.70	1.23	0.98	129.90	0.25	130.60
2015 Design	34.57	1.18	0.94	34.81	0.24	35.51
2015 Environment	12.60	0.96	0.67	12.89	0.29	13.27
2015 Human	61.26	1.10	0.81	61.55	0.29	62.07
2015 Other	246.90	1.06	0.71	247.30	0.35	247.60

Table 1-4. Posterior distribution parameters for ALL-MDP-FS, CCCG = 3.

Generic or Causal	CCF Posterior Distribution Parameters					
	$a_1^{posterior}$	$b_1^{posterior}$	$a_2^{posterior}$	$b_2^{posterior}$	$a_3^{posterior}$	$b_3^{posterior}$
Generic	276.59	2.93	1.53	278.01	1.40	278.07
Component	215.09	1.23	0.98	215.29	0.25	215.99
Design	75.74	1.93	1.56	76.10	0.36	77.30
Environment	17.97	0.96	0.67	18.26	0.29	18.64

Generic or Causal	CCF Posterior Distribution Parameters					
	$a_1^{posterior}$	$b_1^{posterior}$	$a_2^{posterior}$	$b_2^{posterior}$	$a_3^{posterior}$	$b_3^{posterior}$
Human	116.33	2.10	0.81	117.62	1.29	117.14
Other	278.49	1.11	0.77	278.89	0.35	279.25

Table 1-5. Preliminary mean values of alpha factors and causal alpha factors.

Generic or Causal	Mean Values		
	α_1	α_2	α_3
Generic	9.90E-01	5.47E-03	5.02E-03
Component	9.94E-01	4.52E-03	1.15E-03
Design	9.75E-01	2.01E-02	4.69E-03
Environment	9.49E-01	3.53E-02	1.55E-02
Human	9.82E-01	6.84E-03	1.09E-02
Other	9.96E-01	2.74E-03	1.24E-03

- **Step 4:** Calculate the normalization factor for each alpha factor of the CCCG, other than α_1 .
 - **Step 4.1:** Calculate the assessed alpha factors by applying the gamma factors in **Step 2.3** (Table 1-2) and the preliminary mean values of causal alpha factors in **Step 3.3** (Table 1-5). For example:

$$\alpha'_2 = \sum_{i \in r} \gamma_i \alpha_{2,i} = 0.3874 * 4.52E-3 + 0.1902 * 2.01E-2 + 0.0244 * 3.53E-2 + 0.2544 * 6.84E-3 + 0.1436 * 2.74E-3 = 8.57E-3$$

$$\alpha'_3 = \sum_{i \in r} \gamma_i \alpha_{3,i} = 4.67E-3$$

- **Step 4.2:** Calculate the normalization factor, NF_k , by dividing the generic alpha factor by the associated assessed alpha factor.

$$NF_2 = \frac{\alpha_2}{\alpha'_2} = \frac{5.47E-3}{8.57E-3} = 0.638$$

$$NF_3 = \frac{\alpha_3}{\alpha'_3} = \frac{5.02E-3}{4.67E-3} = 1.08$$

- **Step 5:** Calculate the normalized causal alpha factors and the distribution parameters.
 - **Step 5.1:** Calculate the normalized causal alpha factor mean values by multiplying the preliminary causal alpha factors (in Step 3.3 and Table 1-5) by the normalization factor, NF_k , $2 \leq k \leq m$. The adjusted α_1 would be determined by $1 - \sum_{k=2}^m \alpha_k$. Table 1-6 shows the normalized causal alpha factors for ALL-MDP-FS, CCCG = 3. The last column of the table shows the assessed alpha factors with the normalized causal alpha factors. These assessed alpha factors are equal to the associated generic alpha factors given in Table 1-5.

Table 1-6. Normalized mean values of causal alpha factors for ALL-MDP-FS, CCCG = 3.

	Causal Alpha Factor Mean Value					Assessed Alpha Factor
	Component	Design	Environment	Human	Other	
Adjusted α_1	9.96E-01	9.82E-01	9.61E-01	9.84E-01	9.97E-01	9.90E-01

Normalized α_2	2.88E-03	1.28E-02	2.25E-02	4.37E-03	1.75E-03	5.47E-03
Normalized α_3	1.24E-03	5.05E-03	1.66E-02	1.17E-02	1.33E-03	5.02E-03

- **Step 5.2:** Update the causal alpha factor uncertainty distribution parameters with the normalized mean values in Step 5.1 (Table 1-6).

For $2 \leq k \leq m$, the $a_{k,i}$ parameters in the $beta(a_{k,i}, b_{k,i})$ distribution remain the same as those in Step 3.2 (Table 1-4). The $b_{k,i}$ parameter can then be determined via the following equation:

$$b_{k,i}^{norm} = \left(\frac{1 - \alpha_k^{norm}}{\alpha_k^{norm}} \right) a_{k,i} \quad (16)$$

For $k=1$, the $b_{k,i}$ parameters in the $beta(a_{k,i}, b_{k,i})$ distribution remain unchanged from those in Step 3.2 (Table 1-4). The $a_{k,i}$ parameter can then be determined via the following equation:

$$a_{1,i}^{norm} = \left(\frac{\alpha_1^{norm}}{1 - \alpha_1^{norm}} \right) b_{1,i} \quad (17)$$

Table 1-7 displays the updated causal alpha factor uncertainty distribution parameters, which are consistent with the RADS-calculated parameters in Section 2.1.1.1 of this report (minor differences exist due to rounding issue in the calculations).

Table 1-7. Updated causal alpha factor distribution parameters for ALL-MDP-FS, CCCG = 3.

Cause	Causal Alpha Factor Distribution Parameters after Normalization					
	a_1^{norm}	b_1	a_2	b_2^{norm}	a_3	b_3^{norm}
Component	296.43	1.23	0.98	337.98	0.25	200.84
Design	105.82	1.93	1.56	120.16	0.36	71.86
Environment	23.58	0.96	0.67	29.00	0.29	17.31
Human	128.54	2.10	0.81	184.81	1.29	108.84
Other	360.38	1.11	0.77	437.55	0.35	259.66

1.5 Summary Notes

The following is a list summarizing the notes, observations, and thoughts derived from this study:

1. This report developed causal CCF parameter estimations for five failure cause groups (i.e., component, design, environment, human, and “other”), using the NRC CCF database and software in RADS (<https://rads.inl.gov/Pages/CCF.aspx>). The results were obtained to support the CAFM and should be used as appropriate in PRA applications such as the NRC SDP.
2. This report utilized the same data period (2006–2020) and same CCF templates as in INL/EXT-21-62940, Revision 1 [6], although for the causal CCF parameter estimates, this study used the 2015 causal CCF prior distributions rather than the 2015 generic ones. All the 2015 causal and generic CCF prior distributions were developed in INL/EXT-21-43723 [11], using 1997–2015 data. Section 3.1.3 of this report shows the 2015 generic CCF priors and the five causal CCF priors.
3. The CAFM is a natural extension of the AFM. The base SPAR models may legitimately continue to use the generic alpha factors, which are also included in this report. However, for SDP risk assessments, the CAFM may be more appropriate as it tends to reduce uncertainties by focusing on specific failure causes resulting directly from licensee performance deficiencies [7].

4. Each CCF template parameter estimate subsection in Section 2 would begin with general information on the template and the generic CCF parameter estimation results, followed by the causal CCF parameter estimation results for the component, design, environment, human, and “other” failure cause groups. The generic CCF parameter estimation results should mostly be the same as those in the 2020 CCF parameter estimates (INL/EXT-21-62940, Revision 1 [6]), though minute differences may exist for some CCF templates, due to the “live” CCF database in which the failure event and CCF identification and characterization undergo continuous development, as is also the case for the INPO IRIS database.
5. Sections 1.3 and 1.4 of this paper provide high-level description of the general process and techniques used in the CCF parameter estimation, along with examples of the CCF event impact vectors, the mapping of thereof, and the Bayesian estimation process. A detailed description of the normalization process used in the causal CCF parameter estimation is also included, with the CCF template ALL-MDP-FS and a CCCG size of three serving as an example for confirming the RADS output results.
6. Due to the rarity of CCF event occurrences, the prior distributions used in the CCF parameter estimation would strongly influence the estimation results. As described in NUREG/CR-5485 [2] and INL/EXT-21-65527 [13], CCF prior distributions can either be based on analysts’ subjective judgement or on the observed data. When using observed data gleaned from industry operating experience, they can be either generic and pertain to all the available data, or can correspond to smaller data pools based on characteristics such as failure cause or component type. Non-generic CCF priors such as the causal CCF priors developed in INL/EXT-21-43723 [11] or the component-specific CCF priors developed in INL/EXT-21-65527 could better represent the associated pool-specific CCF characteristics and reduce the uncertainty caused by pool-to-pool variability.
7. Tables 1-8 to 1-12 compare the five 2015 causal CCF priors (component, design, environment, human, and “other”) to the 2015 generic CCF priors for CCCG sizes two through four, respectively.
 - a. The mean values of the common-cause alpha factors (e.g., α_2 in the CCCG size of two; α_2 and α_3 in the CCCG size of three) in the 2015 **component** causal CCF priors are about **50% lower** than the corresponding alpha factors in the 2015 generic CCF priors.
 - b. The mean values of the common-cause alpha factors in the 2015 **design** causal CCF priors are about **40%–80% higher** than the corresponding alpha factors in the 2015 generic CCF priors.
 - c. The mean values of the common-cause alpha factors in the 2015 **environment** causal CCF priors are about **2–3 times higher** than the corresponding alpha factors in the 2015 generic CCF priors.
 - d. The mean values of the common-cause alpha factors in the 2015 **human** causal CCF priors are about **25% or less lower** than the corresponding alpha factors in the 2015 generic CCF priors.
 - e. The mean values of the common-cause alpha factors in the 2015 **other** causal CCF priors are about **80% lower** than the corresponding alpha factors in the 2015 generic CCF priors.

Table 1-8. Comparison of the 2015 generic and the 2015 component causal CCF priors.

CCCG	Alpha Factor	2015 Generic Priors			2015 Component Priors			
		Mean	a	b	Mean	a	b	Δ (Mean) %
2	α_1	9.80E-01	2.24E+01	4.69E-01	9.89E-01	4.38E+01	4.83E-01	1.0%
	α_2	2.05E-02	4.69E-01	2.24E+01	1.09E-02	4.83E-01	4.38E+01	-46.8%
3	α_1	9.81E-01	5.80E+01	1.13E+00	9.91E-01	1.30E+02	1.23E+00	1.0%
	α_2	1.44E-02	8.51E-01	5.83E+01	7.46E-03	9.77E-01	1.30E+02	-48.2%
	α_3	4.68E-03	2.77E-01	5.88E+01	1.90E-03	2.49E-01	1.31E+02	-59.4%

CCCG	Alpha Factor	2015 Generic Priors			2015 Component Priors			
		Mean	a	b	Mean	a	b	Δ (Mean) %
4	α_1	9.80E-01	9.07E+01	1.89E+00	9.89E-01	1.82E+02	2.06E+00	0.9%
	α_2	1.36E-02	1.26E+00	9.13E+01	7.84E-03	1.44E+00	1.83E+02	-42.4%
	α_3	4.35E-03	4.02E-01	9.22E+01	2.24E-03	4.11E-01	1.84E+02	-48.5%
	α_4	2.50E-03	2.31E-01	9.23E+01	1.11E-03	2.04E-01	1.84E+02	-55.6%

Table 1-9. Comparison of the 2015 generic and the 2015 design causal CCF priors.

CCCG	Alpha Factor	2015 Generic Priors			2015 Design Priors			
		Mean	a	b	Mean	a	b	Δ (Mean) %
2	α_1	9.80E-01	2.24E+01	4.69E-01	9.68E-01	1.37E+01	4.50E-01	-1.2%
	α_2	2.05E-02	4.69E-01	2.24E+01	3.19E-02	4.50E-01	1.37E+01	55.8%
3	α_1	9.81E-01	5.80E+01	1.13E+00	9.67E-01	3.46E+01	1.18E+00	-1.4%
	α_2	1.44E-02	8.51E-01	5.83E+01	2.63E-02	9.39E-01	3.48E+01	82.6%
	α_3	4.68E-03	2.77E-01	5.88E+01	6.70E-03	2.40E-01	3.55E+01	43.1%
4	α_1	9.80E-01	9.07E+01	1.89E+00	9.64E-01	5.03E+01	1.90E+00	-1.6%
	α_2	1.36E-02	1.26E+00	9.13E+01	2.46E-02	1.29E+00	5.09E+01	80.8%
	α_3	4.35E-03	4.02E-01	9.22E+01	7.52E-03	3.93E-01	5.18E+01	73.0%
	α_4	2.50E-03	2.31E-01	9.23E+01	4.23E-03	2.21E-01	5.20E+01	69.2%

Table 1-10. Comparison of the 2015 generic and the 2015 environment causal CCF priors.

CCCG	Alpha Factor	2015 Generic Priors			2015 Environment Priors			
		Mean	a	b	Mean	a	b	Δ (Mean) %
2	α_1	9.80E-01	2.24E+01	4.69E-01	9.30E-01	5.04E+00	3.80E-01	-5.1%
	α_2	2.05E-02	4.69E-01	2.24E+01	7.01E-02	3.80E-01	5.04E+00	242.3%
3	α_1	9.81E-01	5.80E+01	1.13E+00	9.29E-01	1.26E+01	9.60E-01	-5.3%
	α_2	1.44E-02	8.51E-01	5.83E+01	4.92E-02	6.67E-01	1.29E+01	241.6%
	α_3	4.68E-03	2.77E-01	5.88E+01	2.16E-02	2.93E-01	1.33E+01	361.2%
4	α_1	9.80E-01	9.07E+01	1.89E+00	9.26E-01	2.10E+01	1.67E+00	-5.4%
	α_2	1.36E-02	1.26E+00	9.13E+01	4.58E-02	1.04E+00	2.17E+01	236.6%
	α_3	4.35E-03	4.02E-01	9.22E+01	1.71E-02	3.89E-01	2.23E+01	293.3%
	α_4	2.50E-03	2.31E-01	9.23E+01	1.06E-02	2.41E-01	2.25E+01	323.9%

Table 1-11. Comparison of the 2015 generic and the 2015 human causal CCF priors.

CCCG	Alpha Factor	2015 Generic Priors			2015 Human Priors			
		Mean	a	b	Mean	a	b	Δ (Mean) %
2	α_1	9.80E-01	2.24E+01	4.69E-01	9.81E-01	2.41E+01	4.71E-01	0.1%
	α_2	2.05E-02	4.69E-01	2.24E+01	1.92E-02	4.71E-01	2.41E+01	-6.2%
3	α_1	9.81E-01	5.80E+01	1.13E+00	9.82E-01	6.13E+01	1.10E+00	0.1%
	α_2	1.44E-02	8.51E-01	5.83E+01	1.30E-02	8.10E-01	6.16E+01	-9.7%
	α_3	4.68E-03	2.77E-01	5.88E+01	4.68E-03	2.92E-01	6.21E+01	-0.1%

CCCG	Alpha Factor	2015 Generic Priors			2015 Human Priors			
		Mean	a	b	Mean	a	b	Δ (Mean) %
4	α_1	9.80E-01	9.07E+01	1.89E+00	9.83E-01	1.13E+02	1.95E+00	0.3%
	α_2	1.36E-02	1.26E+00	9.13E+01	1.15E-02	1.31E+00	1.13E+02	-15.5%
	α_3	4.35E-03	4.02E-01	9.22E+01	3.76E-03	4.31E-01	1.14E+02	-13.5%
	α_4	2.50E-03	2.31E-01	9.23E+01	1.83E-03	2.10E-01	1.14E+02	-26.8%

Table 1-12. Comparison of the 2015 generic and the 2015 “other” causal CCF priors.

CCCG	Alpha Factor	2015 Generic Priors			2015 Other Priors			
		Mean	a	b	Mean	a	b	Δ (Mean) %
2	α_1	9.80E-01	2.24E+01	4.69E-01	9.95E-01	1.09E+02	4.93E-01	1.6%
	α_2	2.05E-02	4.69E-01	2.24E+01	4.53E-03	4.93E-01	1.09E+02	-77.9%
3	α_1	9.81E-01	5.80E+01	1.13E+00	9.96E-01	2.47E+02	1.06E+00	1.5%
	α_2	1.44E-02	8.51E-01	5.83E+01	2.88E-03	7.14E-01	2.47E+02	-80.0%
	α_3	4.68E-03	2.77E-01	5.88E+01	1.39E-03	3.46E-01	2.48E+02	-70.3%
4	α_1	9.80E-01	9.07E+01	1.89E+00	9.96E-01	4.83E+02	2.12E+00	1.6%
	α_2	1.36E-02	1.26E+00	9.13E+01	3.20E-03	1.55E+00	4.83E+02	-76.5%
	α_3	4.35E-03	4.02E-01	9.22E+01	5.46E-04	2.65E-01	4.85E+02	-87.4%
	α_4	2.50E-03	2.31E-01	9.23E+01	6.21E-04	3.01E-01	4.85E+02	-75.2%

8. Table 1-13 compares the 2015 generic and 2015 causal alpha factor mean values of α_2 in the CCCG size of two for the CCF templates in this report. It shows that both the priors and the observed data (i.e., the adjusted independent failure events and adjusted impact vectors associated with the CCF template) would affect the differences between the generic and causal alpha factors.
- The mean value of α_2 for the CCCG size of two in the 2015 **component** causal CCF priors is nearly **50% lower** than the value in the 2015 generic CCF priors. The mean values of the causal alpha factors for the CCF templates in this report could range from approximately **90% lower to 20% higher** than those of the generic alpha factors for the same CCF template.
 - The mean value of α_2 for the CCCG size of two in the 2015 **design** causal CCF priors is nearly **60% higher** than the value in the 2015 generic CCF priors. The mean values of the causal alpha factors for the CCF templates in this report could range from approximately **90% lower to 230% higher** than those of the generic alpha factors for the same CCF template.
 - The mean value of α_2 for the CCCG size of two in the 2015 **environment** causal CCF priors is nearly **250% higher** than the value in the 2015 generic CCF priors. The mean values of the causal alpha factors for the CCF templates in this report could range from approximately **0% to 1500% higher** than those of the generic alpha factors for the same CCF template.
 - The mean value of α_2 for the CCCG size of two in the 2015 **human** causal CCF priors is about **5% lower** than the value in the 2015 generic CCF priors. The mean values of the causal alpha factors for the CCF templates in this report could range from approximately **90% lower to 100% higher** than those of the generic alpha factors for the same CCF template.
 - The mean value of α_2 for the CCCG size of two in the 2015 **other** causal CCF priors is nearly **80% lower** than the value in the 2015 generic CCF priors. The mean values of the causal alpha factors for the CCF templates in this report could range from approximately **0% to 100% lower** than those of the generic alpha factors for the same CCF template.

9. A common question when comparing causal alpha factor values against the associated generic alpha factor values is how an individual causal alpha factor could exceed its associated generic alpha factor. Using ALL-MDP-FS (Table 1-13) as an example, three of the causal alpha factors (design 1.52E-2, environment 3.47E-2, and human 1.94E-2) are higher than the generic alpha factor 1.07E-2. A quick answer to the above question is that alpha factors are estimated as the ratio of the number of CCF events to the total number of failure events. When the number of CCF events is split into several different causal groups, the number of total events becomes split as well. Thus, we would have:

$$\frac{n_{CCF,1} + n_{CCF,2} + n_{CCF,3} + n_{CCF,4} + n_{CCF,5}}{n_{t,1} + n_{t,2} + n_{t,3} + n_{t,4} + n_{t,5}} \neq \frac{n_{CCF,1}}{n_{t,1}} + \frac{n_{CCF,2}}{n_{t,2}} + \frac{n_{CCF,3}}{n_{t,3}} + \frac{n_{CCF,4}}{n_{t,4}} + \frac{n_{CCF,5}}{n_{t,5}}$$

$$\sum_{i=1}^5 \hat{\alpha}_{2,i} \neq \hat{\alpha}_2$$

and rather

$$\sum_{i=1}^5 \hat{\alpha}_{2,i} * \gamma_i = \hat{\alpha}_2$$

in which the γ factor is introduced to the CAFM so the causal alpha factors can be related to the generic alpha factor:

$$\gamma_i = \frac{n_{t,i}}{n_t}$$

Table 1-13. Comparison of the 2015 generic and 2015 causal alpha factor mean values of α_2 in the CCCG size of two.

Section	CCF Template	Generic Mean	Component Causal Mean		Design Causal Mean		Environment Causal Mean		Human Causal Mean		Other Causal Mean	
		α_2 (CCCG=2)	α_2 (CCCG=2)	Δ %	α_2 (CCCG=2)	Δ %	α_2 (CCCG=2)	Δ %	α_2 (CCCG=2)	Δ %	α_2 (CCCG=2)	Δ %
2.1.1.1	ALL-MDP-FS	1.07E-02	3.92E-03	-63%	1.52E-02	42%	3.47E-02	224%	1.94E-02	81%	3.23E-03	-70%
2.1.1.2	ALL-MDP-FH	8.46E-03	5.23E-03	-38%	1.23E-02	45%	1.89E-02	123%	6.70E-03	-21%	2.24E-03	-74%
2.1.1.3	ALL-MDP-FHRH	1.61E-02	6.95E-03	-57%	2.15E-02	34%	6.65E-02	313%	8.23E-03	-49%	3.34E-03	-79%
2.1.1.4	ALL-MDP-RH	1.95E-02	7.90E-03	-59%	2.60E-02	33%	9.05E-02	364%	1.02E-02	-48%	3.75E-03	-81%
2.1.1.5	ALL-MDP-FR-NR	2.24E-02	6.67E-03	-70%	2.18E-02	-3%	1.10E-01	391%	9.21E-03	-59%	5.10E-03	-77%
2.1.1.6	ALL-MDP-FS-NS	1.36E-02	4.98E-03	-63%	1.92E-02	41%	3.72E-02	174%	2.47E-02	82%	3.59E-03	-74%
2.1.1.7	ALL-MDP-FS-NR	4.38E-03	3.07E-03	-30%	8.28E-03	89%	7.01E-02	1500%	5.22E-03	19%	2.13E-03	-51%
2.1.2.1	ALL-PMP-FR	6.29E-03	4.33E-03	-31%	1.28E-02	103%	1.82E-02	189%	4.87E-03	-23%	2.16E-03	-66%
2.1.3.1	CLN-MDP-FS	1.27E-02	4.81E-03	-62%	1.76E-02	39%	4.66E-02	267%	2.30E-02	81%	3.47E-03	-73%
2.1.3.2	CLN-MDP-FH	1.23E-02	7.61E-03	-38%	2.17E-02	76%	3.73E-02	203%	1.16E-02	-6%	3.15E-03	-74%
2.1.3.3	CLN-MDP-FHRH	1.17E-02	7.51E-03	-36%	2.96E-02	153%	4.29E-02	267%	9.02E-03	-23%	3.40E-03	-71%
2.1.3.4	CLN-MDP-RH	1.46E-02	9.41E-03	-36%	3.75E-02	157%	6.72E-02	360%	1.21E-02	-17%	4.28E-03	-71%
2.1.3.5	CLN-MDP-FR-NR	1.26E-02	6.57E-03	-48%	3.02E-02	140%	4.06E-02	222%	1.01E-02	-20%	3.40E-03	-73%
2.1.3.6	CLN-MDP-FS-NR	6.17E-03	4.32E-03	-30%	1.32E-02	114%	7.01E-02	1036%	7.38E-03	20%	2.66E-03	-57%
2.1.3.7	CLN-MDP-FS-NS	1.63E-02	6.23E-03	-62%	2.15E-02	32%	5.05E-02	210%	2.94E-02	80%	3.86E-03	-76%
2.1.4.1	CSS-MDP-FS	1.17E-02	7.69E-03	-34%	2.15E-02	84%	7.01E-02	499%	1.39E-02	19%	3.77E-03	-68%
2.1.4.2	CSS-MDP-FH	1.81E-02	7.79E-03	-57%	3.19E-02	76%	4.32E-02	139%	1.92E-02	6%	3.28E-03	-82%
2.1.4.3	CSS-MDP-FHRH	1.68E-02	8.17E-03	-51%	3.19E-02	90%	4.53E-02	170%	1.36E-02	-19%	3.43E-03	-80%
2.1.4.4	CSS-MDP-RH	1.88E-02	1.09E-02	-42%	3.19E-02	70%	7.01E-02	273%	1.88E-02	0%	4.53E-03	-76%
2.1.5.1	BWR-RHR-MDP-FS	2.03E-02	1.25E-02	-38%	5.51E-02	171%	7.01E-02	245%	1.99E-02	-2%	5.55E-03	-73%
2.1.5.2	BWR-RHR-MDP-FH	1.88E-02	1.09E-02	-42%	3.19E-02	70%	7.01E-02	273%	3.03E-02	61%	7.38E-03	-61%
2.1.5.3	BWR-RHR-MDP-FHRH	1.49E-02	1.11E-02	-26%	3.20E-02	115%	7.28E-02	389%	1.70E-02	14%	4.67E-03	-69%
2.1.5.4	BWR-RHR-MDP-RH	1.55E-02	1.09E-02	-30%	3.14E-02	103%	7.14E-02	361%	1.70E-02	10%	4.61E-03	-70%
2.1.6.1	AFW-MDP-FS	3.65E-02	1.32E-02	-64%	3.44E-02	-6%	8.33E-02	128%	6.42E-02	76%	5.90E-03	-84%
2.1.6.2	AFW-MDP-FH	1.81E-02	6.56E-03	-64%	3.19E-02	76%	3.64E-02	101%	1.13E-02	-38%	4.53E-03	-75%
2.1.6.3	AFW-MDP-FHRH	1.57E-02	8.38E-03	-47%	3.19E-02	103%	4.70E-02	199%	1.33E-02	-15%	3.56E-03	-77%
2.1.6.4	AFW-MDP-RH	1.74E-02	1.41E-02	-19%	3.19E-02	83%	7.01E-02	303%	2.27E-02	30%	5.86E-03	-66%
2.1.7.1	AFW-PMP-FR	1.45E-02	1.09E-02	-25%	3.19E-02	120%	3.43E-02	137%	1.01E-02	-30%	3.00E-03	-79%

Section	CCF Template	Generic Mean	Component Causal Mean		Design Causal Mean		Environment Causal Mean		Human Causal Mean		Other Causal Mean	
		α^2 (CCCG=2)	α^2 (CCCG=2)	Δ %	α^2 (CCCG=2)	Δ %	α^2 (CCCG=2)	Δ %	α^2 (CCCG=2)	Δ %	α^2 (CCCG=2)	Δ %
2.1.8.1	SWN-MDP-FS	9.57E-03	6.67E-03	-30%	1.54E-02	61%	7.01E-02	632%	1.07E-02	12%	3.15E-03	-67%
2.1.8.2	SWN-MDP-FR	3.21E-02	7.88E-03	-75%	1.55E-02	-52%	1.24E-01	286%	1.20E-02	-63%	3.69E-03	-89%
2.1.8.3	SSW-MDP-FS	9.40E-03	5.42E-03	-42%	1.60E-02	70%	3.40E-02	262%	9.21E-03	-2%	2.89E-03	-69%
2.1.8.4	SSW-MDP-FR	2.03E-02	7.45E-03	-63%	1.61E-02	-21%	7.39E-02	264%	1.05E-02	-48%	3.36E-03	-83%
2.1.8.5	SWS-MDP-FS	8.22E-03	4.87E-03	-41%	1.36E-02	65%	3.20E-02	289%	8.08E-03	-2%	2.69E-03	-67%
2.1.8.6	SWS-MDP-FR	2.70E-02	7.19E-03	-73%	1.22E-02	-55%	1.18E-01	337%	9.39E-03	-65%	3.57E-03	-87%
2.1.9.1	HPI-MDP-FS	7.21E-03	5.34E-03	-26%	1.20E-02	66%	7.01E-02	872%	9.59E-03	33%	2.74E-03	-62%
2.1.9.2	HPI-MDP-FH	1.88E-02	1.09E-02	-42%	2.33E-02	24%	7.01E-02	273%	1.44E-02	-23%	4.53E-03	-76%
2.1.9.2	HPI-MDP-FHRH	1.72E-02	8.44E-03	-51%	2.76E-02	60%	4.75E-02	176%	1.22E-02	-29%	3.52E-03	-80%
2.1.9.4	HPI-MDP-RH	1.81E-02	8.73E-03	-52%	3.00E-02	66%	4.91E-02	171%	1.30E-02	-28%	3.64E-03	-80%
2.1.10.1	PWR-RHR-MDP-FS	1.21E-02	6.92E-03	-43%	1.78E-02	47%	3.47E-02	187%	1.16E-02	-4%	2.93E-03	-76%
2.1.10.2	PWR-RHR-MDP-FH	1.81E-02	1.09E-02	-40%	3.19E-02	76%	7.01E-02	287%	2.41E-02	33%	6.10E-03	-66%
2.1.10.3	PWR-RHR-MDP-FHRH	1.53E-02	1.04E-02	-32%	2.96E-02	93%	7.01E-02	358%	1.67E-02	9%	4.48E-03	-71%
2.1.10.4	PWR-RHR-MDP-RH	1.70E-02	1.01E-02	-41%	2.87E-02	69%	7.01E-02	312%	1.75E-02	3%	4.53E-03	-73%
2.1.11.1	CCW-MDP-FS	7.70E-03	5.24E-03	-32%	1.51E-02	96%	7.01E-02	810%	8.95E-03	16%	2.98E-03	-61%
2.1.11.2	CCW-MDP-FR	7.08E-03	4.43E-03	-37%	1.29E-02	82%	2.83E-02	300%	6.50E-03	-8%	2.40E-03	-66%
2.1.12.1	ALL-PDP-FS	4.69E-03	3.36E-03	-28%	8.17E-03	74%	3.27E-02	597%	5.64E-03	20%	2.02E-03	-57%
2.1.12.2	ALL-PDP-FR	1.29E-02	6.33E-03	-51%	4.26E-02	230%	5.15E-02	299%	1.14E-02	-12%	3.95E-03	-69%
2.2.1.1	MFW-TDP-FS	1.68E-02	7.59E-03	-55%	3.19E-02	90%	4.31E-02	157%	1.29E-02	-23%	4.53E-03	-73%
2.2.1.2	MFW-TDP-FR	5.54E-03	3.67E-03	-34%	6.85E-03	24%	1.82E-02	229%	4.93E-03	-11%	1.89E-03	-66%
2.2.2.1	AFW-TDP-FS	2.05E-02	1.09E-02	-47%	3.19E-02	56%	7.01E-02	242%	1.92E-02	-6%	4.53E-03	-78%
2.2.2.2	AFW-TDP-FH	2.05E-02	1.09E-02	-47%	3.19E-02	56%	7.01E-02	242%	1.92E-02	-6%	4.53E-03	-78%
2.2.2.3	AFW-TDP-FHRH	1.96E-02	1.09E-02	-44%	3.19E-02	63%	7.01E-02	258%	1.96E-02	0%	4.53E-03	-77%
2.2.2.4	AFW-TDP-RH	1.96E-02	1.09E-02	-44%	3.19E-02	63%	7.01E-02	258%	1.96E-02	0%	4.53E-03	-77%
2.2.3.1	HCI-RCI-TDP-FS	5.39E-03	3.29E-03	-39%	8.93E-03	66%	1.85E-02	243%	4.36E-03	-19%	2.02E-03	-63%
2.2.3.2	HCI-RCI-TDP-FH	1.27E-02	8.66E-03	-32%	2.22E-02	75%	7.01E-02	452%	1.58E-02	24%	3.95E-03	-69%
2.2.3.3	HCI-RCI-TDP-FHRH	1.12E-02	7.69E-03	-31%	1.94E-02	73%	7.01E-02	526%	1.25E-02	12%	3.52E-03	-69%
2.2.3.4	HCI-RCI-TDP-RH	1.67E-02	1.12E-02	-33%	3.20E-02	92%	7.01E-02	320%	1.74E-02	4%	4.68E-03	-72%
2.3.1.1	ALL-MOV-FTOC	3.56E-03	2.42E-03	-32%	6.17E-03	73%	1.50E-02	321%	3.29E-03	-8%	1.81E-03	-49%

Section	CCF Template	Generic Mean	Component Causal Mean		Design Causal Mean		Environment Causal Mean		Human Causal Mean		Other Causal Mean	
		α^2 (CCCG=2)	α^2 (CCCG=2)	Δ %	α^2 (CCCG=2)	Δ %	α^2 (CCCG=2)	Δ %	α^2 (CCCG=2)	Δ %	α^2 (CCCG=2)	Δ %
2.3.1.2	ALL-MOV-CC	2.01E-03	1.34E-03	-33%	3.98E-03	98%	9.54E-03	375%	1.50E-03	-25%	1.29E-03	-36%
2.3.1.3	ALL-MOV-OO	8.40E-03	5.71E-03	-32%	1.39E-02	65%	3.16E-02	276%	8.84E-03	5%	2.75E-03	-67%
2.3.1.4	ALL-MOV-CO	3.68E-02	2.35E-02	-36%	6.43E-02	75%	7.01E-02	90%	3.83E-02	4%	3.27E-02	-11%
2.3.1.5	ALL-MOV-LK	8.52E-03	4.94E-03	-42%	1.62E-02	90%	2.96E-02	247%	9.35E-03	10%	2.69E-03	-68%
2.3.2.1	CSS-MOV-FTOC	9.89E-03	7.62E-03	-23%	2.09E-02	111%	7.01E-02	609%	1.34E-02	35%	3.59E-03	-64%
2.3.2.2	CSS-MOV-CC	1.25E-02	9.17E-03	-27%	2.66E-02	113%	7.01E-02	461%	1.57E-02	26%	4.22E-03	-66%
2.3.2.3	CSS-MOV-OO	1.42E-02	1.19E-02	-16%	3.25E-02	129%	7.01E-02	394%	2.14E-02	51%	5.08E-03	-64%
2.3.3.1	BWR-RHR-MOV-FTOC	8.22E-03	5.79E-03	-30%	1.52E-02	85%	3.22E-02	292%	7.03E-03	-14%	2.77E-03	-66%
2.3.3.2	BWR-RHR-MOV-CC	6.17E-03	4.41E-03	-29%	1.35E-02	119%	3.39E-02	449%	5.61E-03	-9%	2.48E-03	-60%
2.3.3.3	BWR-RHR-MOV-OO	1.41E-02	8.46E-03	-40%	2.12E-02	50%	4.16E-02	195%	1.18E-02	-16%	3.42E-03	-76%
2.3.4.1	PWR-RCS-MOV-FTOC	1.42E-02	8.53E-03	-40%	2.43E-02	71%	4.84E-02	241%	1.40E-02	-1%	3.60E-03	-75%
2.3.4.2	PWR-RCS-MOV-CC	1.74E-02	1.09E-02	-37%	3.19E-02	83%	4.77E-02	174%	1.48E-02	-15%	3.58E-03	-79%
2.3.4.3	PWR-RCS-MOV-OO	1.68E-02	1.44E-02	-14%	3.19E-02	90%	7.01E-02	317%	2.45E-02	46%	6.20E-03	-63%
2.3.5.1	AFW-MOV-FTOC	5.93E-03	3.62E-03	-39%	1.12E-02	89%	2.26E-02	281%	5.11E-03	-14%	2.20E-03	-63%
2.3.5.2	AFW-MOV-CC	8.62E-03	5.23E-03	-39%	1.73E-02	101%	3.18E-02	269%	7.77E-03	-10%	2.77E-03	-68%
2.3.5.3	AFW-MOV-OO	1.05E-02	6.08E-03	-42%	1.62E-02	54%	3.86E-02	268%	9.42E-03	-10%	2.92E-03	-72%
2.3.6.1	HPI-MOV-FTOC	9.68E-03	6.20E-03	-36%	1.80E-02	86%	4.05E-02	318%	9.59E-03	-1%	3.00E-03	-69%
2.3.6.2	HPI-MOV-CC	1.29E-02	7.50E-03	-42%	2.09E-02	62%	4.43E-02	243%	1.23E-02	-5%	3.32E-03	-74%
2.3.6.3	HPI-MOV-OO	1.45E-02	1.02E-02	-30%	2.93E-02	102%	7.01E-02	383%	1.57E-02	8%	4.41E-03	-70%
2.3.7.1	PWR-RHR-MOV-FTOC	6.34E-03	3.97E-03	-37%	1.46E-02	130%	2.67E-02	321%	6.31E-03	0%	2.41E-03	-62%
2.3.7.2	PWR-RHR-MOV-CC	8.86E-03	5.23E-03	-41%	1.82E-02	105%	3.58E-02	304%	8.76E-03	-1%	4.53E-03	-49%
2.3.7.3	PWR-RHR-MOV-OO	1.22E-02	8.50E-03	-30%	2.58E-02	111%	5.13E-02	320%	1.45E-02	19%	3.75E-03	-69%
2.3.8.1	HCI-RCI-MOV-FTOC	6.17E-03	4.67E-03	-24%	1.31E-02	112%	3.39E-02	449%	5.61E-03	-9%	2.41E-03	-61%
2.3.8.2	HCI-RCI-MOV-CC	8.22E-03	5.62E-03	-32%	1.57E-02	91%	3.74E-02	355%	7.52E-03	-9%	2.76E-03	-66%
2.3.8.3	HCI-RCI-MOV-OO	1.21E-02	9.78E-03	-19%	2.76E-02	128%	7.01E-02	479%	1.41E-02	17%	4.18E-03	-65%
2.4.1.1	ALL-AOV-FTOC	2.92E-02	9.78E-03	-67%	4.96E-02	70%	4.55E-02	56%	3.81E-02	30%	4.61E-03	-84%
2.4.1.2	ALL-AOV-CC	3.28E-02	1.16E-02	-65%	5.48E-02	67%	5.21E-02	59%	4.61E-02	41%	5.19E-03	-84%

Section	CCF Template	Generic Mean	Component Causal Mean		Design Causal Mean		Environment Causal Mean		Human Causal Mean		Other Causal Mean	
		$\alpha 2$ (CCCG=2)	$\alpha 2$ (CCCG=2)	$\Delta \%$	$\alpha 2$ (CCCG=2)	$\Delta \%$	$\alpha 2$ (CCCG=2)	$\Delta \%$	$\alpha 2$ (CCCG=2)	$\Delta \%$	$\alpha 2$ (CCCG=2)	$\Delta \%$
2.4.1.3	ALL-AOV-OO	2.13E-02	9.84E-03	-54%	3.84E-02	80%	6.43E-02	202%	1.85E-02	-13%	4.34E-03	-80%
2.4.1.4	ALL-AOV-SO	2.78E-02	1.01E-02	-64%	2.04E-02	-27%	5.60E-02	101%	4.79E-02	72%	4.90E-03	-82%
2.4.2.1	AFW-AOV-FTOC	3.38E-02	1.10E-02	-67%	5.45E-02	61%	7.34E-02	117%	5.10E-02	51%	5.34E-03	-84%
2.4.2.2	AFW-AOV-CC	4.80E-02	1.67E-02	-65%	1.01E-01	110%	7.01E-02	46%	8.65E-02	80%	7.78E-03	-84%
2.4.2.3	AFW-AOV-OO	1.23E-02	6.89E-03	-44%	1.61E-02	31%	3.95E-02	221%	1.07E-02	-13%	2.95E-03	-76%
2.5.1.1	ALL-CKV-CC	1.88E-02	1.09E-02	-42%	3.19E-02	70%	7.01E-02	273%	3.03E-02	61%	7.38E-03	-61%
2.5.1.2	ALL-CKV-OO	2.77E-02	1.07E-02	-61%	9.02E-02	226%	6.53E-02	136%	1.61E-02	-42%	5.19E-03	-81%
2.5.1.3	ALL-CKV-LK	1.05E-02	6.67E-03	-36%	1.82E-02	73%	4.59E-02	337%	1.03E-02	-2%	3.18E-03	-70%
2.5.2.1	AFW-CKV-OO	1.70E-02	1.43E-02	-16%	3.19E-02	88%	7.01E-02	312%	2.59E-02	52%	4.53E-03	-73%
2.5.3.1	PWR-RHR-CKV-OO	1.57E-02	1.08E-02	-31%	3.07E-02	96%	7.01E-02	346%	1.76E-02	12%	4.63E-03	-71%
2.5.6.1	HCI-RCI-CKV-OO	1.59E-02	7.56E-03	-52%	2.13E-02	34%	4.24E-02	167%	1.27E-02	-20%	3.21E-03	-80%
2.6.1.1	ALL-TSA-PG	1.46E-01	1.09E-02	-93%	1.79E-02	-88%	1.49E-01	2%	1.92E-02	-87%	4.53E-03	-97%
2.6.1.2	ALL-TSA-PG-EE	1.53E-01	N/A (Note 1)		N/A (Note 1)		1.53E-01	0%	N/A (Note 1)		N/A (Note 1)	
2.6.1.3	ALL-TSA-PG-NE	1.74E-02	1.09E-02	-37%	1.26E-02	-28%	1.90E-02	9%	1.92E-02	10%	4.53E-03	-74%
2.6.1.4	ALL-TSA-FO-NE	3.88E-02	9.79E-03	-75%	4.13E-02	6%	1.74E-01	348%	1.77E-02	-54%	4.72E-03	-88%
2.6.2.1	SWS-TSA-FO-NE	4.69E-02	9.03E-03	-81%	2.75E-02	-41%	1.66E-01	254%	1.63E-02	-65%	4.53E-03	-90%
2.6.2.2	SWS-STR-PG	7.00E-02	1.09E-02	-84%	2.53E-02	-64%	9.32E-02	33%	1.13E-02	-84%	2.91E-03	-96%
2.6.2.3	SWS-STR-PG-EE	8.51E-02	N/A (Note 1)		N/A (Note 1)		8.51E-02	0%	N/A (Note 1)		N/A (Note 1)	
2.6.2.4	SWS-STR-PG-NE	2.27E-02	1.09E-02	-52%	2.56E-02	13%	2.78E-02	22%	1.14E-02	-50%	2.83E-03	-88%
2.6.3.1	CWS-TSA-PG-EE	1.53E-01	N/A (Note 1)		N/A (Note 1)		1.53E-01	0%	N/A (Note 1)		N/A (Note 1)	
2.6.3.2	CWS-TSA-PG-NE	1.74E-02	1.09E-02	-37%	1.26E-02	-28%	1.90E-02	9%	1.92E-02	10%	4.53E-03	-74%
2.7.1.1	ALL-HTX-HT	1.86E-02	9.40E-03	-49%	3.19E-02	72%	1.89E-02	2%	2.44E-02	31%	4.53E-03	-76%
2.7.2.1	CCW-HTX-HT	2.05E-02	9.32E-03	-55%	3.19E-02	56%	2.18E-02	6%	2.52E-02	23%	4.53E-03	-78%
2.8.1.1	ALL-SVV-CC	2.20E-02	9.28E-03	-58%	2.94E-02	34%	7.01E-02	219%	1.92E-02	-13%	4.53E-03	-79%
2.8.1.2	ALL-SVV-OO	1.96E-02	1.09E-02	-44%	3.19E-02	63%	7.01E-02	258%	1.92E-02	-2%	1.96E-02	0%
2.8.2.1	BWR-MSS-SRV-CC	3.20E-02	1.59E-02	-50%	5.31E-02	66%	7.88E-02	146%	2.04E-02	-36%	5.12E-03	-84%
2.8.2.2	BWR-MSS-SRV-OO	1.84E-02	1.09E-02	-41%	1.55E-02	-16%	3.09E-02	68%	1.92E-02	4%	2.35E-03	-87%
2.9.1.1	ALL-PORV-CC	3.06E-02	1.09E-02	-64%	8.91E-02	191%	6.69E-02	119%	1.79E-02	-42%	5.25E-03	-83%
2.9.1.2	ALL-PORV-OO	9.97E-03	7.34E-03	-26%	2.01E-02	102%	7.01E-02	603%	1.34E-02	34%	3.56E-03	-64%

Section	CCF Template	Generic Mean	Component Causal Mean		Design Causal Mean		Environment Causal Mean		Human Causal Mean		Other Causal Mean	
		α_2 (CCCG=2)	α_2 (CCCG=2)	Δ %	α_2 (CCCG=2)	Δ %	α_2 (CCCG=2)	Δ %	α_2 (CCCG=2)	Δ %	α_2 (CCCG=2)	Δ %
2.9.2.1	PWR-MSS-PRV-CC	3.42E-02	1.16E-02	-66%	9.40E-02	175%	7.66E-02	124%	2.00E-02	-42%	5.47E-03	-84%
2.9.2.2	PWR-MSS-PRV-OO	1.12E-02	8.30E-03	-26%	2.34E-02	109%	7.01E-02	526%	1.44E-02	29%	3.88E-03	-65%
2.9.3.1	PWR-RCS-PORV-CC	1.31E-02	7.24E-03	-45%	3.19E-02	144%	3.67E-02	180%	1.10E-02	-16%	3.20E-03	-76%
2.9.3.2	PWR-RCS-PORV-OO	1.81E-02	1.45E-02	-20%	4.35E-02	140%	7.01E-02	287%	1.92E-02	6%	6.35E-03	-65%
2.10.1.1	PWR-MSS-MSV-CC	2.17E-02	8.32E-03	-62%	2.29E-02	6%	6.93E-02	219%	1.39E-02	-36%	4.53E-03	-79%
2.10.1.2	PWR-MSS-MSV-OO	2.98E-02	1.47E-02	-51%	5.26E-02	77%	7.01E-02	135%	3.88E-02	30%	6.10E-03	-80%
2.10.2.1	BWR-MSS-MSV-CC	1.82E-02	1.09E-02	-40%	2.51E-02	38%	7.01E-02	285%	1.51E-02	-17%	3.81E-03	-79%
2.10.2.2	BWR-MSS-MSV-OO	1.87E-02	1.21E-02	-35%	3.46E-02	85%	7.01E-02	275%	2.15E-02	15%	5.09E-03	-73%
2.11.1.1	EPS-EDG-FS	8.28E-03	3.17E-03	-62%	7.82E-03	-6%	3.88E-02	369%	1.72E-02	108%	3.22E-03	-61%
2.11.1.2	EPS-EDG-LR	5.56E-03	4.35E-03	-22%	7.82E-03	41%	3.07E-02	452%	5.18E-03	-7%	2.38E-03	-57%
2.11.1.3	EPS-EDG-FR	1.38E-02	1.47E-02	7%	1.89E-02	37%	3.74E-02	171%	7.96E-03	-42%	3.85E-03	-72%
2.12.1.1	CVR-VAC-CC	1.61E-02	7.70E-03	-52%	3.19E-02	98%	4.29E-02	166%	1.19E-02	-26%	4.53E-03	-72%
2.13.1.1	ACP-CRB-480-CC	1.23E-02	9.48E-03	-23%	2.88E-02	134%	7.01E-02	470%	1.44E-02	17%	4.30E-03	-65%
2.13.1.2	ACP-CRB-480-OO	1.06E-02	8.81E-03	-17%	3.19E-02	201%	7.01E-02	561%	1.37E-02	29%	4.40E-03	-58%
2.13.1.3	ACP-CRB-480-SA	1.47E-02	8.22E-03	-44%	2.50E-02	70%	5.33E-02	263%	1.34E-02	-9%	3.61E-03	-75%
2.13.1.4	ACP-CRB-480-FTOC	7.62E-03	6.34E-03	-17%	2.36E-02	210%	7.01E-02	820%	8.86E-03	16%	3.45E-03	-55%
2.13.2.1	ACP-CRB-4160-CC	1.59E-02	1.86E-02	17%	3.19E-02	101%	7.01E-02	341%	3.32E-02	109%	7.95E-03	-50%
2.13.2.2	ACP-CRB-4160-OO	5.87E-03	4.05E-03	-31%	1.60E-02	173%	3.61E-02	515%	7.07E-03	20%	2.56E-03	-56%
2.13.2.3	ACP-CRB-4160-SA	1.02E-02	5.92E-03	-42%	1.53E-02	50%	3.15E-02	209%	9.19E-03	-10%	2.69E-03	-74%
2.13.2.4	ACP-CRB-4160-FTOC	5.04E-03	3.64E-03	-28%	1.53E-02	204%	3.44E-02	583%	6.21E-03	23%	2.34E-03	-54%
2.14.1.1	DCP-BAT-NO	1.41E-02	8.23E-03	-42%	2.34E-02	66%	5.83E-02	313%	1.44E-02	2%	3.76E-03	-73%
2.14.2.1	DCP-BCH-FC	8.28E-03	4.52E-03	-45%	1.82E-02	120%	3.96E-02	378%	1.41E-02	70%	3.01E-03	-64%
2.15.1.1	RPS-RTB-CC	1.56E-02	1.20E-02	-23%	3.19E-02	104%	7.01E-02	349%	2.06E-02	32%	4.53E-03	-71%
2.16.1.1	ALL-MDC-FS	2.33E-03	1.28E-03	-45%	3.82E-03	64%	1.07E-02	359%	2.88E-03	24%	1.30E-03	-44%
2.16.1.2	ALL-MDC-FR	4.33E-03	1.92E-03	-56%	3.79E-03	-12%	6.57E-02	1417%	3.08E-03	-29%	2.13E-03	-51%
3.1.1.1	CCF-DEM	1.33E-02	4.54E-03	-66%	3.03E-02	128%	1.65E-02	24%	1.87E-02	41%	2.60E-03	-80%
3.1.2.1	CCF-RATE	2.16E-02	4.22E-03	-80%	1.84E-02	-15%	1.26E-01	483%	1.28E-02	-41%	7.28E-03	-66%
3.1.3.1	CCF (No Data)	2.05E-02	1.09E-02	-47%	3.19E-02	56%	7.01E-02	242%	1.92E-02	-6%	4.53E-03	-78%

Section	CCF Template	Generic Mean	Component Causal Mean		Design Causal Mean		Environment Causal Mean		Human Causal Mean		Other Causal Mean	
		α_2 (CCCG=2)	α_2 (CCCG=2)	Δ %	α_2 (CCCG=2)	Δ %	α_2 (CCCG=2)	Δ %	α_2 (CCCG=2)	Δ %	α_2 (CCCG=2)	Δ %

Note:

1. Not applicable, as this CCF template is for the extreme environmental cause only.

2. INDUSTRY COMPONENT CAUSAL CCF PARAMETER DISTRIBUTIONS

This section presents the causal CCF parameter estimations for the following components:

Section 2.1 Motor-Driven Pumps

Section 2.2 Turbine-Driven Pumps

Section 2.3 Motor-Operated Valves

Section 2.4 Air-Operated Valves

Section 2.5 Check Valves

Section 2.6 Strainers, Trash Racks, and Filters

Section 2.7 Heat Exchangers

Section 2.8 Safety and Relief Valves

Section 2.9 Power-Operated Relief Valves

Section 2.10 Main Steam Isolation Valves

Section 2.11 Generators

Section 2.12 Vacuum Breakers

Section 2.13 AC Power Distribution Breakers

Section 2.14 DC Power System – Batteries, Chargers, and Breakers

Section 2.15 Reactor Trip Breakers

Section 2.16 Air Compressors.

2.1 Motor-Driven Pumps

2.1.1 Pooled Motor-Driven Pumps

2.1.1.1 ALL-MDP-FS: All Systems Motor-Driven Pumps Fail to Start

Generic CCF Parameters

Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Start
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 342.9

Total Number of Common-Cause Failure Events: 4

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9740223	0.9893215	0.9911700	0.9983098	0.9908411	1.686E+02	1.820E+00
α_2	1.69E-03	1.07E-02	8.83E-03	2.60E-02	9.16E-03	1.820E+00	1.686E+02

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9779286	0.9895111	0.9906518	0.9971814	0.9918165	2.766E+02	2.932E+00
α_2	6.66E-04	5.47E-03	4.35E-03	1.41E-02	3.08E-03	1.530E+00	2.780E+02
α_3	5.26E-04	5.02E-03	3.90E-03	1.33E-02	5.10E-03	1.402E+00	2.781E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9792807	0.9891400	0.9899766	0.9961565	0.9921708	3.815E+02	4.188E+00
α_2	1.19E-03	5.81E-03	4.98E-03	1.33E-02	3.35E-03	2.242E+00	3.834E+02
α_3	2.14E-04	2.99E-03	2.19E-03	8.50E-03	2.56E-03	1.152E+00	3.845E+02
α_4	5.51E-05	2.06E-03	1.29E-03	6.69E-03	1.92E-03	7.940E-01	3.849E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9810673	0.9891245	0.9896988	0.9952066	0.9927324	5.539E+02	6.090E+00
α_2	1.46E-03	5.35E-03	4.78E-03	1.12E-02	2.94E-03	2.999E+00	5.570E+02
α_3	4.30E-04	3.03E-03	2.46E-03	7.56E-03	1.77E-03	1.695E+00	5.583E+02
α_4	1.05E-04	1.85E-03	1.31E-03	5.48E-03	1.79E-03	1.038E+00	5.589E+02
α_5	3.00E-07	6.39E-04	2.02E-04	2.76E-03	7.69E-04	3.580E-01	5.596E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9826341	0.9897590	0.9902410	0.9952269	0.9931572	6.605E+02	6.834E+00
α_2	1.12E-03	4.29E-03	3.81E-03	9.11E-03	2.65E-03	2.863E+00	6.644E+02

α_3	4.24E-04	2.71E-03	2.24E-03	6.64E-03	1.38E-03	1.811E+00	6.655E+02
α_4	1.47E-04	1.83E-03	1.36E-03	5.10E-03	1.42E-03	1.219E+00	6.661E+02
α_5	1.70E-05	1.03E-03	5.97E-04	3.54E-03	1.07E-03	6.898E-01	6.666E+02
α_6	6.45E-09	3.75E-04	6.58E-05	1.82E-03	3.21E-04	2.504E-01	6.670E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9836830	0.9897849	0.9901519	0.9946404	0.9934869	8.792E+02	9.074E+00
α_2	1.23E-03	3.95E-03	3.58E-03	7.92E-03	2.47E-03	3.506E+00	8.848E+02
α_3	5.01E-04	2.49E-03	2.13E-03	5.72E-03	1.15E-03	2.214E+00	8.861E+02
α_4	2.52E-04	1.85E-03	1.50E-03	4.68E-03	1.10E-03	1.646E+00	8.866E+02
α_5	8.13E-05	1.25E-03	8.98E-04	3.60E-03	1.06E-03	1.107E+00	8.872E+02
α_6	2.11E-06	5.59E-04	2.53E-04	2.15E-03	5.97E-04	4.963E-01	8.878E+02
α_7	2.88E-16	1.18E-04	9.40E-07	6.85E-04	1.38E-04	1.051E-01	8.882E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9848067	0.9904249	0.9907549	0.9949148	0.9937452	9.695E+02	9.373E+00
α_2	1.05E-03	3.47E-03	3.14E-03	7.03E-03	2.37E-03	3.399E+00	9.755E+02
α_3	3.51E-04	2.01E-03	1.68E-03	4.79E-03	9.91E-04	1.968E+00	9.769E+02
α_4	2.01E-04	1.60E-03	1.28E-03	4.10E-03	8.64E-04	1.566E+00	9.773E+02
α_5	1.06E-04	1.27E-03	9.50E-04	3.52E-03	9.26E-04	1.242E+00	9.777E+02
α_6	1.93E-05	7.89E-04	4.85E-04	2.59E-03	7.24E-04	7.720E-01	9.781E+02
α_7	2.80E-08	3.02E-04	7.17E-05	1.39E-03	3.22E-04	2.953E-01	9.786E+02
α_8	6.06E-14	1.33E-04	3.06E-06	7.49E-04	6.03E-05	1.298E-01	9.788E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.90E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01	9.90E-01
α_2	1.07E-02	5.47E-03	5.81E-03	5.35E-03	4.29E-03	3.95E-03	3.47E-03
α_3		5.02E-03	2.99E-03	3.03E-03	2.71E-03	2.49E-03	2.01E-03
α_4			2.06E-03	1.85E-03	1.83E-03	1.85E-03	1.60E-03
α_5				6.39E-04	1.03E-03	1.25E-03	1.27E-03
α_6					3.75E-04	5.59E-04	7.89E-04
α_7						1.18E-04	3.02E-04
α_8							1.33E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.90E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01	9.90E-01
Beta	1.07E-02	1.05E-02	1.09E-02	1.09E-02	1.02E-02	1.02E-02	9.58E-03
Gamma		4.78E-01	4.65E-01	5.08E-01	5.81E-01	6.14E-01	6.37E-01
Delta			4.08E-01	4.52E-01	5.44E-01	6.02E-01	6.71E-01
Epsilon				2.56E-01	4.35E-01	5.09E-01	6.09E-01
Mu					2.66E-01	3.52E-01	4.91E-01
Omega						1.75E-01	3.55E-01
Sigma							3.05E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	144.38	216.57	288.76	360.95	433.14	505.33	577.52
N₁	1.7976	2.0179	2.0357	2.0908	2.0997	2.0674	1.9958
N₂	1.3512	0.6786	0.9821	1.0744	1.1620	1.2624	1.3810
N₃		1.1250	0.7500	0.6458	0.6042	0.5848	0.5779
N₄			0.5625	0.6563	0.6233	0.5628	0.5040
N₅				0.2813	0.4688	0.5414	0.5397
N₆					0.1406	0.3047	0.4223
N₇						0.0703	0.1875
N₈							0.0352

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 135.2

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.386

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9847816	0.9960793	0.9982610	0.9999871	1.228E+02	4.834E-01	--
α_2	1.29E-05	3.92E-03	1.74E-03	1.52E-02	4.834E-01	1.228E+02	0.821

CCCG = 3, Gamma = 0.387

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9885317	0.9958814	0.9969251	0.9996650	2.964E+02	1.226E+00	--
α_2	1.40E-04	2.88E-03	1.98E-03	8.70E-03	9.769E-01	3.378E+02	0.638
α_3	1.97E-08	1.24E-03	2.14E-04	5.99E-03	2.487E-01	2.011E+02	1.074

CCCG = 4, Gamma = 0.388

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9878681	0.9948281	0.9956305	0.9990452	3.957E+02	2.057E+00	--
α_2	3.54E-04	3.22E-03	2.52E-03	8.48E-03	1.442E+00	4.465E+02	0.665
α_3	1.56E-06	1.25E-03	4.68E-04	5.13E-03	4.114E-01	3.292E+02	0.903
α_4	9.24E-10	7.05E-04	7.68E-05	3.62E-03	2.036E-01	2.887E+02	1.031

CCCG = 5, Gamma = 0.389

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9883919	0.9941303	0.9946465	0.9981055	6.238E+02	3.683E+00	--
α_2	6.81E-04	3.34E-03	2.86E-03	7.62E-03	2.243E+00	6.703E+02	0.738
α_3	7.77E-05	1.55E-03	1.07E-03	4.64E-03	9.912E-01	6.401E+02	0.775
α_4	5.42E-07	7.95E-04	2.69E-04	3.37E-03	3.765E-01	4.732E+02	1.049
α_5	1.68E-21	1.93E-04	1.10E-07	1.12E-03	7.237E-02	3.741E+02	1.327

CCCG = 6, Gamma = 0.390

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9890649	0.9942966	0.9947440	0.9980004	7.216E+02	4.139E+00	--
α_2	5.32E-04	2.77E-03	2.35E-03	6.44E-03	2.128E+00	7.659E+02	0.749
α_3	9.93E-05	1.44E-03	1.05E-03	4.13E-03	1.134E+00	7.855E+02	0.731
α_4	5.60E-06	8.57E-04	4.25E-04	3.17E-03	5.533E-01	6.452E+02	0.891
α_5	1.68E-09	4.31E-04	5.75E-05	2.16E-03	2.210E-01	5.128E+02	1.121
α_6	2.59E-16	2.03E-04	1.41E-06	1.18E-03	1.027E-01	5.048E+02	1.139

CCCG = 7, Gamma = 0.390

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9897015	0.9940172	0.9943207	0.9972966	1.069E+03	6.432E+00	--
α_2	6.66E-04	2.56E-03	2.27E-03	5.46E-03	2.840E+00	1.105E+03	0.801
α_3	2.25E-04	1.52E-03	1.24E-03	3.76E-03	1.746E+00	1.149E+03	0.771
α_4	6.32E-05	1.01E-03	7.26E-04	2.95E-03	1.084E+00	1.067E+03	0.830
α_5	3.37E-06	5.92E-04	2.87E-04	2.21E-03	5.376E-01	9.078E+02	0.976
α_6	2.26E-10	2.57E-04	2.59E-05	1.33E-03	1.979E-01	7.704E+02	1.151
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.876E+02	1.290

CCCG = 8, Gamma = 0.390

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9904645	0.9945257	0.9948181	0.9975885	1.110E+03	6.112E+00	--
α_2	4.54E-04	2.10E-03	1.81E-03	4.73E-03	2.364E+00	1.123E+03	0.813
α_3	1.47E-04	1.24E-03	9.79E-04	3.22E-03	1.512E+00	1.219E+03	0.749
α_4	5.35E-05	9.14E-04	6.47E-04	2.68E-03	1.056E+00	1.154E+03	0.792
α_5	9.84E-06	6.50E-04	3.70E-04	2.24E-03	6.745E-01	1.038E+03	0.881
α_6	4.64E-08	3.46E-04	8.78E-05	1.57E-03	3.076E-01	8.894E+02	1.028
α_7	9.97E-16	1.43E-04	1.41E-06	8.22E-04	1.093E-01	7.665E+02	1.193
α_8	1.29E-18	8.38E-05	2.33E-07	4.88E-04	8.885E-02	1.060E+03	0.863

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.96E-01	9.95E-01	9.94E-01	9.94E-01	9.94E-01	9.95E-01
α_2	3.92E-03	2.88E-03	3.22E-03	3.34E-03	2.77E-03	2.56E-03	2.10E-03
α_3		1.24E-03	1.25E-03	1.55E-03	1.44E-03	1.52E-03	1.24E-03
α_4			7.05E-04	7.95E-04	8.57E-04	1.01E-03	9.14E-04
α_5				1.93E-04	4.31E-04	5.92E-04	6.50E-04
α_6					2.03E-04	2.57E-04	3.46E-04
α_7						3.86E-05	1.43E-04
α_8							8.38E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.96E-01	9.95E-01	9.94E-01	9.94E-01	9.94E-01	9.95E-01
Beta	3.92E-03	4.12E-03	5.17E-03	5.87E-03	5.70E-03	5.98E-03	5.47E-03
Gamma		3.00E-01	3.78E-01	4.32E-01	5.14E-01	5.71E-01	6.16E-01
Delta			3.61E-01	3.90E-01	5.08E-01	5.56E-01	6.33E-01
Epsilon				1.96E-01	4.25E-01	4.67E-01	5.72E-01
Mu					3.21E-01	3.33E-01	4.68E-01
Omega						1.31E-01	3.96E-01
Sigma							3.70E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	56.93	85.39	113.85	142.32	170.78	199.24	227.71
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 63.0

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.191

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9506873	0.9847973	0.9904572	0.9996045	5.073E+01	7.831E-01	--
α_2	3.95E-04	1.52E-02	9.54E-03	4.93E-02	7.831E-01	5.073E+01	0.821

CCCG = 3, Gamma = 0.190

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9573910	0.9821009	0.9849900	0.9969277	1.058E+02	1.928E+00	--
α_2	1.63E-03	1.29E-02	1.03E-02	3.28E-02	1.564E+00	1.201E+02	0.638
α_3	2.74E-06	5.04E-03	1.65E-03	2.16E-02	3.646E-01	7.192E+01	1.074

CCCG = 4, Gamma = 0.189

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9557330	0.9785601	0.9807375	0.9939429	1.408E+02	3.086E+00	--
α_2	2.62E-03	1.33E-02	1.14E-02	3.07E-02	2.160E+00	1.598E+02	0.665
α_3	6.80E-05	5.39E-03	2.99E-03	1.89E-02	6.427E-01	1.185E+02	0.903
α_4	1.69E-07	2.71E-03	6.03E-04	1.26E-02	2.832E-01	1.042E+02	1.031

CCCG = 5, Gamma = 0.189

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9595882	0.9777854	0.9791903	0.9911832	2.194E+02	4.985E+00	--
α_2	3.17E-03	1.20E-02	1.07E-02	2.53E-02	2.888E+00	2.383E+02	0.738
α_3	7.34E-04	6.41E-03	5.05E-03	1.67E-02	1.474E+00	2.284E+02	0.775
α_4	1.47E-05	3.06E-03	1.44E-03	1.16E-02	5.195E-01	1.693E+02	1.049
α_5	1.31E-15	7.73E-04	5.71E-06	4.48E-03	1.037E-01	1.341E+02	1.327

CCCG = 6, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9625738	0.9785626	0.9797061	0.9906462	2.707E+02	5.930E+00	--
α_2	2.53E-03	9.71E-03	8.61E-03	2.06E-02	2.835E+00	2.892E+02	0.749
α_3	9.48E-04	6.05E-03	4.99E-03	1.48E-02	1.811E+00	2.973E+02	0.731
α_4	1.23E-04	3.53E-03	2.30E-03	1.11E-02	8.664E-01	2.447E+02	0.891
α_5	3.62E-07	1.67E-03	4.62E-04	7.42E-03	3.251E-01	1.948E+02	1.121
α_6	2.68E-17	4.82E-04	1.75E-06	2.81E-03	9.247E-02	1.919E+02	1.139

CCCG = 7, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9646406	0.9782656	0.9791082	0.9890136	3.679E+02	8.174E+00	--
α_2	2.86E-03	9.12E-03	8.29E-03	1.82E-02	3.541E+00	3.847E+02	0.801
α_3	1.06E-03	5.37E-03	4.58E-03	1.24E-02	2.167E+00	4.012E+02	0.771
α_4	4.13E-04	3.81E-03	2.97E-03	1.01E-02	1.428E+00	3.730E+02	0.830
α_5	5.86E-05	2.42E-03	1.49E-03	7.94E-03	7.698E-01	3.176E+02	0.976
α_6	6.35E-09	8.62E-04	1.29E-04	4.26E-03	2.327E-01	2.698E+02	1.151
α_7	2.34E-40	1.46E-04	6.56E-12	6.45E-04	3.515E-02	2.410E+02	1.290

CCCG = 8, Gamma = 0.187

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9663845	0.9792294	0.9800153	0.9893910	3.957E+02	8.393E+00	--
α_2	2.51E-03	8.30E-03	7.51E-03	1.68E-02	3.385E+00	4.047E+02	0.813
α_3	7.74E-04	4.44E-03	3.72E-03	1.06E-02	1.966E+00	4.406E+02	0.749
α_4	3.32E-04	3.28E-03	2.53E-03	8.79E-03	1.375E+00	4.175E+02	0.792
α_5	1.19E-04	2.55E-03	1.74E-03	7.75E-03	9.609E-01	3.755E+02	0.881
α_6	6.68E-06	1.57E-03	7.26E-04	6.01E-03	5.073E-01	3.221E+02	1.028
α_7	2.13E-15	3.90E-04	3.66E-06	2.25E-03	1.083E-01	2.778E+02	1.193
α_8	9.15E-18	2.38E-04	8.00E-07	1.39E-03	9.140E-02	3.843E+02	0.863

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.82E-01	9.79E-01	9.78E-01	9.79E-01	9.78E-01	9.79E-01
α_2	1.52E-02	1.29E-02	1.33E-02	1.20E-02	9.71E-03	9.12E-03	8.30E-03
α_3		5.04E-03	5.39E-03	6.41E-03	6.05E-03	5.37E-03	4.44E-03
α_4			2.71E-03	3.06E-03	3.53E-03	3.81E-03	3.28E-03
α_5				7.73E-04	1.67E-03	2.42E-03	2.55E-03
α_6					4.82E-04	8.62E-04	1.57E-03
α_7						1.46E-04	3.90E-04
α_8							2.38E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.82E-01	9.79E-01	9.78E-01	9.79E-01	9.78E-01	9.79E-01
Beta	1.52E-02	1.79E-02	2.14E-02	2.22E-02	2.14E-02	2.17E-02	2.08E-02
Gamma		2.82E-01	3.78E-01	4.61E-01	5.47E-01	5.80E-01	6.01E-01
Delta			3.35E-01	3.74E-01	4.84E-01	5.74E-01	6.44E-01
Epsilon				2.02E-01	3.78E-01	4.73E-01	5.92E-01
Mu					2.24E-01	2.94E-01	4.63E-01
Omega						1.45E-01	2.85E-01
Sigma							3.79E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	26.53	39.79	53.05	66.32	79.58	92.84	106.11
N_1	1.3333	1.3750	1.2500	1.1979	1.1354	1.0674	0.9958
N_2	0.3333	0.6250	0.8750	0.8958	0.8941	0.8874	0.8810
N_3		0.1250	0.2500	0.3958	0.4792	0.5223	0.5467

N₄			0.0625	0.1563	0.2483	0.3128	0.3477
N₅				0.0313	0.0938	0.1664	0.2272
N₆					0.0156	0.0547	0.1098
N₇						0.0078	0.0313
N₈							0.0039

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 8.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.024

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8552707	0.9653294	0.9874568	0.9999731	1.058E+01	3.801E-01	--
α_2	2.69E-05	3.47E-02	1.25E-02	1.45E-01	3.801E-01	1.058E+01	0.821

CCCG = 3, Gamma = 0.024

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8835117	0.9608779	0.9726013	0.9981182	2.358E+01	9.600E-01	--
α_2	3.36E-04	2.25E-02	1.30E-02	7.71E-02	6.673E-01	2.898E+01	0.638
α_3	1.47E-06	1.66E-02	4.03E-03	7.64E-02	2.927E-01	1.733E+01	1.074

CCCG = 4, Gamma = 0.024

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8935018	0.9567679	0.9644220	0.9938084	3.694E+01	1.669E+00	--
α_2	1.33E-03	2.31E-02	1.65E-02	6.76E-02	1.039E+00	4.387E+01	0.665
α_3	1.02E-05	1.18E-02	4.20E-03	4.92E-02	3.887E-01	3.266E+01	0.903
α_4	9.66E-08	8.33E-03	1.38E-03	4.08E-02	2.414E-01	2.872E+01	1.031

CCCG = 5, Gamma = 0.024

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9177217	0.9584663	0.9620625	0.9869108	8.047E+01	3.487E+00	--
α_2	3.07E-03	1.97E-02	1.63E-02	4.80E-02	1.791E+00	8.903E+01	0.738
α_3	1.11E-03	1.39E-02	1.04E-02	3.88E-02	1.207E+00	8.537E+01	0.775
α_4	1.20E-05	6.79E-03	2.72E-03	2.73E-02	4.340E-01	6.352E+01	1.049
α_5	2.42E-26	1.09E-03	3.88E-08	6.00E-03	5.493E-02	5.048E+01	1.327

CCCG = 6, Gamma = 0.025

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9279120	0.9625565	0.9654803	0.9872044	1.004E+02	3.905E+00	--
α_2	1.16E-03	1.20E-02	9.23E-03	3.23E-02	1.335E+00	1.099E+02	0.749
α_3	1.65E-03	1.34E-02	1.07E-02	3.45E-02	1.531E+00	1.124E+02	0.731
α_4	1.49E-04	7.69E-03	4.58E-03	2.58E-02	7.191E-01	9.281E+01	0.891
α_5	4.87E-08	3.32E-03	5.69E-04	1.61E-02	2.467E-01	7.406E+01	1.121
α_6	1.10E-20	9.95E-04	6.00E-07	5.78E-03	7.279E-02	7.305E+01	1.139

CCCG = 7, Gamma = 0.025

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9370583	0.9640176	0.9659323	0.9844349	1.546E+02	5.770E+00	--
α_2	1.15E-03	9.28E-03	7.40E-03	2.38E-02	1.549E+00	1.655E+02	0.801
α_3	2.04E-03	1.15E-02	9.65E-03	2.71E-02	1.989E+00	1.715E+02	0.771
α_4	7.18E-04	7.99E-03	6.07E-03	2.18E-02	1.287E+00	1.598E+02	0.830
α_5	8.43E-05	5.05E-03	2.93E-03	1.72E-02	6.913E-01	1.363E+02	0.976
α_6	1.48E-08	2.00E-03	3.02E-04	9.90E-03	2.327E-01	1.160E+02	1.151
α_7	1.38E-64	2.04E-04	3.09E-17	5.14E-04	2.112E-02	1.037E+02	1.290

CCCG = 8, Gamma = 0.025

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9448548	0.9670879	0.9685395	0.9843631	2.062E+02	7.016E+00	--
α_2	9.39E-04	7.30E-03	5.85E-03	1.86E-02	1.583E+00	2.153E+02	0.813
α_3	1.49E-03	8.44E-03	7.09E-03	2.00E-02	1.986E+00	2.333E+02	0.749
α_4	1.05E-03	7.51E-03	6.09E-03	1.88E-02	1.672E+00	2.210E+02	0.792
α_5	2.68E-04	5.05E-03	3.53E-03	1.50E-02	1.011E+00	1.991E+02	0.881
α_6	2.52E-05	3.33E-03	1.70E-03	1.22E-02	5.709E-01	1.709E+02	1.028
α_7	2.81E-10	1.22E-03	9.60E-05	6.47E-03	1.809E-01	1.476E+02	1.193
α_8	8.79E-108	6.09E-05	1.84E-27	4.56E-05	1.245E-02	2.043E+02	0.863

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.65E-01	9.61E-01	9.57E-01	9.58E-01	9.63E-01	9.64E-01	9.67E-01
α_2	3.47E-02	2.25E-02	2.31E-02	1.97E-02	1.20E-02	9.28E-03	7.30E-03
α_3		1.66E-02	1.18E-02	1.39E-02	1.34E-02	1.15E-02	8.44E-03
α_4			8.33E-03	6.79E-03	7.69E-03	7.99E-03	7.51E-03
α_5				1.09E-03	3.32E-03	5.05E-03	5.05E-03
α_6					9.95E-04	2.00E-03	3.33E-03
α_7						2.04E-04	1.22E-03
α_8							6.09E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.65E-01	9.61E-01	9.57E-01	9.58E-01	9.63E-01	9.64E-01	9.67E-01
Beta	3.47E-02	3.91E-02	4.32E-02	4.15E-02	3.74E-02	3.60E-02	3.29E-02
Gamma		4.25E-01	4.65E-01	5.25E-01	6.79E-01	7.42E-01	7.78E-01
Delta			4.15E-01	3.61E-01	4.72E-01	5.71E-01	6.70E-01
Epsilon				1.38E-01	3.60E-01	4.76E-01	5.63E-01
Mu					2.31E-01	3.04E-01	4.77E-01
Omega						9.23E-02	2.79E-01
Sigma							4.74E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.58	5.37	7.16	8.95	10.74	12.53	14.32
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 87.2

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.256

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9496194	0.9806079	0.9846500	0.9977656	7.436E+01	1.471E+00	--
α_2	2.23E-03	1.94E-02	1.54E-02	5.04E-02	1.471E+00	7.436E+01	0.821

CCCG = 3, Gamma = 0.254

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9626930	0.9839102	0.9863074	0.9969282	1.286E+02	2.103E+00	--
α_2	1.25E-04	4.37E-03	2.77E-03	1.41E-02	8.104E-01	1.847E+02	0.638
α_3	1.06E-03	1.17E-02	8.93E-03	3.19E-02	1.292E+00	1.089E+02	1.074

CCCG = 4, Gamma = 0.254

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9728617	0.9870628	0.9884568	0.9964990	2.253E+02	2.953E+00	--
α_2	4.29E-04	4.62E-03	3.52E-03	1.26E-02	1.312E+00	2.830E+02	0.665
α_3	1.90E-04	4.45E-03	3.00E-03	1.36E-02	9.307E-01	2.082E+02	0.903
α_4	7.11E-05	3.87E-03	2.28E-03	1.31E-02	7.099E-01	1.826E+02	1.031

CCCG = 5, Gamma = 0.254

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9775898	0.9883115	0.9892249	0.9959127	3.473E+02	4.107E+00	--
α_2	5.76E-04	4.09E-03	3.32E-03	1.02E-02	1.684E+00	4.102E+02	0.738
α_3	2.33E-04	3.04E-03	2.25E-03	8.54E-03	1.193E+00	3.914E+02	0.775
α_4	1.12E-04	3.04E-03	2.00E-03	9.51E-03	8.816E-01	2.891E+02	1.049
α_5	5.84E-07	1.52E-03	4.66E-04	6.62E-03	3.487E-01	2.288E+02	1.327

CCCG = 6, Gamma = 0.254

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9809072	0.9896298	0.9903234	0.9959838	4.602E+02	4.822E+00	--
α_2	4.75E-04	3.28E-03	2.67E-03	8.17E-03	1.714E+00	5.204E+02	0.749
α_3	1.89E-04	2.31E-03	1.72E-03	6.41E-03	1.233E+00	5.336E+02	0.731
α_4	1.28E-04	2.34E-03	1.64E-03	6.93E-03	1.026E+00	4.380E+02	0.891
α_5	2.07E-05	1.80E-03	9.81E-04	6.37E-03	6.286E-01	3.482E+02	1.121
α_6	2.46E-09	6.43E-04	8.56E-05	3.23E-03	2.207E-01	3.430E+02	1.139

CCCG = 7, Gamma = 0.254

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9828881	0.9901329	0.9906485	0.9956170	6.217E+02	6.195E+00	--
α_2	5.92E-04	3.12E-03	2.65E-03	7.28E-03	2.105E+00	6.721E+02	0.801
α_3	2.01E-04	1.97E-03	1.52E-03	5.28E-03	1.383E+00	6.991E+02	0.771
α_4	1.61E-04	1.92E-03	1.44E-03	5.31E-03	1.247E+00	6.490E+02	0.830
α_5	6.33E-05	1.63E-03	1.08E-03	5.06E-03	8.999E-01	5.519E+02	0.976
α_6	1.96E-06	9.50E-04	3.88E-04	3.80E-03	4.456E-01	4.686E+02	1.151
α_7	7.84E-15	2.76E-04	3.63E-06	1.58E-03	1.154E-01	4.184E+02	1.290

CCCG = 8, Gamma = 0.254

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9844420	0.9908300	0.9912655	0.9957310	7.382E+02	6.832E+00	--
α_2	5.83E-04	2.88E-03	2.46E-03	6.59E-03	2.229E+00	7.723E+02	0.813
α_3	1.38E-04	1.54E-03	1.16E-03	4.21E-03	1.291E+00	8.388E+02	0.749
α_4	1.17E-04	1.51E-03	1.12E-03	4.23E-03	1.198E+00	7.940E+02	0.792
α_5	9.20E-05	1.50E-03	1.07E-03	4.39E-03	1.075E+00	7.135E+02	0.881
α_6	1.29E-05	1.04E-03	5.75E-04	3.67E-03	6.396E-01	6.116E+02	1.028
α_7	4.39E-08	5.51E-04	1.28E-04	2.55E-03	2.907E-01	5.273E+02	1.193
α_8	7.66E-16	1.48E-04	1.37E-06	8.55E-04	1.081E-01	7.295E+02	0.863

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.84E-01	9.87E-01	9.88E-01	9.90E-01	9.90E-01	9.91E-01
α_2	1.94E-02	4.37E-03	4.62E-03	4.09E-03	3.28E-03	3.12E-03	2.88E-03
α_3		1.17E-02	4.45E-03	3.04E-03	2.31E-03	1.97E-03	1.54E-03
α_4			3.87E-03	3.04E-03	2.34E-03	1.92E-03	1.51E-03
α_5				1.52E-03	1.80E-03	1.63E-03	1.50E-03
α_6					6.43E-04	9.50E-04	1.04E-03
α_7						2.76E-04	5.51E-04
α_8							1.48E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.84E-01	9.87E-01	9.88E-01	9.90E-01	9.90E-01	9.91E-01
Beta	1.94E-02	1.61E-02	1.29E-02	1.17E-02	1.04E-02	9.87E-03	9.17E-03
Gamma		7.28E-01	6.43E-01	6.50E-01	6.83E-01	6.84E-01	6.86E-01
Delta			4.65E-01	6.00E-01	6.75E-01	7.07E-01	7.56E-01
Epsilon				3.34E-01	5.11E-01	5.98E-01	6.83E-01
Mu					2.63E-01	4.30E-01	5.37E-01
Omega						2.25E-01	4.01E-01
Sigma							2.12E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	36.72	55.07	73.43	91.79	110.15	128.51	146.86
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		1.0000	0.5000	0.2500	0.1250	0.0625	0.0313

N₄			0.5000	0.5000	0.3750	0.2500	0.1563
N₅				0.2500	0.3750	0.3750	0.3125
N₆					0.1250	0.2500	0.3125
N₇						0.0625	0.1563
N₈							0.0313

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 49.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9877220	0.9967743	0.9984981	0.9999857	1.579E+02	5.111E-01	--
α_2	1.43E-05	3.23E-03	1.50E-03	1.23E-02	5.111E-01	1.579E+02	0.821

CCCG = 3, Gamma = 0.144

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9911254	0.9969192	0.9977734	0.9997959	3.602E+02	1.113E+00	--
α_2	4.20E-05	1.75E-03	1.08E-03	5.76E-03	7.673E-01	4.372E+02	0.638
α_3	4.78E-07	1.33E-03	4.02E-04	5.80E-03	3.458E-01	2.599E+02	1.074

CCCG = 4, Gamma = 0.144

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928213	0.9968682	0.9973209	0.9993675	7.072E+02	2.222E+00	--
α_2	2.87E-04	2.09E-03	1.69E-03	5.26E-03	1.656E+00	7.910E+02	0.665
α_3	1.42E-08	4.54E-04	8.87E-05	2.16E-03	2.646E-01	5.830E+02	0.903
α_4	6.51E-08	5.89E-04	1.44E-04	2.69E-03	3.010E-01	5.109E+02	1.031

CCCG = 5, Gamma = 0.144

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9948096	0.9970952	0.9972682	0.9987902	1.889E+03	5.503E+00	--
α_2	6.38E-04	1.93E-03	1.77E-03	3.79E-03	3.811E+00	1.968E+03	0.738
α_3	7.07E-05	7.20E-04	5.53E-04	1.94E-03	1.354E+00	1.878E+03	0.775
α_4	2.02E-08	2.13E-04	5.09E-05	9.80E-04	2.961E-01	1.388E+03	1.049
α_5	1.15E-34	3.87E-05	4.26E-11	1.92E-04	4.243E-02	1.097E+03	1.327

CCCG = 6, Gamma = 0.144

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9944948	0.9969603	0.9971516	0.9987728	1.707E+03	5.204E+00	--
α_2	5.14E-04	1.79E-03	1.61E-03	3.69E-03	3.183E+00	1.774E+03	0.749
α_3	5.89E-05	6.91E-04	5.19E-04	1.91E-03	1.257E+00	1.819E+03	0.731
α_4	1.37E-06	3.37E-04	1.54E-04	1.29E-03	5.031E-01	1.494E+03	0.891
α_5	2.82E-15	9.73E-05	1.28E-06	5.58E-04	1.155E-01	1.187E+03	1.121
α_6	5.81E-13	1.24E-04	4.55E-06	6.88E-04	1.451E-01	1.168E+03	1.139

CCCG = 7, Gamma = 0.144

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9954602	0.9971057	0.9972008	0.9984268	3.455E+03	1.003E+01	--
α_2	6.03E-04	1.49E-03	1.40E-03	2.70E-03	5.226E+00	3.499E+03	0.801
α_3	1.97E-04	7.69E-04	6.80E-04	1.65E-03	2.800E+00	3.638E+03	0.771
α_4	4.18E-05	4.09E-04	3.16E-04	1.10E-03	1.384E+00	3.378E+03	0.830
α_5	6.04E-07	1.71E-04	7.63E-05	6.60E-04	4.902E-01	2.873E+03	0.976
α_6	1.12E-15	4.70E-05	5.96E-07	2.70E-04	1.146E-01	2.438E+03	1.151
α_7	3.54E-93	6.73E-06	7.16E-25	8.00E-06	1.464E-02	2.175E+03	1.290

CCCG = 8, Gamma = 0.144

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9952438	0.9971316	0.9972549	0.9985984	2.659E+03	7.648E+00	--
α_2	4.05E-04	1.31E-03	1.19E-03	2.64E-03	3.480E+00	2.644E+03	0.813
α_3	1.18E-04	6.82E-04	5.71E-04	1.63E-03	1.960E+00	2.870E+03	0.749
α_4	3.14E-05	4.29E-04	3.15E-04	1.22E-03	1.166E+00	2.717E+03	0.792
α_5	1.25E-06	2.20E-04	1.06E-04	8.24E-04	5.375E-01	2.442E+03	0.881
α_6	1.91E-11	8.62E-05	6.69E-06	4.56E-04	1.805E-01	2.093E+03	1.028
α_7	1.19E-35	2.30E-05	1.72E-11	1.12E-04	4.139E-02	1.803E+03	1.193
α_8	6.91E-09	1.13E-04	2.50E-05	5.28E-04	2.827E-01	2.494E+03	0.863

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	3.23E-03	1.75E-03	2.09E-03	1.93E-03	1.79E-03	1.49E-03	1.31E-03
α_3		1.33E-03	4.54E-04	7.20E-04	6.91E-04	7.69E-04	6.82E-04
α_4			5.89E-04	2.13E-04	3.37E-04	4.09E-04	4.29E-04
α_5				3.87E-05	9.73E-05	1.71E-04	2.20E-04
α_6					1.24E-04	4.70E-05	8.62E-05
α_7						6.73E-06	2.30E-05
α_8							1.13E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	3.23E-03	3.08E-03	3.13E-03	2.90E-03	3.04E-03	2.89E-03	2.87E-03
Gamma		4.31E-01	3.33E-01	3.35E-01	4.11E-01	4.85E-01	5.42E-01
Delta			5.65E-01	2.59E-01	4.47E-01	4.52E-01	5.61E-01
Epsilon				1.54E-01	3.97E-01	3.54E-01	5.08E-01
Mu					5.61E-01	2.40E-01	5.03E-01
Omega						1.25E-01	6.12E-01
Sigma							8.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	20.63	30.95	41.26	51.58	61.89	72.21	82.53
N_1	0.4643	0.6429	0.7857	0.8929	0.9643	1.0000	1.0000
N_2	0.0179	0.0536	0.1071	0.1786	0.2679	0.3750	0.5000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.1.2 ALL-MDP-FH: All Systems Motor-Driven Pumps Fail to Run Less Than One Hour

Generic CCF Parameters

Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run < 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 32.5
Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9668559	0.9915400	0.9963349	0.9999742	1.0000000	5.491E+01	4.685E-01
α_2	2.36E-05	8.46E-03	3.67E-03	3.31E-02	0.00E+00	4.685E-01	5.491E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9648534	0.9876861	0.9910135	0.9991501	1.0000000	9.048E+01	1.128E+00
α_2	3.11E-04	9.29E-03	6.05E-03	2.93E-02	0.00E+00	8.512E-01	9.076E+01
α_3	1.51E-07	3.02E-03	6.46E-04	1.42E-02	0.00E+00	2.768E-01	9.133E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9637070	0.9848595	0.9873604	0.9974691	1.0000000	1.232E+02	1.894E+00
α_2	8.70E-04	1.01E-02	7.61E-03	2.77E-02	0.00E+00	1.260E+00	1.238E+02
α_3	3.49E-06	3.22E-03	1.18E-03	1.33E-02	0.00E+00	4.024E-01	1.247E+02
α_4	1.28E-08	1.85E-03	2.76E-04	9.17E-03	0.00E+00	2.315E-01	1.248E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9695918	0.9848651	0.9862698	0.9953525	1.0000000	2.233E+02	3.432E+00
α_2	1.44E-03	8.49E-03	7.09E-03	2.03E-02	0.00E+00	1.924E+00	2.248E+02
α_3	2.68E-04	4.63E-03	3.28E-03	1.36E-02	0.00E+00	1.049E+00	2.257E+02
α_4	1.28E-06	1.69E-03	5.81E-04	7.11E-03	0.00E+00	3.822E-01	2.264E+02
α_5	2.94E-20	3.38E-04	3.15E-07	1.97E-03	0.00E+00	7.674E-02	2.267E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9714029	0.9853380	0.9865598	0.9951077	1.0000000	2.577E+02	3.835E+00
α_2	9.32E-04	6.50E-03	5.30E-03	1.62E-02	0.00E+00	1.701E+00	2.599E+02
α_3	3.64E-04	4.61E-03	3.43E-03	1.29E-02	0.00E+00	1.207E+00	2.603E+02
α_4	2.09E-05	2.28E-03	1.20E-03	8.21E-03	0.00E+00	5.960E-01	2.610E+02

α_5	3.31E-09	8.45E-04	1.13E-04	4.24E-03	0.00E+00	2.211E-01	2.613E+02
α_6	3.30E-15	4.20E-04	4.25E-06	2.42E-03	0.00E+00	1.098E-01	2.614E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9752931	0.9859837	0.9867644	0.9940027	1.0000000	4.043E+02	5.747E+00
α_2	1.12E-03	5.47E-03	4.69E-03	1.25E-02	0.00E+00	2.243E+00	4.078E+02
α_3	5.33E-04	3.97E-03	3.20E-03	1.01E-02	0.00E+00	1.630E+00	4.084E+02
α_4	1.64E-04	2.64E-03	1.89E-03	7.68E-03	0.00E+00	1.083E+00	4.090E+02
α_5	9.97E-06	1.38E-03	6.95E-04	5.07E-03	0.00E+00	5.654E-01	4.095E+02
α_6	2.57E-10	4.67E-04	4.32E-05	2.43E-03	0.00E+00	1.916E-01	4.099E+02
α_7	5.81E-41	8.49E-05	3.16E-12	3.72E-04	0.00E+00	3.480E-02	4.100E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9764071	0.9866302	0.9873836	0.9942927	1.0000000	4.225E+02	5.726E+00
α_2	8.49E-04	4.71E-03	3.97E-03	1.11E-02	0.00E+00	2.018E+00	4.262E+02
α_3	3.35E-04	3.25E-03	2.51E-03	8.66E-03	0.00E+00	1.391E+00	4.269E+02
α_4	1.48E-04	2.48E-03	1.76E-03	7.26E-03	0.00E+00	1.062E+00	4.272E+02
α_5	2.90E-05	1.64E-03	9.58E-04	5.57E-03	0.00E+00	7.026E-01	4.275E+02
α_6	3.21E-07	8.17E-04	2.51E-04	3.55E-03	0.00E+00	3.497E-01	4.279E+02
α_7	1.23E-15	2.52E-04	2.31E-06	1.45E-03	0.00E+00	1.078E-01	4.281E+02
α_8	2.57E-17	2.21E-04	9.37E-07	1.29E-03	0.00E+00	9.469E-02	4.282E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.88E-01	9.85E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01
α_2	8.46E-03	9.29E-03	1.01E-02	8.49E-03	6.50E-03	5.47E-03	4.71E-03
α_3		3.02E-03	3.22E-03	4.63E-03	4.61E-03	3.97E-03	3.25E-03
α_4			1.85E-03	1.69E-03	2.28E-03	2.64E-03	2.48E-03
α_5				3.38E-04	8.45E-04	1.38E-03	1.64E-03
α_6					4.20E-04	4.67E-04	8.17E-04
α_7						8.49E-05	2.52E-04
α_8							2.21E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.88E-01	9.85E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01
Beta	8.46E-03	1.23E-02	1.51E-02	1.51E-02	1.47E-02	1.40E-02	1.34E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	32.50	32.50	32.50	32.50	32.50	32.50	32.50
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 4.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.126

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9797232	0.9947732	0.9976777	0.9999827	9.200E+01	4.834E-01	--
α_2	1.73E-05	5.23E-03	2.32E-03	2.03E-02	4.834E-01	9.200E+01	0.524

CCCG = 3, Gamma = 0.126

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9843455	0.9943738	0.9957961	0.9995418	2.166E+02	1.226E+00	--
α_2	2.23E-04	4.58E-03	3.16E-03	1.38E-02	9.769E-01	2.123E+02	0.633
α_3	1.67E-08	1.05E-03	1.81E-04	5.07E-03	2.487E-01	2.377E+02	0.568

CCCG = 4, Gamma = 0.126

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9827199	0.9926263	0.9937659	0.9986368	2.769E+02	2.057E+00	--
α_2	5.76E-04	5.23E-03	4.09E-03	1.38E-02	1.442E+00	2.743E+02	0.682
α_3	1.80E-06	1.44E-03	5.39E-04	5.90E-03	4.114E-01	2.862E+02	0.656
α_4	9.29E-10	7.08E-04	7.71E-05	3.63E-03	2.036E-01	2.873E+02	0.654

CCCG = 5, Gamma = 0.126

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9850186	0.9924200	0.9930844	0.9975515	4.822E+02	3.683E+00	--
α_2	9.66E-04	4.73E-03	4.05E-03	1.08E-02	2.243E+00	4.722E+02	0.755
α_3	9.80E-05	1.95E-03	1.35E-03	5.85E-03	9.912E-01	5.074E+02	0.705
α_4	5.07E-07	7.44E-04	2.51E-04	3.16E-03	3.765E-01	5.056E+02	0.708
α_5	1.37E-21	1.59E-04	9.04E-08	9.16E-04	7.237E-02	4.562E+02	0.785

CCCG = 6, Gamma = 0.126

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9851172	0.9922322	0.9928391	0.9972741	5.287E+02	4.139E+00	--
α_2	8.04E-04	4.18E-03	3.55E-03	9.71E-03	2.128E+00	5.066E+02	0.803
α_3	1.36E-04	1.97E-03	1.43E-03	5.64E-03	1.134E+00	5.745E+02	0.710
α_4	6.28E-06	9.62E-04	4.77E-04	3.56E-03	5.533E-01	5.745E+02	0.710
α_5	1.53E-09	3.94E-04	5.25E-05	1.98E-03	2.210E-01	5.611E+02	0.728
α_6	3.30E-16	2.59E-04	1.80E-06	1.50E-03	1.027E-01	3.959E+02	1.032

CCCG = 7, Gamma = 0.126

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9873985	0.9926764	0.9930470	0.9966892	8.718E+02	6.432E+00	--
α_2	8.98E-04	3.45E-03	3.06E-03	7.36E-03	2.840E+00	8.193E+02	0.841
α_3	2.80E-04	1.89E-03	1.55E-03	4.68E-03	1.746E+00	9.217E+02	0.749
α_4	7.25E-05	1.16E-03	8.32E-04	3.39E-03	1.084E+00	9.307E+02	0.742
α_5	3.24E-06	5.70E-04	2.76E-04	2.13E-03	5.376E-01	9.422E+02	0.734
α_6	1.86E-10	2.12E-04	2.14E-05	1.09E-03	1.979E-01	9.346E+02	0.740
α_7	7.43E-53	3.32E-05	3.32E-15	1.13E-04	2.656E-02	8.006E+02	0.864

CCCG = 8, Gamma = 0.126

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9877633	0.9929717	0.9933460	0.9969022	8.636E+02	6.112E+00	--
α_2	6.25E-04	2.89E-03	2.50E-03	6.50E-03	2.364E+00	8.155E+02	0.845
α_3	1.99E-04	1.68E-03	1.33E-03	4.35E-03	1.512E+00	9.003E+02	0.767
α_4	6.62E-05	1.13E-03	8.00E-04	3.32E-03	1.056E+00	9.341E+02	0.739
α_5	1.10E-05	7.29E-04	4.15E-04	2.51E-03	6.745E-01	9.250E+02	0.747
α_6	4.34E-08	3.23E-04	8.20E-05	1.46E-03	3.076E-01	9.528E+02	0.725
α_7	8.01E-16	1.14E-04	1.13E-06	6.60E-04	1.093E-01	9.547E+02	0.724
α_8	2.56E-18	1.66E-04	4.61E-07	9.69E-04	8.885E-02	5.347E+02	1.293

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.94E-01	9.93E-01	9.92E-01	9.92E-01	9.93E-01	9.93E-01
α_2	5.23E-03	4.58E-03	5.23E-03	4.73E-03	4.18E-03	3.45E-03	2.89E-03
α_3		1.05E-03	1.44E-03	1.95E-03	1.97E-03	1.89E-03	1.68E-03
α_4			7.08E-04	7.44E-04	9.62E-04	1.16E-03	1.13E-03
α_5				1.59E-04	3.94E-04	5.70E-04	7.29E-04
α_6					2.59E-04	2.12E-04	3.23E-04
α_7						3.32E-05	1.14E-04
α_8							1.66E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.94E-01	9.93E-01	9.92E-01	9.92E-01	9.93E-01	9.93E-01
Beta	5.23E-03	5.63E-03	7.37E-03	7.58E-03	7.77E-03	7.32E-03	7.03E-03
Gamma		1.86E-01	2.91E-01	3.76E-01	4.62E-01	5.28E-01	5.89E-01
Delta			3.30E-01	3.16E-01	4.51E-01	5.11E-01	5.95E-01
Epsilon				1.76E-01	4.04E-01	4.12E-01	5.41E-01
Mu					3.97E-01	3.00E-01	4.53E-01
Omega						1.35E-01	4.65E-01
Sigma							5.92E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.10	4.10	4.10	4.10	4.10	4.10	4.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 5.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9510934	0.9876761	0.9948375	0.9999726	3.605E+01	4.498E-01	--
α_2	2.74E-05	1.23E-02	5.16E-03	4.89E-02	4.498E-01	3.605E+01	0.524

CCCG = 3, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9497588	0.9820771	0.9866840	0.9986391	6.456E+01	1.178E+00	--
α_2	6.45E-04	1.46E-02	9.95E-03	4.44E-02	9.387E-01	6.342E+01	0.633
α_3	3.50E-08	3.34E-03	5.38E-04	1.64E-02	2.396E-01	7.156E+01	0.568

CCCG = 4, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9466252	0.9776440	0.9812778	0.9962284	8.302E+01	1.898E+00	--
α_2	1.38E-03	1.53E-02	1.17E-02	4.18E-02	1.285E+00	8.256E+01	0.682
α_3	4.15E-06	4.51E-03	1.61E-03	1.88E-02	3.927E-01	8.675E+01	0.656
α_4	9.71E-09	2.52E-03	3.38E-04	1.27E-02	2.207E-01	8.721E+01	0.654

CCCG = 5, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9549770	0.9773999	0.9794207	0.9929155	1.516E+02	3.506E+00	--
α_2	2.35E-03	1.32E-02	1.11E-02	3.11E-02	1.992E+00	1.491E+02	0.755
α_3	4.12E-04	6.66E-03	4.77E-03	1.94E-02	1.078E+00	1.608E+02	0.705
α_4	1.18E-06	2.25E-03	7.29E-04	9.68E-03	3.632E-01	1.607E+02	0.708
α_5	4.61E-21	4.99E-04	2.89E-07	2.89E-03	7.248E-02	1.452E+02	0.785

CCCG = 6, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9571166	0.9774191	0.9791095	0.9919454	1.818E+02	4.199E+00	--
α_2	1.90E-03	1.10E-02	9.24E-03	2.63E-02	1.941E+00	1.740E+02	0.803
α_3	6.41E-04	6.69E-03	5.13E-03	1.81E-02	1.332E+00	1.978E+02	0.710
α_4	3.33E-05	3.11E-03	1.68E-03	1.10E-02	6.181E-01	1.983E+02	0.710
α_5	8.17E-09	1.19E-03	1.77E-04	5.90E-03	2.313E-01	1.939E+02	0.728
α_6	5.12E-20	5.61E-04	5.29E-07	3.26E-03	7.684E-02	1.369E+02	1.032

CCCG = 7, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9616149	0.9777634	0.9788924	0.9900561	2.736E+02	6.223E+00	--
α_2	2.48E-03	1.02E-02	8.93E-03	2.20E-02	2.654E+00	2.588E+02	0.841
α_3	7.63E-04	5.60E-03	4.53E-03	1.41E-02	1.645E+00	2.920E+02	0.749
α_4	2.50E-04	3.76E-03	2.72E-03	1.08E-02	1.115E+00	2.952E+02	0.742
α_5	1.95E-05	2.01E-03	1.07E-03	7.22E-03	6.034E-01	2.992E+02	0.734
α_6	1.06E-10	5.99E-04	4.46E-05	3.18E-03	1.780E-01	2.971E+02	0.740
α_7	5.85E-51	1.07E-04	2.21E-14	3.79E-04	2.734E-02	2.545E+02	0.864

CCCG = 8, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9623175	0.9781546	0.9792606	0.9902146	2.797E+02	6.246E+00	--
α_2	2.15E-03	9.31E-03	8.12E-03	2.05E-02	2.504E+00	2.666E+02	0.845
α_3	5.12E-04	4.78E-03	3.73E-03	1.27E-02	1.419E+00	2.953E+02	0.767
α_4	1.83E-04	3.34E-03	2.34E-03	9.89E-03	1.027E+00	3.066E+02	0.739
α_5	4.96E-05	2.41E-03	1.44E-03	8.05E-03	7.337E-01	3.038E+02	0.747
α_6	1.26E-06	1.27E-03	4.57E-04	5.28E-03	3.975E-01	3.132E+02	0.725
α_7	2.45E-20	2.45E-04	2.35E-07	1.42E-03	7.703E-02	3.141E+02	0.724
α_8	4.62E-18	4.97E-04	1.24E-06	2.90E-03	8.749E-02	1.759E+02	1.293

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.82E-01	9.78E-01	9.77E-01	9.77E-01	9.78E-01	9.78E-01
α_2	1.23E-02	1.46E-02	1.53E-02	1.32E-02	1.10E-02	1.02E-02	9.31E-03
α_3		3.34E-03	4.51E-03	6.66E-03	6.69E-03	5.60E-03	4.78E-03
α_4			2.52E-03	2.25E-03	3.11E-03	3.76E-03	3.34E-03
α_5				4.99E-04	1.19E-03	2.01E-03	2.41E-03
α_6					5.61E-04	5.99E-04	1.27E-03
α_7						1.07E-04	2.45E-04
α_8							4.97E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.82E-01	9.78E-01	9.77E-01	9.77E-01	9.78E-01	9.78E-01
Beta	1.23E-02	1.79E-02	2.24E-02	2.26E-02	2.26E-02	2.22E-02	2.18E-02
Gamma		1.86E-01	3.14E-01	4.17E-01	5.12E-01	5.43E-01	5.74E-01
Delta			3.59E-01	2.92E-01	4.21E-01	5.36E-01	6.19E-01
Epsilon				1.81E-01	3.61E-01	4.19E-01	5.70E-01
Mu					3.20E-01	2.60E-01	4.55E-01
Omega						1.52E-01	3.69E-01
Sigma							6.70E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.00	5.00	5.00	5.00	5.00	5.00	5.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 5.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9205470	0.9810898	0.9933398	0.9999857	1.972E+01	3.801E-01	--
α_2	1.43E-05	1.89E-02	6.66E-03	7.95E-02	3.801E-01	1.972E+01	0.524

CCCG = 3, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9056841	0.9684553	0.9780239	0.9984945	2.947E+01	9.600E-01	--
α_2	3.38E-04	2.26E-02	1.31E-02	7.75E-02	6.673E-01	2.880E+01	0.633
α_3	7.73E-07	8.90E-03	2.12E-03	4.10E-02	2.927E-01	3.259E+01	0.568

CCCG = 4, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9004671	0.9596522	0.9668340	0.9942340	3.970E+01	1.669E+00	--
α_2	1.47E-03	2.55E-02	1.82E-02	7.44E-02	1.039E+00	3.972E+01	0.682
α_3	7.95E-06	9.18E-03	3.27E-03	3.84E-02	3.887E-01	4.197E+01	0.656
α_4	6.54E-08	5.68E-03	9.36E-04	2.78E-02	2.414E-01	4.226E+01	0.654

CCCG = 5, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9199240	0.9595952	0.9631016	0.9872738	8.281E+01	3.487E+00	--
α_2	3.34E-03	2.14E-02	1.77E-02	5.21E-02	1.791E+00	8.190E+01	0.755
α_3	1.07E-03	1.35E-02	1.01E-02	3.75E-02	1.207E+00	8.847E+01	0.705
α_4	8.59E-06	4.86E-03	1.94E-03	1.96E-02	4.340E-01	8.882E+01	0.708
α_5	1.51E-26	6.82E-04	2.43E-08	3.76E-03	5.493E-02	8.044E+01	0.785

CCCG = 6, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9275292	0.9623550	0.9652933	0.9871343	9.982E+01	3.905E+00	--
α_2	1.34E-03	1.38E-02	1.06E-02	3.71E-02	1.335E+00	9.540E+01	0.803
α_3	1.71E-03	1.40E-02	1.12E-02	3.60E-02	1.531E+00	1.079E+02	0.710
α_4	1.27E-04	6.58E-03	3.91E-03	2.21E-02	7.191E-01	1.086E+02	0.710
α_5	3.38E-08	2.31E-03	3.95E-04	1.12E-02	2.467E-01	1.065E+02	0.728
α_6	1.06E-20	9.67E-04	5.82E-07	5.61E-03	7.279E-02	7.521E+01	1.032

CCCG = 7, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9383995	0.9647926	0.9666691	0.9847747	1.581E+02	5.770E+00	--
α_2	1.29E-03	1.03E-02	8.24E-03	2.65E-02	1.549E+00	1.485E+02	0.841
α_3	2.10E-03	1.18E-02	9.93E-03	2.79E-02	1.989E+00	1.666E+02	0.749
α_4	6.80E-04	7.57E-03	5.74E-03	2.07E-02	1.287E+00	1.688E+02	0.742
α_5	6.70E-05	4.02E-03	2.33E-03	1.37E-02	6.913E-01	1.714E+02	0.734
α_6	1.01E-08	1.36E-03	2.05E-04	6.74E-03	2.327E-01	1.704E+02	0.740
α_7	9.81E-65	1.44E-04	2.19E-17	3.64E-04	2.112E-02	1.461E+02	0.864

CCCG = 8, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9457236	0.9676112	0.9690412	0.9846145	2.096E+02	7.016E+00	--
α_2	1.03E-03	8.01E-03	6.42E-03	2.04E-02	1.583E+00	1.961E+02	0.845
α_3	1.61E-03	9.11E-03	7.66E-03	2.16E-02	1.986E+00	2.160E+02	0.767
α_4	1.03E-03	7.40E-03	6.00E-03	1.85E-02	1.672E+00	2.244E+02	0.739
α_5	2.39E-04	4.52E-03	3.15E-03	1.35E-02	1.011E+00	2.228E+02	0.747
α_6	1.88E-05	2.48E-03	1.26E-03	9.07E-03	5.709E-01	2.298E+02	0.725
α_7	1.80E-10	7.84E-04	6.13E-05	4.14E-03	1.809E-01	2.306E+02	0.724
α_8	1.39E-107	9.63E-05	2.92E-27	7.22E-05	1.245E-02	1.293E+02	1.293

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.68E-01	9.60E-01	9.60E-01	9.62E-01	9.65E-01	9.68E-01
α_2	1.89E-02	2.26E-02	2.55E-02	2.14E-02	1.38E-02	1.03E-02	8.01E-03
α_3		8.90E-03	9.18E-03	1.35E-02	1.40E-02	1.18E-02	9.11E-03
α_4			5.68E-03	4.86E-03	6.58E-03	7.57E-03	7.40E-03
α_5				6.82E-04	2.31E-03	4.02E-03	4.52E-03
α_6					9.67E-04	1.36E-03	2.48E-03
α_7						1.44E-04	7.84E-04
α_8							9.63E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.68E-01	9.60E-01	9.60E-01	9.62E-01	9.65E-01	9.68E-01
Beta	1.89E-02	3.15E-02	4.03E-02	4.04E-02	3.76E-02	3.52E-02	3.24E-02
Gamma		2.82E-01	3.68E-01	4.70E-01	6.33E-01	7.07E-01	7.53E-01
Delta			3.82E-01	2.92E-01	4.13E-01	5.26E-01	6.26E-01
Epsilon				1.23E-01	3.33E-01	4.22E-01	5.16E-01
Mu					2.95E-01	2.73E-01	4.26E-01
Omega						9.58E-02	2.62E-01
Sigma							1.09E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.10	5.10	5.10	5.10	5.10	5.10	5.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 12.2

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.375

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9737637	0.9932972	0.9970897	0.9999809	6.974E+01	4.706E-01	--
α_2	1.91E-05	6.70E-03	2.91E-03	2.62E-02	4.706E-01	6.974E+01	0.524

CCCG = 3, Gamma = 0.375

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9737636	0.9908950	0.9934178	0.9994064	1.200E+02	1.103E+00	--
α_2	1.98E-04	6.88E-03	4.37E-03	2.21E-02	8.104E-01	1.170E+02	0.633
α_3	1.87E-07	2.22E-03	5.21E-04	1.03E-02	2.921E-01	1.311E+02	0.568

CCCG = 4, Gamma = 0.375

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9753217	0.9896271	0.9913036	0.9981998	1.863E+02	1.953E+00	--
α_2	6.57E-04	7.06E-03	5.39E-03	1.92E-02	1.312E+00	1.845E+02	0.682
α_3	3.74E-06	2.23E-03	8.81E-04	9.02E-03	4.307E-01	1.927E+02	0.656
α_4	2.15E-09	1.08E-03	1.28E-04	5.51E-03	2.099E-01	1.936E+02	0.654

CCCG = 5, Gamma = 0.375

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9788476	0.9897798	0.9908330	0.9971130	3.009E+02	3.107E+00	--
α_2	8.03E-04	5.69E-03	4.62E-03	1.42E-02	1.684E+00	2.942E+02	0.755
α_3	1.31E-04	2.97E-03	2.02E-03	9.08E-03	9.426E-01	3.161E+02	0.705
α_4	9.08E-07	1.21E-03	4.16E-04	5.10E-03	3.816E-01	3.152E+02	0.708
α_5	1.38E-16	3.47E-04	1.90E-06	2.02E-03	9.865E-02	2.845E+02	0.785

CCCG = 6, Gamma = 0.375

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9805337	0.9900438	0.9908816	0.9966918	3.801E+02	3.822E+00	--
α_2	6.82E-04	4.71E-03	3.84E-03	1.17E-02	1.714E+00	3.621E+02	0.803
α_3	1.76E-04	2.69E-03	1.94E-03	7.77E-03	1.108E+00	4.105E+02	0.710
α_4	2.09E-05	1.58E-03	8.82E-04	5.53E-03	6.509E-01	4.105E+02	0.710
α_5	1.25E-08	6.32E-04	1.14E-04	3.05E-03	2.536E-01	4.011E+02	0.728
α_6	5.48E-17	3.38E-04	1.54E-06	1.97E-03	9.572E-02	2.830E+02	1.032

CCCG = 7, Gamma = 0.375

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9825576	0.9903531	0.9909534	0.9960988	5.333E+02	5.195E+00	--
α_2	7.95E-04	4.19E-03	3.56E-03	9.77E-03	2.105E+00	5.000E+02	0.841
α_3	2.20E-04	2.34E-03	1.79E-03	6.36E-03	1.320E+00	5.627E+02	0.749
α_4	8.93E-05	1.75E-03	1.21E-03	5.25E-03	9.967E-01	5.680E+02	0.742
α_5	4.61E-06	9.12E-04	4.33E-04	3.44E-03	5.249E-01	5.752E+02	0.734
α_6	2.55E-10	3.43E-04	3.35E-05	1.78E-03	1.956E-01	5.707E+02	0.740
α_7	3.09E-28	1.08E-04	2.45E-09	5.87E-04	5.291E-02	4.889E+02	0.864

CCCG = 8, Gamma = 0.375

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9835343	0.9906391	0.9911589	0.9959689	6.172E+02	5.832E+00	--
α_2	7.74E-04	3.81E-03	3.27E-03	8.73E-03	2.229E+00	5.821E+02	0.845
α_3	1.68E-04	1.96E-03	1.47E-03	5.40E-03	1.260E+00	6.431E+02	0.767
α_4	8.86E-05	1.56E-03	1.10E-03	4.60E-03	1.042E+00	6.671E+02	0.739
α_5	2.71E-05	1.15E-03	7.05E-04	3.80E-03	7.626E-01	6.606E+02	0.747
α_6	1.10E-07	4.80E-04	1.34E-04	2.14E-03	3.271E-01	6.807E+02	0.725
α_7	1.91E-13	1.97E-04	5.28E-06	1.11E-03	1.344E-01	6.821E+02	0.724
α_8	1.81E-20	2.01E-04	1.89E-07	1.17E-03	7.682E-02	3.820E+02	1.293

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.91E-01	9.90E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
α_2	6.70E-03	6.88E-03	7.06E-03	5.69E-03	4.71E-03	4.19E-03	3.81E-03
α_3		2.22E-03	2.23E-03	2.97E-03	2.69E-03	2.34E-03	1.96E-03
α_4			1.08E-03	1.21E-03	1.58E-03	1.75E-03	1.56E-03
α_5				3.47E-04	6.32E-04	9.12E-04	1.15E-03
α_6					3.38E-04	3.43E-04	4.80E-04
α_7						1.08E-04	1.97E-04
α_8							2.01E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.91E-01	9.90E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
Beta	6.70E-03	9.10E-03	1.04E-02	1.02E-02	9.96E-03	9.65E-03	9.36E-03
Gamma		2.44E-01	3.19E-01	4.43E-01	5.27E-01	5.65E-01	5.93E-01
Delta			3.27E-01	3.44E-01	4.87E-01	5.71E-01	6.47E-01
Epsilon				2.23E-01	3.80E-01	4.38E-01	5.66E-01
Mu					3.49E-01	3.31E-01	4.32E-01
Omega						2.40E-01	4.53E-01
Sigma							5.05E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	12.20	12.20	12.20	12.20	12.20	12.20	12.20
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 6.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9913471	0.9977563	0.9989888	0.9999918	2.193E+02	4.932E-01	--
α_2	8.23E-06	2.24E-03	1.01E-03	8.65E-03	4.932E-01	2.193E+02	0.524

CCCG = 3, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9925211	0.9974489	0.9981892	0.9998491	4.142E+02	1.059E+00	--
α_2	3.32E-05	1.78E-03	1.05E-03	6.01E-03	7.137E-01	4.005E+02	0.633
α_3	2.77E-07	7.72E-04	2.33E-04	3.37E-03	3.458E-01	4.473E+02	0.568

CCCG = 4, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9932333	0.9970931	0.9975340	0.9994460	7.253E+02	2.115E+00	--
α_2	2.66E-04	2.15E-03	1.71E-03	5.54E-03	1.549E+00	7.182E+02	0.682
α_3	1.10E-08	3.54E-04	6.91E-05	1.68E-03	2.646E-01	7.478E+02	0.656
α_4	4.43E-08	4.01E-04	9.84E-05	1.83E-03	3.010E-01	7.503E+02	0.654

CCCG = 5, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9949636	0.9972038	0.9973758	0.9988565	1.899E+03	5.325E+00	--
α_2	6.21E-04	1.95E-03	1.77E-03	3.87E-03	3.632E+00	1.862E+03	0.755
α_3	6.65E-05	6.77E-04	5.20E-04	1.83E-03	1.354E+00	1.998E+03	0.705
α_4	1.41E-08	1.49E-04	3.55E-05	6.84E-04	2.961E-01	1.990E+03	0.708
α_5	7.04E-35	2.36E-05	2.60E-11	1.17E-04	4.243E-02	1.795E+03	0.785

CCCG = 6, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9944928	0.9969985	0.9971975	0.9988249	1.639E+03	4.936E+00	--
α_2	4.89E-04	1.84E-03	1.63E-03	3.88E-03	2.915E+00	1.584E+03	0.803
α_3	5.97E-05	7.00E-04	5.26E-04	1.94E-03	1.257E+00	1.794E+03	0.710
α_4	1.14E-06	2.81E-04	1.28E-04	1.08E-03	5.031E-01	1.793E+03	0.710
α_5	1.91E-15	6.60E-05	8.70E-07	3.78E-04	1.155E-01	1.750E+03	0.728
α_6	5.49E-13	1.18E-04	4.30E-06	6.51E-04	1.451E-01	1.235E+03	1.032

CCCG = 7, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9955769	0.9972012	0.9972967	0.9984996	3.440E+03	9.654E+00	--
α_2	5.77E-04	1.49E-03	1.39E-03	2.75E-03	4.851E+00	3.250E+03	0.841
α_3	1.96E-04	7.66E-04	6.77E-04	1.64E-03	2.800E+00	3.653E+03	0.749
α_4	3.83E-05	3.75E-04	2.90E-04	1.00E-03	1.384E+00	3.687E+03	0.742
α_5	4.65E-07	1.31E-04	5.87E-05	5.08E-04	4.902E-01	3.731E+03	0.734
α_6	7.37E-16	3.10E-05	3.92E-07	1.78E-04	1.146E-01	3.700E+03	0.740
α_7	2.43E-93	4.62E-06	4.91E-25	5.49E-06	1.464E-02	3.169E+03	0.864

CCCG = 8, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9952859	0.9971985	0.9973273	0.9986713	2.544E+03	7.148E+00	--
α_2	3.29E-04	1.21E-03	1.08E-03	2.55E-03	2.980E+00	2.451E+03	0.845
α_3	1.26E-04	7.24E-04	6.06E-04	1.73E-03	1.960E+00	2.704E+03	0.767
α_4	3.04E-05	4.16E-04	3.05E-04	1.18E-03	1.166E+00	2.805E+03	0.739
α_5	1.10E-06	1.94E-04	9.36E-05	7.24E-04	5.375E-01	2.777E+03	0.747
α_6	1.39E-11	6.31E-05	4.90E-06	3.34E-04	1.805E-01	2.860E+03	0.725
α_7	7.47E-36	1.44E-05	1.08E-11	7.06E-05	4.139E-02	2.865E+03	0.724
α_8	1.07E-08	1.76E-04	3.89E-05	8.21E-04	2.827E-01	1.604E+03	1.293

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	2.24E-03	1.78E-03	2.15E-03	1.95E-03	1.84E-03	1.49E-03	1.21E-03
α_3		7.72E-04	3.54E-04	6.77E-04	7.00E-04	7.66E-04	7.24E-04
α_4			4.01E-04	1.49E-04	2.81E-04	3.75E-04	4.16E-04
α_5				2.36E-05	6.60E-05	1.31E-04	1.94E-04
α_6					1.18E-04	3.10E-05	6.31E-05
α_7						4.62E-06	1.44E-05
α_8							1.76E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	2.24E-03	2.55E-03	2.91E-03	2.80E-03	3.00E-03	2.80E-03	2.80E-03
Gamma		3.03E-01	2.60E-01	3.04E-01	3.88E-01	4.67E-01	5.67E-01
Delta			5.31E-01	2.03E-01	3.99E-01	4.14E-01	5.44E-01
Epsilon				1.37E-01	3.95E-01	3.08E-01	5.18E-01
Mu					6.40E-01	2.13E-01	5.67E-01
Omega						1.30E-01	7.51E-01
Sigma							9.24E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.10	6.10	6.10	6.10	6.10	6.10	6.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.1.3 ALL-MDP-FHRH: All Systems Motor-Driven Pumps Fail to Run Less Than or Greater Than One Hour

Generic CCF Parameters

Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run < 1H, Fail to Run > 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 129.0
Total Number of Common-Cause Failure Events: 6

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9577366	0.9839144	0.9873814	0.9982386	0.9854384	8.738E+01	1.429E+00
α_2	1.76E-03	1.61E-02	1.26E-02	4.23E-02	1.46E-02	1.429E+00	8.738E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9577735	0.9792392	0.9812392	0.9938622	0.9782264	1.537E+02	3.258E+00
α_2	4.01E-03	1.66E-02	1.46E-02	3.61E-02	1.79E-02	2.606E+00	1.543E+02
α_3	5.53E-05	4.15E-03	2.32E-03	1.45E-02	3.83E-03	6.518E-01	1.563E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9600458	0.9781997	0.9796185	0.9915006	0.9772385	2.172E+02	4.840E+00
α_2	3.46E-03	1.30E-02	1.16E-02	2.75E-02	1.26E-02	2.893E+00	2.191E+02
α_3	1.02E-03	7.44E-03	6.03E-03	1.87E-02	9.66E-03	1.653E+00	2.204E+02
α_4	1.18E-07	1.32E-03	3.13E-04	6.10E-03	4.83E-04	2.940E-01	2.217E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9680417	0.9812115	0.9821052	0.9913216	0.9798582	3.486E+02	6.675E+00
α_2	2.81E-03	9.38E-03	8.48E-03	1.90E-02	8.75E-03	3.332E+00	3.519E+02
α_3	1.04E-03	5.71E-03	4.82E-03	1.35E-02	6.09E-03	2.030E+00	3.532E+02
α_4	2.66E-04	3.39E-03	2.52E-03	9.50E-03	5.11E-03	1.205E+00	3.541E+02
α_5	1.54E-15	3.04E-04	2.81E-06	1.76E-03	1.94E-04	1.080E-01	3.552E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9708978	0.9825182	0.9832734	0.9915519	0.9816383	4.142E+02	7.369E+00
α_2	1.97E-03	7.17E-03	6.40E-03	1.50E-02	6.86E-03	3.021E+00	4.185E+02
α_3	9.21E-04	4.93E-03	4.17E-03	1.15E-02	4.52E-03	2.078E+00	4.195E+02
α_4	3.38E-04	3.29E-03	2.54E-03	8.78E-03	4.10E-03	1.386E+00	4.202E+02

α_5	4.17E-05	1.80E-03	1.10E-03	5.95E-03	2.80E-03	7.593E-01	4.208E+02
α_6	6.20E-14	2.97E-04	5.86E-06	1.69E-03	8.12E-05	1.254E-01	4.214E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9750824	0.9842391	0.9847701	0.9915786	0.9833322	5.920E+02	9.480E+00
α_2	1.75E-03	5.72E-03	5.18E-03	1.15E-02	5.35E-03	3.442E+00	5.981E+02
α_3	9.09E-04	4.06E-03	3.52E-03	9.04E-03	3.62E-03	2.441E+00	5.991E+02
α_4	4.64E-04	2.99E-03	2.46E-03	7.33E-03	3.21E-03	1.801E+00	5.997E+02
α_5	1.59E-04	2.01E-03	1.50E-03	5.63E-03	2.88E-03	1.211E+00	6.003E+02
α_6	5.37E-06	9.02E-04	4.40E-04	3.36E-03	1.57E-03	5.426E-01	6.010E+02
α_7	2.85E-34	7.08E-05	8.34E-11	3.52E-04	3.49E-05	4.261E-02	6.015E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9766427	0.9851812	0.9856727	0.9920323	0.9846374	6.415E+02	9.649E+00
α_2	1.39E-03	4.86E-03	4.37E-03	1.00E-02	4.50E-03	3.166E+00	6.480E+02
α_3	6.28E-04	3.27E-03	2.78E-03	7.59E-03	2.89E-03	2.128E+00	6.490E+02
α_4	3.92E-04	2.67E-03	2.18E-03	6.61E-03	2.64E-03	1.736E+00	6.494E+02
α_5	1.89E-04	2.02E-03	1.54E-03	5.50E-03	2.40E-03	1.316E+00	6.498E+02
α_6	4.65E-05	1.33E-03	8.68E-04	4.19E-03	2.02E-03	8.665E-01	6.503E+02
α_7	1.50E-07	5.17E-04	1.50E-04	2.28E-03	8.96E-04	3.366E-01	6.508E+02
α_8	5.94E-17	1.51E-04	8.25E-07	8.80E-04	1.53E-05	9.860E-02	6.510E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.79E-01	9.78E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01
α_2	1.61E-02	1.66E-02	1.30E-02	9.38E-03	7.17E-03	5.72E-03	4.86E-03
α_3		4.15E-03	7.44E-03	5.71E-03	4.93E-03	4.06E-03	3.27E-03
α_4			1.32E-03	3.39E-03	3.29E-03	2.99E-03	2.67E-03
α_5				3.04E-04	1.80E-03	2.01E-03	2.02E-03
α_6					2.97E-04	9.02E-04	1.33E-03
α_7						7.08E-05	5.17E-04
α_8							1.51E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.79E-01	9.78E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01
Beta	1.61E-02	2.08E-02	2.18E-02	1.88E-02	1.75E-02	1.58E-02	1.48E-02
Gamma		2.00E-01	4.02E-01	5.01E-01	5.90E-01	6.37E-01	6.72E-01
Delta			1.51E-01	3.93E-01	5.22E-01	5.96E-01	6.72E-01
Epsilon				8.22E-02	3.90E-01	4.99E-01	6.01E-01
Mu					1.42E-01	3.26E-01	4.97E-01
Omega						7.28E-02	3.34E-01
Sigma							2.27E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	61.92	92.88	123.84	154.80	185.76	216.72	247.68
N₁	3.0467	2.8150	2.6647	2.9603	3.2024	3.5048	3.7876
N₂	0.9600	1.7550	1.6335	1.4081	1.3199	1.1988	1.1482
N₃		0.3750	1.2505	0.9806	0.8708	0.8116	0.7380
N₄			0.0625	0.8229	0.7900	0.7181	0.6740
N₅				0.0313	0.5382	0.6455	0.6138
N₆					0.0156	0.3510	0.5168
N₇						0.0078	0.2288
N₈							0.0039

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 24.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.175

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9730547	0.9930491	0.9969047	0.9999770	6.906E+01	4.834E-01	--
α_2	2.30E-05	6.95E-03	3.10E-03	2.69E-02	4.834E-01	6.906E+01	0.803

CCCG = 3, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794080	0.9925928	0.9944601	0.9993958	1.642E+02	1.226E+00	--
α_2	2.95E-04	6.07E-03	4.19E-03	1.83E-02	9.769E-01	1.599E+02	0.921
α_3	2.13E-08	1.33E-03	2.31E-04	6.47E-03	2.487E-01	1.862E+02	0.795

CCCG = 4, Gamma = 0.178

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9793900	0.9911999	0.9925565	0.9983715	2.317E+02	2.057E+00	--
α_2	6.64E-04	6.02E-03	4.72E-03	1.59E-02	1.442E+00	2.379E+02	0.865
α_3	2.71E-06	2.16E-03	8.11E-04	8.88E-03	4.114E-01	1.901E+02	1.086
α_4	8.09E-10	6.17E-04	6.72E-05	3.16E-03	2.036E-01	3.299E+02	0.627

CCCG = 5, Gamma = 0.179

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825558	0.9911700	0.9919422	0.9971460	4.134E+02	3.683E+00	--
α_2	1.05E-03	5.14E-03	4.41E-03	1.17E-02	2.243E+00	4.339E+02	0.878
α_3	1.19E-04	2.38E-03	1.64E-03	7.13E-03	9.912E-01	4.161E+02	0.918
α_4	7.92E-07	1.16E-03	3.93E-04	4.93E-03	3.765E-01	3.236E+02	1.183
α_5	1.29E-21	1.48E-04	8.45E-08	8.57E-04	7.237E-02	4.877E+02	0.785

CCCG = 6, Gamma = 0.180

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9833478	0.9913059	0.9919840	0.9969478	4.719E+02	4.139E+00	--
α_2	8.38E-04	4.36E-03	3.71E-03	1.01E-02	2.128E+00	4.858E+02	0.900
α_3	1.53E-04	2.22E-03	1.61E-03	6.35E-03	1.134E+00	5.104E+02	0.858
α_4	8.38E-06	1.28E-03	6.36E-04	4.75E-03	5.533E-01	4.307E+02	1.018
α_5	2.44E-09	6.27E-04	8.37E-05	3.15E-03	2.210E-01	3.521E+02	1.246
α_6	2.62E-16	2.06E-04	1.43E-06	1.19E-03	1.027E-01	4.990E+02	0.880

CCCG = 7, Gamma = 0.180

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9860596	0.9918965	0.9923059	0.9963356	7.873E+02	6.432E+00	--
α_2	9.04E-04	3.48E-03	3.08E-03	7.40E-03	2.840E+00	8.138E+02	0.891
α_3	3.11E-04	2.09E-03	1.71E-03	5.18E-03	1.746E+00	8.318E+02	0.873
α_4	8.55E-05	1.37E-03	9.82E-04	4.00E-03	1.084E+00	7.884E+02	0.922
α_5	4.48E-06	7.89E-04	3.82E-04	2.95E-03	5.376E-01	6.811E+02	1.068
α_6	2.99E-10	3.40E-04	3.43E-05	1.76E-03	1.979E-01	5.815E+02	1.251
α_7	6.58E-53	2.94E-05	2.94E-15	1.00E-04	2.656E-02	9.041E+02	0.805

CCCG = 8, Gamma = 0.180

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9866698	0.9923422	0.9927495	0.9966240	7.921E+02	6.112E+00	--
α_2	6.15E-04	2.84E-03	2.45E-03	6.39E-03	2.364E+00	8.298E+02	0.881
α_3	2.15E-04	1.81E-03	1.43E-03	4.69E-03	1.512E+00	8.353E+02	0.876
α_4	7.62E-05	1.30E-03	9.21E-04	3.82E-03	1.056E+00	8.110E+02	0.903
α_5	1.37E-05	9.03E-04	5.14E-04	3.11E-03	6.745E-01	7.461E+02	0.982
α_6	6.60E-08	4.91E-04	1.25E-04	2.23E-03	3.076E-01	6.257E+02	1.171
α_7	1.41E-15	2.02E-04	1.99E-06	1.16E-03	1.093E-01	5.411E+02	1.355
α_8	1.75E-18	1.13E-04	3.15E-07	6.61E-04	8.885E-02	7.835E+02	0.936

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01
α_2	6.95E-03	6.07E-03	6.02E-03	5.14E-03	4.36E-03	3.48E-03	2.84E-03
α_3		1.33E-03	2.16E-03	2.38E-03	2.22E-03	2.09E-03	1.81E-03
α_4			6.17E-04	1.16E-03	1.28E-03	1.37E-03	1.30E-03
α_5				1.48E-04	6.27E-04	7.89E-04	9.03E-04
α_6					2.06E-04	3.40E-04	4.91E-04
α_7						2.94E-05	2.02E-04
α_8							1.13E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01
Beta	6.95E-03	7.41E-03	8.80E-03	8.83E-03	8.69E-03	8.10E-03	7.66E-03
Gamma		1.80E-01	3.15E-01	4.18E-01	4.98E-01	5.71E-01	6.29E-01
Delta			2.22E-01	3.55E-01	4.88E-01	5.47E-01	6.25E-01
Epsilon				1.13E-01	3.94E-01	4.58E-01	5.68E-01
Mu					2.47E-01	3.19E-01	4.72E-01
Omega						7.95E-02	3.91E-01
Sigma							3.60E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	11.52	17.28	23.04	28.80	34.56	40.32	46.08
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 23.4

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9274861	0.9784635	0.9872134	0.9996162	3.179E+01	6.998E-01	--
α_2	3.84E-04	2.15E-02	1.28E-02	7.25E-02	6.998E-01	3.179E+01	0.803

CCCG = 3, Gamma = 0.181

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9304998	0.9719432	0.9770234	0.9959950	5.814E+01	1.678E+00	--
α_2	2.14E-03	2.26E-02	1.74E-02	6.10E-02	1.314E+00	5.672E+01	0.921
α_3	2.95E-06	5.42E-03	1.77E-03	2.32E-02	3.646E-01	6.691E+01	0.795

CCCG = 4, Gamma = 0.181

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9338154	0.9694232	0.9730506	0.9926207	8.198E+01	2.586E+00	--
α_2	2.65E-03	1.90E-02	1.55E-02	4.74E-02	1.660E+00	8.575E+01	0.865
α_3	1.17E-04	9.24E-03	5.14E-03	3.23E-02	6.427E-01	6.894E+01	1.086
α_4	1.47E-07	2.35E-03	5.22E-04	1.09E-02	2.832E-01	1.202E+02	0.627

CCCG = 5, Gamma = 0.180

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9455667	0.9710682	0.9731488	0.9894588	1.449E+02	4.318E+00	--
α_2	3.11E-03	1.47E-02	1.26E-02	3.30E-02	2.305E+00	1.550E+02	0.878
α_3	9.59E-04	9.24E-03	7.18E-03	2.46E-02	1.391E+00	1.490E+02	0.918
α_4	2.14E-05	4.45E-03	2.10E-03	1.68E-02	5.195E-01	1.163E+02	1.183
α_5	9.96E-16	5.90E-04	4.35E-06	3.42E-03	1.037E-01	1.758E+02	0.785

CCCG = 6, Gamma = 0.180

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9500944	0.9723790	0.9740718	0.9888799	1.792E+02	5.090E+00	--
α_2	2.27E-03	1.14E-02	9.78E-03	2.63E-02	2.175E+00	1.879E+02	0.900
α_3	1.13E-03	8.25E-03	6.68E-03	2.08E-02	1.645E+00	1.976E+02	0.858
α_4	1.70E-04	5.08E-03	3.29E-03	1.61E-02	8.525E-01	1.671E+02	1.018
α_5	5.16E-07	2.37E-03	6.57E-04	1.06E-02	3.251E-01	1.369E+02	1.246
α_6	2.65E-17	4.76E-04	1.73E-06	2.77E-03	9.247E-02	1.943E+02	0.880

CCCG = 7, Gamma = 0.180

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9567409	0.9741184	0.9752533	0.9876202	2.695E+02	7.160E+00	--
α_2	2.55E-03	9.84E-03	8.72E-03	2.09E-02	2.818E+00	2.835E+02	0.891
α_3	1.11E-03	6.56E-03	5.48E-03	1.57E-02	1.918E+00	2.904E+02	0.873
α_4	5.17E-04	5.02E-03	3.88E-03	1.34E-02	1.388E+00	2.755E+02	0.922
α_5	7.71E-05	3.21E-03	1.97E-03	1.06E-02	7.675E-01	2.383E+02	1.068
α_6	8.41E-09	1.14E-03	1.72E-04	5.64E-03	2.327E-01	2.037E+02	1.251
α_7	1.78E-40	1.11E-04	4.99E-12	4.90E-04	3.515E-02	3.170E+02	0.805

CCCG = 8, Gamma = 0.180

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9584891	0.9751336	0.9762186	0.9880726	2.828E+02	7.211E+00	--
α_2	2.07E-03	8.58E-03	7.53E-03	1.87E-02	2.613E+00	3.019E+02	0.881
α_3	7.24E-04	5.35E-03	4.32E-03	1.35E-02	1.638E+00	3.046E+02	0.876
α_4	4.00E-04	4.38E-03	3.33E-03	1.19E-02	1.300E+00	2.959E+02	0.903
α_5	1.58E-04	3.48E-03	2.37E-03	1.06E-02	9.525E-01	2.724E+02	0.982
α_6	9.38E-06	2.21E-03	1.02E-03	8.45E-03	5.069E-01	2.286E+02	1.171
α_7	2.99E-15	5.47E-04	5.14E-06	3.16E-03	1.083E-01	1.980E+02	1.355
α_8	1.23E-17	3.19E-04	1.07E-06	1.86E-03	9.140E-02	2.867E+02	0.936

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.78E-01	9.72E-01	9.69E-01	9.71E-01	9.72E-01	9.74E-01	9.75E-01
α_2	2.15E-02	2.26E-02	1.90E-02	1.47E-02	1.14E-02	9.84E-03	8.58E-03
α_3		5.42E-03	9.24E-03	9.24E-03	8.25E-03	6.56E-03	5.35E-03
α_4			2.35E-03	4.45E-03	5.08E-03	5.02E-03	4.38E-03
α_5				5.90E-04	2.37E-03	3.21E-03	3.48E-03
α_6					4.76E-04	1.14E-03	2.21E-03
α_7						1.11E-04	5.47E-04
α_8							3.19E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.78E-01	9.72E-01	9.69E-01	9.71E-01	9.72E-01	9.74E-01	9.75E-01
Beta	2.15E-02	2.81E-02	3.06E-02	2.89E-02	2.76E-02	2.59E-02	2.49E-02
Gamma		1.93E-01	3.79E-01	4.94E-01	5.86E-01	6.20E-01	6.55E-01
Delta			2.03E-01	3.53E-01	4.90E-01	5.91E-01	6.72E-01
Epsilon				1.17E-01	3.59E-01	4.71E-01	6.00E-01
Mu					1.67E-01	2.80E-01	4.69E-01
Omega						8.86E-02	2.81E-01
Sigma							3.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	11.23	16.85	22.46	28.08	33.70	39.31	44.93
N_1	0.5000	0.3750	0.2500	0.1563	0.0938	0.0547	0.0313
N_2	0.2500	0.3750	0.3750	0.3125	0.2344	0.1641	0.1094
N_3		0.1250	0.2500	0.3125	0.3125	0.2734	0.2188

N₄			0.0625	0.1563	0.2344	0.2734	0.2734
N₅				0.0313	0.0938	0.1641	0.2188
N₆					0.0156	0.0547	0.1094
N₇						0.0078	0.0313
N₈							0.0039

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 11.2

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.109

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8107619	0.9334676	0.9510340	0.9959283	1.469E+01	1.047E+00	--
α_2	4.07E-03	6.65E-02	4.90E-02	1.89E-01	1.047E+00	1.469E+01	0.803

CCCG = 3, Gamma = 0.103

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8011639	0.9069613	0.9171496	0.9778122	2.398E+01	2.460E+00	--
α_2	1.33E-02	7.48E-02	6.39E-02	1.74E-01	1.917E+00	2.372E+01	0.921
α_3	1.11E-04	1.83E-02	9.10E-03	6.75E-02	5.427E-01	2.918E+01	0.795

CCCG = 4, Gamma = 0.099

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8152046	0.9034382	0.9104940	0.9675032	3.433E+01	3.669E+00	--
α_2	9.36E-03	4.97E-02	4.26E-02	1.15E-01	2.039E+00	3.896E+01	0.865
α_3	4.53E-03	4.26E-02	3.36E-02	1.11E-01	1.389E+00	3.125E+01	1.086
α_4	4.90E-08	4.27E-03	7.01E-04	2.09E-02	2.414E-01	5.629E+01	0.627

CCCG = 5, Gamma = 0.096

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8756792	0.9289752	0.9326613	0.9696673	7.177E+01	5.487E+00	--
α_2	6.72E-03	2.93E-02	2.57E-02	6.45E-02	2.458E+00	8.128E+01	0.878
α_3	3.88E-03	2.34E-02	1.96E-02	5.61E-02	1.874E+00	7.822E+01	0.918
α_4	1.16E-03	1.77E-02	1.29E-02	5.08E-02	1.101E+00	6.110E+01	1.183
α_5	1.30E-26	5.86E-04	2.08E-08	3.23E-03	5.493E-02	9.361E+01	0.785

CCCG = 6, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8931508	0.9381014	0.9411486	0.9726361	8.949E+01	5.905E+00	--
α_2	2.72E-03	1.77E-02	1.46E-02	4.31E-02	1.779E+00	9.904E+01	0.900
α_3	3.74E-03	1.97E-02	1.68E-02	4.58E-02	2.087E+00	1.036E+02	0.858
α_4	1.27E-03	1.43E-02	1.09E-02	3.91E-02	1.275E+00	8.783E+01	1.018
α_5	1.59E-04	9.49E-03	5.53E-03	3.23E-02	6.911E-01	7.211E+01	1.246
α_6	7.76E-21	7.06E-04	4.24E-07	4.09E-03	7.279E-02	1.030E+02	0.880

CCCG = 7, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9158061	0.9483813	0.9503587	0.9742016	1.428E+02	7.770E+00	--
α_2	1.87E-03	1.16E-02	9.61E-03	2.80E-02	1.845E+00	1.575E+02	0.891
α_3	3.47E-03	1.52E-02	1.33E-02	3.35E-02	2.470E+00	1.601E+02	0.873
α_4	1.66E-03	1.12E-02	9.21E-03	2.78E-02	1.731E+00	1.523E+02	0.922
α_5	6.58E-04	8.82E-03	6.51E-03	2.49E-02	1.173E+00	1.318E+02	1.068
α_6	2.46E-05	4.66E-03	2.24E-03	1.75E-02	5.290E-01	1.129E+02	1.251
α_7	8.12E-65	1.20E-04	1.81E-17	3.01E-04	2.112E-02	1.764E+02	0.805

CCCG = 8, Gamma = 0.092

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9266737	0.9537320	0.9552781	0.9755099	1.859E+02	9.016E+00	--
α_2	1.30E-03	8.46E-03	6.96E-03	2.07E-02	1.781E+00	2.088E+02	0.881
α_3	2.49E-03	1.13E-02	9.81E-03	2.52E-02	2.393E+00	2.093E+02	0.876
α_4	1.87E-03	1.01E-02	8.52E-03	2.35E-02	2.067E+00	2.034E+02	0.903
α_5	7.86E-04	7.44E-03	5.79E-03	1.97E-02	1.406E+00	1.875E+02	0.982
α_6	3.02E-04	6.18E-03	4.26E-03	1.86E-02	9.783E-01	1.574E+02	1.171
α_7	1.96E-06	2.76E-03	9.42E-04	1.17E-02	3.784E-01	1.366E+02	1.355
α_8	9.06E-108	6.28E-05	1.90E-27	4.70E-05	1.245E-02	1.982E+02	0.936

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.33E-01	9.07E-01	9.03E-01	9.29E-01	9.38E-01	9.48E-01	9.54E-01
α_2	6.65E-02	7.48E-02	4.97E-02	2.93E-02	1.77E-02	1.16E-02	8.46E-03
α_3		1.83E-02	4.26E-02	2.34E-02	1.97E-02	1.52E-02	1.13E-02
α_4			4.27E-03	1.77E-02	1.43E-02	1.12E-02	1.01E-02
α_5				5.86E-04	9.49E-03	8.82E-03	7.44E-03
α_6					7.06E-04	4.66E-03	6.18E-03
α_7						1.20E-04	2.76E-03
α_8							6.28E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.33E-01	9.07E-01	9.03E-01	9.29E-01	9.38E-01	9.48E-01	9.54E-01
Beta	6.65E-02	9.30E-02	9.66E-02	7.10E-02	6.19E-02	5.16E-02	4.63E-02
Gamma		1.96E-01	4.85E-01	5.87E-01	7.15E-01	7.76E-01	8.17E-01
Delta			9.12E-02	4.39E-01	5.54E-01	6.21E-01	7.01E-01
Epsilon				3.21E-02	4.16E-01	5.47E-01	6.20E-01
Mu					6.92E-02	3.52E-01	5.47E-01
Omega						2.50E-02	3.14E-01
Sigma							2.22E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.38	8.06	10.75	13.44	16.13	18.82	21.50
N_1	1.1667	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.6667	1.2500	1.0000	0.6667	0.4444	0.2963	0.1975
N_3		0.2500	1.0000	0.6667	0.5556	0.4815	0.4074

N₄			0.0000	0.6667	0.5556	0.4444	0.3951
N₅				0.0000	0.4444	0.4815	0.3951
N₆					0.0000	0.2963	0.4074
N₇						0.0000	0.1975
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 50.3

Total Number of Common-Cause Failure Events: 3

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.388

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9687971	0.9917675	0.9961243	0.9999622	6.191E+01	5.139E-01	--
α_2	3.78E-05	8.23E-03	3.88E-03	3.12E-02	5.139E-01	6.191E+01	0.803

CCCG = 3, Gamma = 0.391

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9697656	0.9890843	0.9918064	0.9990968	1.117E+02	1.233E+00	--
α_2	3.80E-04	8.61E-03	5.85E-03	2.62E-02	9.404E-01	1.083E+02	0.921
α_3	1.94E-07	2.31E-03	5.41E-04	1.06E-02	2.921E-01	1.263E+02	0.795

CCCG = 4, Gamma = 0.394

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9729442	0.9881692	0.9898607	0.9976101	1.847E+02	2.212E+00	--
α_2	1.04E-03	8.21E-03	6.57E-03	2.10E-02	1.571E+00	1.898E+02	0.865
α_3	4.79E-06	2.83E-03	1.12E-03	1.14E-02	4.312E-01	1.519E+02	1.086
α_4	1.58E-09	7.95E-04	9.37E-05	4.05E-03	2.099E-01	2.637E+02	0.627

CCCG = 5, Gamma = 0.395

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9763995	0.9881712	0.9892414	0.9962862	2.955E+02	3.537E+00	--
α_2	1.29E-03	6.75E-03	5.73E-03	1.57E-02	2.113E+00	3.108E+02	0.878
α_3	1.40E-04	3.15E-03	2.14E-03	9.63E-03	9.440E-01	2.984E+02	0.918
α_4	1.23E-06	1.64E-03	5.64E-04	6.93E-03	3.816E-01	2.321E+02	1.183
α_5	1.13E-16	2.82E-04	1.54E-06	1.64E-03	9.865E-02	3.500E+02	0.785

CCCG = 6, Gamma = 0.396

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9782133	0.9883884	0.9892240	0.9957093	3.802E+02	4.466E+00	--
α_2	1.28E-03	5.95E-03	5.14E-03	1.34E-02	2.355E+00	3.935E+02	0.900
α_3	1.76E-04	2.68E-03	1.93E-03	7.72E-03	1.111E+00	4.138E+02	0.858
α_4	2.46E-05	1.86E-03	1.04E-03	6.50E-03	6.510E-01	3.492E+02	1.018
α_5	1.76E-08	8.87E-04	1.60E-04	4.28E-03	2.536E-01	2.856E+02	1.246
α_6	3.83E-17	2.36E-04	1.07E-06	1.38E-03	9.572E-02	4.048E+02	0.880

CCCG = 7, Gamma = 0.396

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9807294	0.9889702	0.9895648	0.9951810	5.371E+02	5.990E+00	--
α_2	1.32E-03	5.08E-03	4.50E-03	1.08E-02	2.843E+00	5.570E+02	0.891
α_3	2.44E-04	2.41E-03	1.86E-03	6.45E-03	1.377E+00	5.700E+02	0.873
α_4	9.39E-05	1.84E-03	1.28E-03	5.52E-03	9.969E-01	5.402E+02	0.922
α_5	5.68E-06	1.12E-03	5.34E-04	4.24E-03	5.249E-01	4.668E+02	1.068
α_6	3.65E-10	4.91E-04	4.80E-05	2.54E-03	1.956E-01	3.986E+02	1.251
α_7	2.43E-28	8.54E-05	1.93E-09	4.63E-04	5.291E-02	6.197E+02	0.805

CCCG = 8, Gamma = 0.397

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9818264	0.9892982	0.9898081	0.9950294	6.277E+02	6.791E+00	--
α_2	1.29E-03	4.64E-03	4.15E-03	9.66E-03	3.070E+00	6.586E+02	0.881
α_3	2.08E-04	2.06E-03	1.59E-03	5.53E-03	1.372E+00	6.640E+02	0.876
α_4	9.33E-05	1.62E-03	1.15E-03	4.78E-03	1.047E+00	6.446E+02	0.903
α_5	3.01E-05	1.28E-03	7.86E-04	4.24E-03	7.626E-01	5.930E+02	0.982
α_6	1.50E-07	6.57E-04	1.83E-04	2.92E-03	3.271E-01	4.974E+02	1.171
α_7	3.03E-13	3.12E-04	8.37E-06	1.75E-03	1.344E-01	4.302E+02	1.355
α_8	1.11E-20	1.23E-04	1.16E-07	7.16E-04	7.682E-02	6.230E+02	0.936

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.89E-01	9.88E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01
α_2	8.23E-03	8.61E-03	8.21E-03	6.75E-03	5.95E-03	5.08E-03	4.64E-03
α_3		2.31E-03	2.83E-03	3.15E-03	2.68E-03	2.41E-03	2.06E-03
α_4			7.95E-04	1.64E-03	1.86E-03	1.84E-03	1.62E-03
α_5				2.82E-04	8.87E-04	1.12E-03	1.28E-03
α_6					2.36E-04	4.91E-04	6.57E-04
α_7						8.54E-05	3.12E-04
α_8							1.23E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.89E-01	9.88E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01
Beta	8.23E-03	1.09E-02	1.18E-02	1.18E-02	1.16E-02	1.10E-02	1.07E-02
Gamma		2.11E-01	3.06E-01	4.29E-01	4.88E-01	5.39E-01	5.66E-01
Delta			2.19E-01	3.79E-01	5.27E-01	5.95E-01	6.60E-01
Epsilon				1.47E-01	3.76E-01	4.80E-01	5.94E-01
Mu					2.10E-01	3.39E-01	4.60E-01
Omega						1.48E-01	3.99E-01
Sigma							2.83E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	24.14	36.22	48.29	60.36	72.43	84.50	96.58
N_1	1.3800	1.9400	2.4147	2.8041	3.1087	3.4501	3.7564
N_2	0.0433	0.1300	0.2585	0.4290	0.6411	0.7384	0.8413
N_3		0.0000	0.0005	0.0014	0.0028	0.0567	0.1118

N₄			0.0000	0.0000	0.0001	0.0002	0.0055
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 20.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.146

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9871325	0.9966620	0.9984934	0.9999877	1.473E+02	4.932E-01	--
α_2	1.23E-05	3.34E-03	1.51E-03	1.29E-02	4.932E-01	1.473E+02	0.803

CCCG = 3, Gamma = 0.148

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9895889	0.9964469	0.9974764	0.9997897	2.971E+02	1.060E+00	--
α_2	4.68E-05	2.51E-03	1.48E-03	8.46E-03	7.137E-01	2.841E+02	0.921
α_3	3.76E-07	1.05E-03	3.17E-04	4.57E-03	3.458E-01	3.298E+02	0.795

CCCG = 4, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9916180	0.9963981	0.9969438	0.9993132	5.850E+02	2.115E+00	--
α_2	3.29E-04	2.66E-03	2.11E-03	6.84E-03	1.549E+00	5.814E+02	0.865
α_3	1.78E-08	5.70E-04	1.12E-04	2.71E-03	2.646E-01	4.638E+02	1.086
α_4	4.14E-08	3.74E-04	9.18E-05	1.71E-03	3.010E-01	8.035E+02	0.627

CCCG = 5, Gamma = 0.150

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9939226	0.9966252	0.9968326	0.9986196	1.572E+03	5.325E+00	--
α_2	7.13E-04	2.23E-03	2.03E-03	4.44E-03	3.632E+00	1.621E+03	0.878
α_3	8.56E-05	8.71E-04	6.69E-04	2.35E-03	1.354E+00	1.553E+03	0.918
α_4	2.33E-08	2.45E-04	5.86E-05	1.13E-03	2.961E-01	1.207E+03	1.183
α_5	6.95E-35	2.33E-05	2.57E-11	1.16E-04	4.243E-02	1.818E+03	0.785

CCCG = 6, Gamma = 0.150

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9936554	0.9965416	0.9967707	0.9986458	1.422E+03	4.936E+00	--
α_2	5.38E-04	2.02E-03	1.80E-03	4.28E-03	2.915E+00	1.439E+03	0.900
α_3	7.10E-05	8.32E-04	6.25E-04	2.30E-03	1.257E+00	1.510E+03	0.858
α_4	1.61E-06	3.95E-04	1.81E-04	1.51E-03	5.031E-01	1.273E+03	1.018
α_5	3.21E-15	1.11E-04	1.46E-06	6.36E-04	1.155E-01	1.041E+03	1.246
α_6	4.60E-13	9.84E-05	3.60E-06	5.45E-04	1.451E-01	1.474E+03	0.880

CCCG = 7, Gamma = 0.151

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9950155	0.9968457	0.9969533	0.9983089	3.051E+03	9.654E+00	--
α_2	6.05E-04	1.56E-03	1.46E-03	2.88E-03	4.851E+00	3.098E+03	0.891
α_3	2.26E-04	8.84E-04	7.82E-04	1.89E-03	2.800E+00	3.164E+03	0.873
α_4	4.71E-05	4.61E-04	3.56E-04	1.23E-03	1.384E+00	2.998E+03	0.922
α_5	6.70E-07	1.89E-04	8.46E-05	7.32E-04	4.902E-01	2.590E+03	1.068
α_6	1.23E-15	5.19E-05	6.57E-07	2.98E-04	1.146E-01	2.210E+03	1.251
α_7	2.24E-93	4.26E-06	4.53E-25	5.06E-06	1.464E-02	3.435E+03	0.805

CCCG = 8, Gamma = 0.151

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9948438	0.9969355	0.9970763	0.9985465	2.325E+03	7.148E+00	--
α_2	3.38E-04	1.25E-03	1.11E-03	2.62E-03	2.980E+00	2.388E+03	0.881
α_3	1.41E-04	8.15E-04	6.82E-04	1.95E-03	1.960E+00	2.402E+03	0.876
α_4	3.65E-05	5.00E-04	3.66E-04	1.42E-03	1.166E+00	2.332E+03	0.903
α_5	1.42E-06	2.51E-04	1.21E-04	9.38E-04	5.375E-01	2.145E+03	0.982
α_6	2.22E-11	1.00E-04	7.79E-06	5.31E-04	1.805E-01	1.798E+03	1.171
α_7	1.38E-35	2.66E-05	1.99E-11	1.30E-04	4.139E-02	1.555E+03	1.355
α_8	7.66E-09	1.26E-04	2.77E-05	5.85E-04	2.827E-01	2.251E+03	0.936

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	3.34E-03	2.51E-03	2.66E-03	2.23E-03	2.02E-03	1.56E-03	1.25E-03
α_3		1.05E-03	5.70E-04	8.71E-04	8.32E-04	8.84E-04	8.15E-04
α_4			3.74E-04	2.45E-04	3.95E-04	4.61E-04	5.00E-04
α_5				2.33E-05	1.11E-04	1.89E-04	2.51E-04
α_6					9.84E-05	5.19E-05	1.00E-04
α_7						4.26E-06	2.66E-05
α_8							1.26E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	3.34E-03	3.55E-03	3.60E-03	3.37E-03	3.46E-03	3.15E-03	3.06E-03
Gamma		2.95E-01	2.62E-01	3.38E-01	4.15E-01	5.04E-01	5.93E-01
Delta			3.96E-01	2.36E-01	4.21E-01	4.44E-01	5.52E-01
Epsilon				8.69E-02	3.46E-01	3.47E-01	5.02E-01
Mu					4.70E-01	2.29E-01	5.02E-01
Omega						7.59E-02	6.03E-01
Sigma							8.25E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	9.65	14.47	19.30	24.12	28.94	33.77	38.59
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.1.4 ALL-MDP-RH: All Systems Motor-Driven Pumps Fail to Run Greater Than One Hour

Generic CCF Parameters

Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run > 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 96.5

Total Number of Common-Cause Failure Events: 6

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9488164	0.9804867	0.9846683	0.9978565	0.9809246	7.178E+01	1.429E+00
α_2	2.14E-03	1.95E-02	1.53E-02	5.12E-02	1.91E-02	1.429E+00	7.178E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9504369	0.9756011	0.9779402	0.9927782	0.9713806	1.303E+02	3.258E+00
α_2	4.72E-03	1.95E-02	1.72E-02	4.23E-02	2.36E-02	2.606E+00	1.309E+02
α_3	6.51E-05	4.88E-03	2.73E-03	1.70E-02	5.04E-03	6.518E-01	1.329E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9535726	0.9746353	0.9762792	0.9900966	0.9700105	1.860E+02	4.840E+00
α_2	4.03E-03	1.52E-02	1.35E-02	3.20E-02	1.66E-02	2.893E+00	1.879E+02
α_3	1.19E-03	8.66E-03	7.02E-03	2.18E-02	1.27E-02	1.653E+00	1.892E+02
α_4	1.37E-07	1.54E-03	3.64E-04	7.09E-03	6.36E-04	2.940E-01	1.905E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9641252	0.9788947	0.9798946	0.9902427	0.9734196	3.096E+02	6.675E+00
α_2	3.15E-03	1.05E-02	9.52E-03	2.14E-02	1.15E-02	3.332E+00	3.129E+02
α_3	1.17E-03	6.42E-03	5.41E-03	1.51E-02	8.04E-03	2.030E+00	3.142E+02
α_4	2.99E-04	3.81E-03	2.83E-03	1.07E-02	6.75E-03	1.205E+00	3.151E+02
α_5	1.74E-15	3.41E-04	3.16E-06	1.97E-03	2.56E-04	1.080E-01	3.162E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9672776	0.9803350	0.9811814	0.9904899	0.9757403	3.674E+02	7.369E+00
α_2	2.22E-03	8.06E-03	7.20E-03	1.68E-02	9.06E-03	3.021E+00	3.717E+02
α_3	1.04E-03	5.54E-03	4.69E-03	1.30E-02	5.98E-03	2.078E+00	3.727E+02
α_4	3.80E-04	3.70E-03	2.86E-03	9.88E-03	5.42E-03	1.386E+00	3.734E+02

α_5	4.69E-05	2.03E-03	1.24E-03	6.69E-03	3.69E-03	7.593E-01	3.740E+02
α_6	6.98E-14	3.35E-04	6.59E-06	1.90E-03	1.07E-04	1.254E-01	3.746E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9726010	0.9826657	0.9832481	0.9907341	0.9779587	5.374E+02	9.480E+00
α_2	1.93E-03	6.29E-03	5.70E-03	1.27E-02	7.08E-03	3.442E+00	5.435E+02
α_3	1.00E-03	4.46E-03	3.88E-03	9.94E-03	4.79E-03	2.441E+00	5.445E+02
α_4	5.11E-04	3.29E-03	2.71E-03	8.07E-03	4.24E-03	1.801E+00	5.451E+02
α_5	1.75E-04	2.21E-03	1.65E-03	6.20E-03	3.81E-03	1.211E+00	5.457E+02
α_6	5.90E-06	9.92E-04	4.84E-04	3.70E-03	2.07E-03	5.426E-01	5.464E+02
α_7	3.13E-34	7.79E-05	9.17E-11	3.87E-04	4.61E-05	4.261E-02	5.469E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9741782	0.9836106	0.9841525	0.9911846	0.9796702	5.791E+02	9.649E+00
α_2	1.54E-03	5.38E-03	4.83E-03	1.11E-02	5.95E-03	3.166E+00	5.856E+02
α_3	6.95E-04	3.62E-03	3.07E-03	8.40E-03	3.82E-03	2.128E+00	5.866E+02
α_4	4.34E-04	2.95E-03	2.41E-03	7.31E-03	3.49E-03	1.736E+00	5.870E+02
α_5	2.09E-04	2.24E-03	1.70E-03	6.08E-03	3.18E-03	1.316E+00	5.874E+02
α_6	5.14E-05	1.47E-03	9.60E-04	4.64E-03	2.68E-03	8.665E-01	5.879E+02
α_7	1.66E-07	5.72E-04	1.66E-04	2.52E-03	1.19E-03	3.366E-01	5.884E+02
α_8	6.57E-17	1.67E-04	9.13E-07	9.73E-04	2.02E-05	9.860E-02	5.886E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.80E-01	9.76E-01	9.75E-01	9.79E-01	9.80E-01	9.83E-01	9.84E-01
α_2	1.95E-02	1.95E-02	1.52E-02	1.05E-02	8.06E-03	6.29E-03	5.38E-03
α_3		4.88E-03	8.66E-03	6.42E-03	5.54E-03	4.46E-03	3.62E-03
α_4			1.54E-03	3.81E-03	3.70E-03	3.29E-03	2.95E-03
α_5				3.41E-04	2.03E-03	2.21E-03	2.24E-03
α_6					3.35E-04	9.92E-04	1.47E-03
α_7						7.79E-05	5.72E-04
α_8							1.67E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.80E-01	9.76E-01	9.75E-01	9.79E-01	9.80E-01	9.83E-01	9.84E-01
Beta	1.95E-02	2.44E-02	2.54E-02	2.11E-02	1.97E-02	1.73E-02	1.64E-02
Gamma		2.00E-01	4.02E-01	5.01E-01	5.90E-01	6.37E-01	6.72E-01
Delta			1.51E-01	3.93E-01	5.22E-01	5.96E-01	6.72E-01
Epsilon				8.22E-02	3.90E-01	4.99E-01	6.01E-01
Mu					1.42E-01	3.26E-01	4.97E-01
Omega						7.28E-02	3.34E-01
Sigma							2.27E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	46.32	69.48	92.64	115.80	138.96	162.12	185.28
N₁	3.0467	2.8150	2.6647	2.9603	3.2024	3.5048	3.7876
N₂	0.9600	1.7550	1.6335	1.4081	1.3199	1.1988	1.1482
N₃		0.3750	1.2505	0.9806	0.8708	0.8116	0.7380
N₄			0.0625	0.8229	0.7900	0.7181	0.6740
N₅				0.0313	0.5382	0.6455	0.6138
N₆					0.0156	0.3510	0.5168
N₇						0.0078	0.2288
N₈							0.0039

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 19.9

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.190

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9693923	0.9921011	0.9964781	0.9999738	6.072E+01	4.834E-01	--
α_2	2.62E-05	7.90E-03	3.52E-03	3.06E-02	4.834E-01	6.072E+01	0.880

CCCG = 3, Gamma = 0.193

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9765563	0.9915627	0.9936862	0.9993112	1.440E+02	1.226E+00	--
α_2	3.37E-04	6.92E-03	4.77E-03	2.08E-02	9.769E-01	1.403E+02	1.028
α_3	2.43E-08	1.52E-03	2.64E-04	7.37E-03	2.487E-01	1.633E+02	0.888

CCCG = 4, Gamma = 0.194

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9763533	0.9898975	0.9914513	0.9981289	2.016E+02	2.057E+00	--
α_2	7.59E-04	6.88E-03	5.38E-03	1.81E-02	1.442E+00	2.083E+02	0.968
α_3	3.17E-06	2.53E-03	9.51E-04	1.04E-02	4.114E-01	1.623E+02	1.248
α_4	9.16E-10	6.98E-04	7.61E-05	3.58E-03	2.036E-01	2.913E+02	0.697

CCCG = 5, Gamma = 0.196

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9802828	0.9900153	0.9908866	0.9967711	3.652E+02	3.683E+00	--
α_2	1.18E-03	5.76E-03	4.94E-03	1.31E-02	2.243E+00	3.872E+02	0.971
α_3	1.36E-04	2.71E-03	1.87E-03	8.13E-03	9.912E-01	3.650E+02	1.033
α_4	9.24E-07	1.35E-03	4.58E-04	5.74E-03	3.765E-01	2.776E+02	1.360
α_5	1.40E-21	1.62E-04	9.21E-08	9.34E-04	7.237E-02	4.476E+02	0.845

CCCG = 6, Gamma = 0.197

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9811652	0.9901626	0.9909281	0.9965447	4.166E+02	4.139E+00	--
α_2	9.33E-04	4.85E-03	4.12E-03	1.13E-02	2.128E+00	4.365E+02	0.987
α_3	1.75E-04	2.54E-03	1.85E-03	7.27E-03	1.134E+00	4.454E+02	0.970
α_4	9.67E-06	1.48E-03	7.34E-04	5.48E-03	5.533E-01	3.733E+02	1.158
α_5	2.87E-09	7.37E-04	9.85E-05	3.70E-03	2.210E-01	2.995E+02	1.445
α_6	2.91E-16	2.29E-04	1.59E-06	1.33E-03	1.027E-01	4.491E+02	0.964

CCCG = 7, Gamma = 0.197

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9845130	0.9909952	0.9914493	0.9959267	7.079E+02	6.432E+00	--
α_2	9.81E-04	3.77E-03	3.34E-03	8.04E-03	2.840E+00	7.496E+02	0.958
α_3	3.50E-04	2.36E-03	1.93E-03	5.84E-03	1.746E+00	7.384E+02	0.974
α_4	9.63E-05	1.55E-03	1.11E-03	4.50E-03	1.084E+00	7.005E+02	1.028
α_5	5.12E-06	8.99E-04	4.36E-04	3.37E-03	5.376E-01	5.971E+02	1.206
α_6	3.47E-10	3.95E-04	3.99E-05	2.04E-03	1.979E-01	5.006E+02	1.440
α_7	7.08E-53	3.16E-05	3.16E-15	1.08E-04	2.656E-02	8.407E+02	0.858

CCCG = 8, Gamma = 0.198

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9851038	0.9914403	0.9918948	0.9962252	7.080E+02	6.112E+00	--
α_2	6.68E-04	3.09E-03	2.67E-03	6.94E-03	2.364E+00	7.635E+02	0.947
α_3	2.43E-04	2.04E-03	1.61E-03	5.30E-03	1.512E+00	7.391E+02	0.980
α_4	8.67E-05	1.48E-03	1.05E-03	4.34E-03	1.056E+00	7.130E+02	1.016
α_5	1.55E-05	1.02E-03	5.83E-04	3.53E-03	6.745E-01	6.582E+02	1.101
α_6	7.65E-08	5.69E-04	1.45E-04	2.58E-03	3.076E-01	5.399E+02	1.343
α_7	1.67E-15	2.38E-04	2.36E-06	1.38E-03	1.093E-01	4.582E+02	1.583
α_8	1.86E-18	1.21E-04	3.35E-07	7.04E-04	8.885E-02	7.360E+02	0.985

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.92E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	7.90E-03	6.92E-03	6.88E-03	5.76E-03	4.85E-03	3.77E-03	3.09E-03
α_3		1.52E-03	2.53E-03	2.71E-03	2.54E-03	2.36E-03	2.04E-03
α_4			6.98E-04	1.35E-03	1.48E-03	1.55E-03	1.48E-03
α_5				1.62E-04	7.37E-04	8.99E-04	1.02E-03
α_6					2.29E-04	3.95E-04	5.69E-04
α_7						3.16E-05	2.38E-04
α_8							1.21E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.92E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	7.90E-03	8.44E-03	1.01E-02	9.98E-03	9.84E-03	9.00E-03	8.56E-03
Gamma		1.80E-01	3.19E-01	4.23E-01	5.07E-01	5.81E-01	6.39E-01
Delta			2.16E-01	3.59E-01	4.91E-01	5.49E-01	6.27E-01
Epsilon				1.07E-01	3.95E-01	4.62E-01	5.69E-01
Mu					2.37E-01	3.22E-01	4.76E-01
Omega						7.40E-02	3.87E-01
Sigma							3.36E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	9.55	14.33	19.10	23.88	28.66	33.43	38.21
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 18.4

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.190

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9126557	0.9739969	0.9844965	0.9995340	2.621E+01	6.998E-01	--
α_2	4.66E-04	2.60E-02	1.55E-02	8.73E-02	6.998E-01	2.621E+01	0.880

CCCG = 3, Gamma = 0.190

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9170291	0.9664163	0.9724369	0.9951863	4.830E+01	1.678E+00	--
α_2	2.57E-03	2.71E-02	2.09E-02	7.28E-02	1.314E+00	4.718E+01	1.028
α_3	3.54E-06	6.49E-03	2.13E-03	2.78E-02	3.646E-01	5.578E+01	0.888

CCCG = 4, Gamma = 0.189

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9205050	0.9631778	0.9674938	0.9910808	6.764E+01	2.586E+00	--
α_2	3.18E-03	2.27E-02	1.85E-02	5.66E-02	1.660E+00	7.146E+01	0.968
α_3	1.44E-04	1.13E-02	6.32E-03	3.96E-02	6.427E-01	5.607E+01	1.248
α_4	1.74E-07	2.79E-03	6.20E-04	1.30E-02	2.832E-01	1.014E+02	0.697

CCCG = 5, Gamma = 0.189

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9364813	0.9661825	0.9685908	0.9876519	1.234E+02	4.318E+00	--
α_2	3.59E-03	1.69E-02	1.46E-02	3.82E-02	2.305E+00	1.338E+02	0.971
α_3	1.13E-03	1.09E-02	8.45E-03	2.89E-02	1.391E+00	1.265E+02	1.033
α_4	2.58E-05	5.35E-03	2.53E-03	2.02E-02	5.195E-01	9.663E+01	1.360
α_5	1.12E-15	6.63E-04	4.90E-06	3.85E-03	1.037E-01	1.563E+02	0.845

CCCG = 6, Gamma = 0.189

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9417339	0.9677034	0.9696642	0.9869728	1.525E+02	5.090E+00	--
α_2	2.60E-03	1.31E-02	1.12E-02	3.01E-02	2.175E+00	1.637E+02	0.987
α_3	1.33E-03	9.74E-03	7.88E-03	2.45E-02	1.645E+00	1.672E+02	0.970
α_4	2.02E-04	6.03E-03	3.92E-03	1.91E-02	8.525E-01	1.405E+02	1.158
α_5	6.25E-07	2.87E-03	7.96E-04	1.28E-02	3.251E-01	1.130E+02	1.445
α_6	3.03E-17	5.44E-04	1.98E-06	3.17E-03	9.247E-02	1.698E+02	0.964

CCCG = 7, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9507070	0.9704786	0.9717635	0.9858618	2.354E+02	7.160E+00	--
α_2	2.83E-03	1.09E-02	9.70E-03	2.33E-02	2.818E+00	2.548E+02	0.958
α_3	1.28E-03	7.57E-03	6.32E-03	1.81E-02	1.918E+00	2.515E+02	0.974
α_4	5.97E-04	5.78E-03	4.48E-03	1.54E-02	1.388E+00	2.388E+02	1.028
α_5	9.01E-05	3.75E-03	2.31E-03	1.23E-02	7.675E-01	2.039E+02	1.206
α_6	1.00E-08	1.36E-03	2.04E-04	6.71E-03	2.327E-01	1.712E+02	1.440
α_7	1.96E-40	1.22E-04	5.49E-12	5.40E-04	3.515E-02	2.878E+02	0.858

CCCG = 8, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9523647	0.9714356	0.9726727	0.9862818	2.452E+02	7.211E+00	--
α_2	2.30E-03	9.57E-03	8.40E-03	2.08E-02	2.613E+00	2.706E+02	0.947
α_3	8.39E-04	6.20E-03	5.01E-03	1.56E-02	1.638E+00	2.625E+02	0.980
α_4	4.67E-04	5.11E-03	3.88E-03	1.39E-02	1.300E+00	2.534E+02	1.016
α_5	1.84E-04	4.05E-03	2.76E-03	1.23E-02	9.525E-01	2.341E+02	1.101
α_6	1.12E-05	2.63E-03	1.22E-03	1.00E-02	5.069E-01	1.922E+02	1.343
α_7	3.62E-15	6.62E-04	6.23E-06	3.83E-03	1.083E-01	1.634E+02	1.583
α_8	1.34E-17	3.48E-04	1.17E-06	2.03E-03	9.140E-02	2.625E+02	0.985

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.74E-01	9.66E-01	9.63E-01	9.66E-01	9.68E-01	9.70E-01	9.71E-01
α_2	2.60E-02	2.71E-02	2.27E-02	1.69E-02	1.31E-02	1.09E-02	9.57E-03
α_3		6.49E-03	1.13E-02	1.09E-02	9.74E-03	7.57E-03	6.20E-03
α_4			2.79E-03	5.35E-03	6.03E-03	5.78E-03	5.11E-03
α_5				6.63E-04	2.87E-03	3.75E-03	4.05E-03
α_6					5.44E-04	1.36E-03	2.63E-03
α_7						1.22E-04	6.62E-04
α_8							3.48E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.74E-01	9.66E-01	9.63E-01	9.66E-01	9.68E-01	9.70E-01	9.71E-01
Beta	2.60E-02	3.36E-02	3.68E-02	3.38E-02	3.23E-02	2.95E-02	2.86E-02
Gamma		1.93E-01	3.83E-01	4.99E-01	5.94E-01	6.29E-01	6.65E-01
Delta			1.97E-01	3.56E-01	4.92E-01	5.93E-01	6.74E-01
Epsilon				1.10E-01	3.61E-01	4.75E-01	6.01E-01
Mu					1.60E-01	2.83E-01	4.73E-01
Omega						8.26E-02	2.78E-01
Sigma							3.44E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.83	13.25	17.66	22.08	26.50	30.91	35.33
N_1	0.5000	0.3750	0.2500	0.1563	0.0938	0.0547	0.0313
N_2	0.2500	0.3750	0.3750	0.3125	0.2344	0.1641	0.1094
N_3		0.1250	0.2500	0.3125	0.3125	0.2734	0.2188

N₄			0.0625	0.1563	0.2344	0.2734	0.2734
N₅				0.0313	0.0938	0.1641	0.2188
N₆					0.0156	0.0547	0.1094
N₇						0.0078	0.0313
N₈							0.0039

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 6.1

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.095

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7463173	0.9095270	0.9323698	0.9943254	1.052E+01	1.047E+00	--
α_2	5.67E-03	9.05E-02	6.76E-02	2.54E-01	1.047E+00	1.052E+01	0.880

CCCG = 3, Gamma = 0.086

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7408016	0.8770149	0.8895752	0.9701025	1.754E+01	2.460E+00	--
α_2	1.78E-02	9.88E-02	8.52E-02	2.27E-01	1.917E+00	1.748E+01	1.028
α_3	1.49E-04	2.42E-02	1.21E-02	8.91E-02	5.427E-01	2.192E+01	0.888

CCCG = 4, Gamma = 0.080

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7601503	0.8731586	0.8817706	0.9566443	2.526E+01	3.669E+00	--
α_2	1.23E-02	6.46E-02	5.56E-02	1.48E-01	2.039E+00	2.952E+01	0.968
α_3	6.11E-03	5.67E-02	4.51E-02	1.47E-01	1.389E+00	2.309E+01	1.248
α_4	6.33E-08	5.50E-03	9.06E-04	2.69E-02	2.414E-01	4.363E+01	0.697

CCCG = 5, Gamma = 0.076

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8485133	0.9130068	0.9173606	0.9626080	5.759E+01	5.487E+00	--
α_2	8.14E-03	3.54E-02	3.10E-02	7.76E-02	2.458E+00	6.698E+01	0.971
α_3	4.78E-03	2.87E-02	2.40E-02	6.86E-02	1.874E+00	6.339E+01	1.033
α_4	1.46E-03	2.22E-02	1.62E-02	6.36E-02	1.101E+00	4.848E+01	1.360
α_5	1.53E-26	6.88E-04	2.45E-08	3.79E-03	5.493E-02	7.977E+01	0.845

CCCG = 6, Gamma = 0.074

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8695611	0.9241060	0.9277276	0.9662681	7.190E+01	5.905E+00	--
α_2	3.26E-03	2.11E-02	1.74E-02	5.14E-02	1.779E+00	8.264E+01	0.987
α_3	4.62E-03	2.43E-02	2.07E-02	5.62E-02	2.087E+00	8.386E+01	0.970
α_4	1.58E-03	1.77E-02	1.35E-02	4.83E-02	1.275E+00	7.068E+01	1.158
α_5	2.02E-04	1.20E-02	7.00E-03	4.07E-02	6.911E-01	5.700E+01	1.445
α_6	9.26E-21	8.42E-04	5.07E-07	4.88E-03	7.279E-02	8.639E+01	0.964

CCCG = 7, Gamma = 0.072

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9006414	0.9389263	0.9412181	0.9693810	1.195E+02	7.770E+00	--
α_2	2.14E-03	1.33E-02	1.10E-02	3.21E-02	1.845E+00	1.374E+02	0.958
α_3	4.13E-03	1.80E-02	1.57E-02	3.98E-02	2.470E+00	1.345E+02	0.974
α_4	1.97E-03	1.33E-02	1.09E-02	3.29E-02	1.731E+00	1.281E+02	1.028
α_5	7.92E-04	1.06E-02	7.83E-03	2.99E-02	1.173E+00	1.094E+02	1.206
α_6	3.02E-05	5.71E-03	2.74E-03	2.14E-02	5.290E-01	9.214E+01	1.440
α_7	9.21E-65	1.36E-04	2.06E-17	3.42E-04	2.112E-02	1.556E+02	0.858

CCCG = 8, Gamma = 0.071

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9135707	0.9453474	0.9471410	0.9709983	1.560E+02	9.016E+00	--
α_2	1.47E-03	9.60E-03	7.90E-03	2.35E-02	1.781E+00	1.837E+02	0.947
α_3	2.94E-03	1.33E-02	1.16E-02	2.98E-02	2.393E+00	1.770E+02	0.980
α_4	2.23E-03	1.20E-02	1.01E-02	2.79E-02	2.067E+00	1.709E+02	1.016
α_5	9.32E-04	8.81E-03	6.86E-03	2.34E-02	1.406E+00	1.582E+02	1.101
α_6	3.66E-04	7.48E-03	5.16E-03	2.25E-02	9.783E-01	1.299E+02	1.343
α_7	2.42E-06	3.41E-03	1.16E-03	1.44E-02	3.784E-01	1.106E+02	1.583
α_8	1.01E-107	6.98E-05	2.11E-27	5.23E-05	1.245E-02	1.783E+02	0.985

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.10E-01	8.77E-01	8.73E-01	9.13E-01	9.24E-01	9.39E-01	9.45E-01
α_2	9.05E-02	9.88E-02	6.46E-02	3.54E-02	2.11E-02	1.33E-02	9.60E-03
α_3		2.42E-02	5.67E-02	2.87E-02	2.43E-02	1.80E-02	1.33E-02
α_4			5.50E-03	2.22E-02	1.77E-02	1.33E-02	1.20E-02
α_5				6.88E-04	1.20E-02	1.06E-02	8.81E-03
α_6					8.42E-04	5.71E-03	7.48E-03
α_7						1.36E-04	3.41E-03
α_8							6.98E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.10E-01	8.77E-01	8.73E-01	9.13E-01	9.24E-01	9.39E-01	9.45E-01
Beta	9.05E-02	1.23E-01	1.27E-01	8.70E-02	7.59E-02	6.11E-02	5.47E-02
Gamma		1.96E-01	4.91E-01	5.93E-01	7.22E-01	7.83E-01	8.24E-01
Delta			8.84E-02	4.44E-01	5.57E-01	6.23E-01	7.04E-01
Epsilon				3.01E-02	4.20E-01	5.52E-01	6.23E-01
Mu					6.57E-02	3.55E-01	5.54E-01
Omega						2.32E-02	3.18E-01
Sigma							2.01E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.93	4.39	5.86	7.32	8.78	10.25	11.71
N_1	1.1667	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.6667	1.2500	1.0000	0.6667	0.4444	0.2963	0.1975
N_3		0.2500	1.0000	0.6667	0.5556	0.4815	0.4074

N₄			0.0000	0.6667	0.5556	0.4444	0.3951
N₅				0.0000	0.4444	0.4815	0.3951
N₆					0.0000	0.2963	0.4074
N₇						0.0000	0.1975
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 38.1

Total Number of Common-Cause Failure Events: 3

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.392

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9613012	0.9897806	0.9951769	0.9999529	4.978E+01	5.139E-01	--
α_2	4.71E-05	1.02E-02	4.82E-03	3.87E-02	5.139E-01	4.978E+01	0.880

CCCG = 3, Gamma = 0.396

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9630628	0.9866481	0.9899647	0.9988928	9.108E+01	1.233E+00	--
α_2	4.66E-04	1.05E-02	7.17E-03	3.21E-02	9.404E-01	8.839E+01	1.028
α_3	2.37E-07	2.82E-03	6.63E-04	1.30E-02	2.921E-01	1.031E+02	0.888

CCCG = 4, Gamma = 0.399

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9672502	0.9856639	0.9877044	0.9970995	1.521E+02	2.212E+00	--
α_2	1.26E-03	9.89E-03	7.92E-03	2.52E-02	1.571E+00	1.573E+02	0.968
α_3	5.93E-06	3.50E-03	1.39E-03	1.41E-02	4.312E-01	1.228E+02	1.248
α_4	1.89E-09	9.51E-04	1.12E-04	4.84E-03	2.099E-01	2.206E+02	0.697

CCCG = 5, Gamma = 0.401

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9721941	0.9860527	0.9873095	0.9956165	2.501E+02	3.537E+00	--
α_2	1.51E-03	7.88E-03	6.70E-03	1.83E-02	2.113E+00	2.659E+02	0.971
α_3	1.66E-04	3.75E-03	2.54E-03	1.14E-02	9.440E-01	2.509E+02	1.033
α_4	1.50E-06	1.99E-03	6.86E-04	8.42E-03	3.816E-01	1.909E+02	1.360
α_5	1.28E-16	3.20E-04	1.75E-06	1.86E-03	9.865E-02	3.080E+02	0.845

CCCG = 6, Gamma = 0.402

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9744350	0.9863655	0.9873429	0.9949574	3.231E+02	4.466E+00	--
α_2	1.48E-03	6.87E-03	5.94E-03	1.54E-02	2.355E+00	3.405E+02	0.987
α_3	2.10E-04	3.18E-03	2.30E-03	9.17E-03	1.111E+00	3.479E+02	0.970
α_4	2.95E-05	2.23E-03	1.24E-03	7.78E-03	6.510E-01	2.916E+02	1.158
α_5	2.15E-08	1.08E-03	1.95E-04	5.22E-03	2.536E-01	2.340E+02	1.445
α_6	4.42E-17	2.73E-04	1.24E-06	1.59E-03	9.572E-02	3.511E+02	0.964

CCCG = 7, Gamma = 0.403

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9779171	0.9873546	0.9880340	0.9944718	4.677E+02	5.990E+00	--
α_2	1.48E-03	5.69E-03	5.05E-03	1.21E-02	2.843E+00	4.965E+02	0.958
α_3	2.84E-04	2.80E-03	2.16E-03	7.51E-03	1.377E+00	4.898E+02	0.974
α_4	1.09E-04	2.14E-03	1.48E-03	6.41E-03	9.969E-01	4.646E+02	1.028
α_5	6.69E-06	1.32E-03	6.29E-04	4.99E-03	5.249E-01	3.961E+02	1.206
α_6	4.38E-10	5.89E-04	5.76E-05	3.05E-03	1.956E-01	3.321E+02	1.440
α_7	2.70E-28	9.48E-05	2.15E-09	5.14E-04	5.291E-02	5.578E+02	0.858

CCCG = 8, Gamma = 0.403

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9791204	0.9876992	0.9882834	0.9942836	5.453E+02	6.791E+00	--
α_2	1.45E-03	5.20E-03	4.65E-03	1.08E-02	3.070E+00	5.877E+02	0.947
α_3	2.42E-04	2.40E-03	1.85E-03	6.44E-03	1.372E+00	5.699E+02	0.980
α_4	1.09E-04	1.90E-03	1.34E-03	5.60E-03	1.047E+00	5.498E+02	1.016
α_5	3.52E-05	1.50E-03	9.18E-04	4.95E-03	7.626E-01	5.075E+02	1.101
α_6	1.80E-07	7.85E-04	2.19E-04	3.49E-03	3.271E-01	4.164E+02	1.343
α_7	3.68E-13	3.80E-04	1.02E-05	2.13E-03	1.344E-01	3.534E+02	1.583
α_8	1.22E-20	1.35E-04	1.27E-07	7.85E-04	7.682E-02	5.678E+02	0.985

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.87E-01	9.86E-01	9.86E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.02E-02	1.05E-02	9.89E-03	7.88E-03	6.87E-03	5.69E-03	5.20E-03
α_3		2.82E-03	3.50E-03	3.75E-03	3.18E-03	2.80E-03	2.40E-03
α_4			9.51E-04	1.99E-03	2.23E-03	2.14E-03	1.90E-03
α_5				3.20E-04	1.08E-03	1.32E-03	1.50E-03
α_6					2.73E-04	5.89E-04	7.85E-04
α_7						9.48E-05	3.80E-04
α_8							1.35E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.87E-01	9.86E-01	9.86E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.02E-02	1.34E-02	1.43E-02	1.39E-02	1.36E-02	1.26E-02	1.23E-02
Gamma		2.12E-01	3.10E-01	4.35E-01	4.96E-01	5.50E-01	5.77E-01
Delta			2.14E-01	3.82E-01	5.30E-01	5.97E-01	6.62E-01
Epsilon				1.38E-01	3.78E-01	4.84E-01	5.96E-01
Mu					2.01E-01	3.41E-01	4.64E-01
Omega						1.39E-01	3.96E-01
Sigma							2.62E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	18.29	27.43	36.58	45.72	54.86	64.01	73.15
N_1	1.3800	1.9400	2.4147	2.8041	3.1087	3.4501	3.7564
N_2	0.0433	0.1300	0.2585	0.4290	0.6411	0.7384	0.8413
N_3		0.0000	0.0005	0.0014	0.0028	0.0567	0.1118

N₄			0.0000	0.0000	0.0001	0.0002	0.0055
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 14.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.134

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9855385	0.9962478	0.9983056	0.9999862	1.309E+02	4.932E-01	--
α_2	1.38E-05	3.75E-03	1.69E-03	1.45E-02	4.932E-01	1.309E+02	0.880

CCCG = 3, Gamma = 0.135

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9881803	0.9959652	0.9971334	0.9997611	2.615E+02	1.060E+00	--
α_2	5.32E-05	2.84E-03	1.68E-03	9.60E-03	7.137E-01	2.502E+02	1.028
α_3	4.28E-07	1.19E-03	3.60E-04	5.20E-03	3.458E-01	2.901E+02	0.888

CCCG = 4, Gamma = 0.137

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9904759	0.9959065	0.9965261	0.9992192	5.145E+02	2.115E+00	--
α_2	3.73E-04	3.01E-03	2.40E-03	7.75E-03	1.549E+00	5.131E+02	0.968
α_3	2.07E-08	6.63E-04	1.30E-04	3.15E-03	2.646E-01	3.989E+02	1.248
α_4	4.65E-08	4.21E-04	1.03E-04	1.92E-03	3.010E-01	7.151E+02	0.697

CCCG = 5, Gamma = 0.138

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931976	0.9962221	0.9964542	0.9984545	1.404E+03	5.325E+00	--
α_2	7.92E-04	2.48E-03	2.26E-03	4.94E-03	3.632E+00	1.459E+03	0.971
α_3	9.68E-05	9.85E-04	7.56E-04	2.66E-03	1.354E+00	1.373E+03	1.033
α_4	2.69E-08	2.84E-04	6.77E-05	1.30E-03	2.961E-01	1.044E+03	1.360
α_5	7.51E-35	2.52E-05	2.78E-11	1.25E-04	4.243E-02	1.681E+03	0.845

CCCG = 6, Gamma = 0.138

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928978	0.9961282	0.9963844	0.9984836	1.270E+03	4.936E+00	--
α_2	5.94E-04	2.23E-03	1.99E-03	4.72E-03	2.915E+00	1.302E+03	0.987
α_3	8.07E-05	9.46E-04	7.11E-04	2.62E-03	1.257E+00	1.327E+03	0.970
α_4	1.84E-06	4.52E-04	2.07E-04	1.73E-03	5.031E-01	1.111E+03	1.158
α_5	3.75E-15	1.30E-04	1.71E-06	7.43E-04	1.155E-01	8.913E+02	1.445
α_6	5.08E-13	1.09E-04	3.98E-06	6.02E-04	1.451E-01	1.336E+03	0.964

CCCG = 7, Gamma = 0.139

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9945134	0.9965277	0.9966461	0.9981382	2.771E+03	9.654E+00	--
α_2	6.53E-04	1.69E-03	1.57E-03	3.11E-03	4.851E+00	2.871E+03	0.958
α_3	2.54E-04	9.90E-04	8.75E-04	2.12E-03	2.800E+00	2.826E+03	0.974
α_4	5.27E-05	5.16E-04	3.99E-04	1.38E-03	1.384E+00	2.680E+03	1.028
α_5	7.60E-07	2.15E-04	9.59E-05	8.30E-04	4.902E-01	2.284E+03	1.206
α_6	1.42E-15	5.99E-05	7.59E-07	3.44E-04	1.146E-01	1.914E+03	1.440
α_7	2.40E-93	4.56E-06	4.85E-25	5.41E-06	1.464E-02	3.213E+03	0.858

CCCG = 8, Gamma = 0.139

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9942940	0.9966084	0.9967642	0.9983912	2.100E+03	7.148E+00	--
α_2	3.65E-04	1.35E-03	1.20E-03	2.83E-03	2.980E+00	2.209E+03	0.947
α_3	1.59E-04	9.16E-04	7.66E-04	2.19E-03	1.960E+00	2.137E+03	0.980
α_4	4.13E-05	5.65E-04	4.15E-04	1.60E-03	1.166E+00	2.061E+03	1.016
α_5	1.60E-06	2.82E-04	1.37E-04	1.06E-03	5.375E-01	1.902E+03	1.101
α_6	2.56E-11	1.16E-04	8.98E-06	6.12E-04	1.805E-01	1.560E+03	1.343
α_7	1.62E-35	3.13E-05	2.34E-11	1.53E-04	4.139E-02	1.324E+03	1.583
α_8	8.11E-09	1.33E-04	2.93E-05	6.20E-04	2.827E-01	2.126E+03	0.985

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
α_2	3.75E-03	2.84E-03	3.01E-03	2.48E-03	2.23E-03	1.69E-03	1.35E-03
α_3		1.19E-03	6.63E-04	9.85E-04	9.46E-04	9.90E-04	9.16E-04
α_4			4.21E-04	2.84E-04	4.52E-04	5.16E-04	5.65E-04
α_5				2.52E-05	1.30E-04	2.15E-04	2.82E-04
α_6					1.09E-04	5.99E-05	1.16E-04
α_7						4.56E-06	3.13E-05
α_8							1.33E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
Beta	3.75E-03	4.03E-03	4.09E-03	3.78E-03	3.87E-03	3.47E-03	3.39E-03
Gamma		2.95E-01	2.65E-01	3.43E-01	4.23E-01	5.14E-01	6.03E-01
Delta			3.88E-01	2.39E-01	4.22E-01	4.45E-01	5.52E-01
Epsilon				8.17E-02	3.45E-01	3.51E-01	4.99E-01
Mu					4.56E-01	2.31E-01	4.98E-01
Omega						7.07E-02	5.87E-01
Sigma							8.10E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.72	10.08	13.44	16.80	20.16	23.52	26.88
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.1.5 ALL-MDP-FR-NR: Normally Running Systems Motor-Driven Pumps Fail to Run

Generic CCF Parameters

Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 141.5

Total Number of Common-Cause Failure Events: 6

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9500996	0.9776195	0.9805596	0.9950932	0.9770942	1.035E+02	2.369E+00
α_2	4.91E-03	2.24E-02	1.94E-02	4.99E-02	2.29E-02	2.369E+00	1.035E+02

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9513467	0.9734255	0.9751476	0.9896295	0.9698138	1.769E+02	4.828E+00
α_2	6.18E-03	1.95E-02	1.78E-02	3.88E-02	2.20E-02	3.551E+00	1.781E+02
α_3	6.21E-04	7.03E-03	5.32E-03	1.93E-02	8.16E-03	1.277E+00	1.804E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9548565	0.9732920	0.9745257	0.9875264	0.9697151	2.476E+02	6.794E+00
α_2	6.37E-03	1.73E-02	1.61E-02	3.26E-02	1.95E-02	4.410E+00	2.500E+02
α_3	8.92E-04	6.50E-03	5.26E-03	1.63E-02	7.73E-03	1.652E+00	2.527E+02
α_4	5.87E-05	2.88E-03	1.72E-03	9.62E-03	3.09E-03	7.315E-01	2.536E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9633530	0.9769709	0.9777741	0.9878559	0.9717837	3.860E+02	9.099E+00
α_2	4.92E-03	1.25E-02	1.17E-02	2.29E-02	1.50E-02	4.945E+00	3.902E+02
α_3	1.61E-03	6.66E-03	5.85E-03	1.45E-02	7.88E-03	2.632E+00	3.925E+02
α_4	2.33E-04	3.02E-03	2.24E-03	8.50E-03	4.05E-03	1.195E+00	3.939E+02
α_5	1.87E-07	8.27E-04	2.31E-04	3.68E-03	1.24E-03	3.267E-01	3.948E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9658525	0.9780191	0.9786988	0.9878754	0.9730133	4.585E+02	1.030E+01
α_2	3.98E-03	1.03E-02	9.59E-03	1.89E-02	1.30E-02	4.817E+00	4.639E+02
α_3	1.63E-03	6.16E-03	5.47E-03	1.30E-02	7.00E-03	2.886E+00	4.659E+02
α_4	4.66E-04	3.48E-03	2.80E-03	8.79E-03	4.31E-03	1.629E+00	4.671E+02
α_5	3.28E-05	1.57E-03	9.44E-04	5.25E-03	2.15E-03	7.367E-01	4.680E+02

α_6	4.10E-09	5.01E-04	7.67E-05	2.47E-03	5.21E-04	2.348E-01	4.685E+02
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CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9711604	0.9807363	0.9812205	0.9886472	0.9752584	6.434E+02	1.264E+01
α_2	3.00E-03	7.60E-03	7.10E-03	1.39E-02	9.84E-03	4.984E+00	6.511E+02
α_3	1.68E-03	5.37E-03	4.88E-03	1.08E-02	6.80E-03	3.524E+00	6.525E+02
α_4	6.98E-04	3.42E-03	2.93E-03	7.81E-03	4.16E-03	2.243E+00	6.538E+02
α_5	1.73E-04	1.95E-03	1.48E-03	5.36E-03	2.57E-03	1.282E+00	6.548E+02
α_6	3.31E-06	7.74E-04	3.58E-04	2.96E-03	1.14E-03	5.080E-01	6.555E+02
α_7	3.93E-17	1.48E-04	7.45E-07	8.62E-04	2.24E-04	9.730E-02	6.560E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9728580	0.9817877	0.9822337	0.9891809	0.9771168	7.000E+02	1.299E+01
α_2	2.29E-03	6.23E-03	5.78E-03	1.17E-02	7.64E-03	4.443E+00	7.086E+02
α_3	1.44E-03	4.76E-03	4.30E-03	9.63E-03	6.31E-03	3.392E+00	7.096E+02
α_4	7.00E-04	3.28E-03	2.83E-03	7.39E-03	4.02E-03	2.336E+00	7.107E+02
α_5	2.67E-04	2.17E-03	1.72E-03	5.58E-03	2.66E-03	1.545E+00	7.115E+02
α_6	3.89E-05	1.19E-03	7.67E-04	3.77E-03	1.57E-03	8.474E-01	7.122E+02
α_7	3.97E-08	4.16E-04	9.94E-05	1.91E-03	5.94E-04	2.963E-01	7.127E+02
α_8	4.06E-14	1.77E-04	3.55E-06	1.00E-03	9.85E-05	1.259E-01	7.129E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.78E-01	9.73E-01	9.73E-01	9.77E-01	9.78E-01	9.81E-01	9.82E-01
α_2	2.24E-02	1.95E-02	1.73E-02	1.25E-02	1.03E-02	7.60E-03	6.23E-03
α_3		7.03E-03	6.50E-03	6.66E-03	6.16E-03	5.37E-03	4.76E-03
α_4			2.88E-03	3.02E-03	3.48E-03	3.42E-03	3.28E-03
α_5				8.27E-04	1.57E-03	1.95E-03	2.17E-03
α_6					5.01E-04	7.74E-04	1.19E-03
α_7						1.48E-04	4.16E-04
α_8							1.77E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.78E-01	9.73E-01	9.73E-01	9.77E-01	9.78E-01	9.81E-01	9.82E-01
Beta	2.24E-02	2.66E-02	2.67E-02	2.30E-02	2.20E-02	1.93E-02	1.82E-02
Gamma		2.64E-01	3.51E-01	4.57E-01	5.32E-01	6.06E-01	6.58E-01
Delta			3.07E-01	3.66E-01	4.74E-01	5.40E-01	6.03E-01
Epsilon				2.15E-01	3.74E-01	4.57E-01	5.47E-01
Mu					2.42E-01	3.21E-01	4.51E-01
Omega						1.61E-01	3.33E-01
Sigma							2.98E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	77.18	115.77	154.36	192.95	231.55	270.14	308.73
N₁	3.8667	3.1000	2.5333	2.2083	1.6875	1.4766	1.2656
N₂	1.9000	2.7000	3.1500	3.0208	3.1163	2.7408	2.4244
N₃		1.0000	1.2500	1.5833	1.6788	1.8944	2.0012
N₄			0.5000	0.8125	1.0330	1.1597	1.2738
N₅				0.2500	0.5156	0.7167	0.8429
N₆					0.1250	0.3164	0.4977
N₇						0.0625	0.1885
N₈							0.0313

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 40.9

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.269

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9741538	0.9933335	0.9970324	0.9999779	7.203E+01	4.834E-01	--
α_2	2.21E-05	6.67E-03	2.97E-03	2.58E-02	4.834E-01	7.203E+01	0.919

CCCG = 3, Gamma = 0.273

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9789299	0.9924202	0.9943304	0.9993816	1.605E+02	1.226E+00	--
α_2	2.99E-04	6.15E-03	4.24E-03	1.85E-02	9.769E-01	1.579E+02	1.035
α_3	2.28E-08	1.43E-03	2.48E-04	6.93E-03	2.487E-01	1.737E+02	0.945

CCCG = 4, Gamma = 0.276

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9780823	0.9906393	0.9920809	0.9982672	2.177E+02	2.057E+00	--
α_2	7.47E-04	6.77E-03	5.30E-03	1.78E-02	1.442E+00	2.117E+02	1.073
α_3	2.24E-06	1.79E-03	6.71E-04	7.35E-03	4.114E-01	2.299E+02	0.992
α_4	1.06E-09	8.08E-04	8.80E-05	4.14E-03	2.036E-01	2.518E+02	0.907

CCCG = 5, Gamma = 0.278

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9813502	0.9905576	0.9913824	0.9969472	3.864E+02	3.683E+00	--
α_2	1.18E-03	5.79E-03	4.96E-03	1.32E-02	2.243E+00	3.853E+02	1.058
α_3	1.23E-04	2.45E-03	1.69E-03	7.35E-03	9.912E-01	4.038E+02	1.013
α_4	6.68E-07	9.80E-04	3.31E-04	4.16E-03	3.765E-01	3.838E+02	1.067
α_5	1.96E-21	2.26E-04	1.29E-07	1.31E-03	7.237E-02	3.201E+02	1.281

CCCG = 6, Gamma = 0.279

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9819884	0.9905939	0.9913265	0.9966968	4.359E+02	4.139E+00	--
α_2	9.62E-04	5.00E-03	4.25E-03	1.16E-02	2.128E+00	4.232E+02	1.108
α_3	1.67E-04	2.41E-03	1.76E-03	6.91E-03	1.134E+00	4.686E+02	1.004
α_4	7.95E-06	1.22E-03	6.03E-04	4.50E-03	5.533E-01	4.543E+02	1.036
α_5	2.04E-09	5.24E-04	7.00E-05	2.63E-03	2.210E-01	4.212E+02	1.119
α_6	3.16E-16	2.48E-04	1.73E-06	1.44E-03	1.027E-01	4.136E+02	1.139

CCCG = 7, Gamma = 0.280

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9848665	0.9912012	0.9916451	0.9960202	7.246E+02	6.432E+00	--
α_2	1.02E-03	3.93E-03	3.49E-03	8.37E-03	2.840E+00	7.193E+02	1.060
α_3	3.57E-04	2.41E-03	1.97E-03	5.95E-03	1.746E+00	7.241E+02	1.055
α_4	8.81E-05	1.41E-03	1.01E-03	4.12E-03	1.084E+00	7.653E+02	0.999
α_5	4.05E-06	7.13E-04	3.45E-04	2.67E-03	5.376E-01	7.536E+02	1.015
α_6	2.54E-10	2.89E-04	2.92E-05	1.49E-03	1.979E-01	6.846E+02	1.118
α_7	9.96E-53	4.45E-05	4.45E-15	1.52E-04	2.656E-02	5.974E+02	1.282

CCCG = 8, Gamma = 0.281

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9852849	0.9915447	0.9919937	0.9962713	7.168E+02	6.112E+00	--
α_2	6.97E-04	3.22E-03	2.78E-03	7.25E-03	2.364E+00	7.312E+02	1.058
α_3	2.66E-04	2.23E-03	1.77E-03	5.80E-03	1.512E+00	6.753E+02	1.147
α_4	8.37E-05	1.43E-03	1.01E-03	4.19E-03	1.056E+00	7.389E+02	1.049
α_5	1.33E-05	8.76E-04	4.99E-04	3.02E-03	6.745E-01	7.693E+02	1.008
α_6	5.56E-08	4.14E-04	1.05E-04	1.88E-03	3.076E-01	7.434E+02	1.044
α_7	1.16E-15	1.66E-04	1.64E-06	9.58E-04	1.093E-01	6.577E+02	1.180
α_8	1.79E-18	1.16E-04	3.22E-07	6.75E-04	8.885E-02	7.666E+02	1.013

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.92E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01
α_2	6.67E-03	6.15E-03	6.77E-03	5.79E-03	5.00E-03	3.93E-03	3.22E-03
α_3		1.43E-03	1.79E-03	2.45E-03	2.41E-03	2.41E-03	2.23E-03
α_4			8.08E-04	9.80E-04	1.22E-03	1.41E-03	1.43E-03
α_5				2.26E-04	5.24E-04	7.13E-04	8.76E-04
α_6					2.48E-04	2.89E-04	4.14E-04
α_7						4.45E-05	1.66E-04
α_8							1.16E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.92E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01
Beta	6.67E-03	7.58E-03	9.36E-03	9.44E-03	9.41E-03	8.80E-03	8.46E-03
Gamma		1.89E-01	2.77E-01	3.87E-01	4.68E-01	5.53E-01	6.19E-01
Delta			3.11E-01	3.30E-01	4.52E-01	5.06E-01	5.73E-01
Epsilon				1.87E-01	3.88E-01	4.25E-01	5.24E-01
Mu					3.21E-01	3.19E-01	4.43E-01
Omega						1.33E-01	4.05E-01
Sigma							4.11E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	22.31	33.46	44.62	55.77	66.93	78.08	89.24
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 32.8

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.228

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9295115	0.9781932	0.9862358	0.9994284	3.513E+01	7.831E-01	--
α_2	5.72E-04	2.18E-02	1.38E-02	7.05E-02	7.831E-01	3.513E+01	0.919

CCCG = 3, Gamma = 0.227

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9201379	0.9648850	0.9697656	0.9929245	5.985E+01	2.178E+00	--
α_2	5.51E-03	3.16E-02	2.66E-02	7.45E-02	1.939E+00	5.950E+01	1.035
α_3	3.74E-08	3.56E-03	5.74E-04	1.75E-02	2.396E-01	6.703E+01	0.945

CCCG = 4, Gamma = 0.227

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9294579	0.9662728	0.9698297	0.9909201	8.304E+01	2.898E+00	--
α_2	3.34E-03	2.15E-02	1.78E-02	5.24E-02	1.785E+00	8.116E+01	1.073
α_3	3.82E-04	9.96E-03	6.63E-03	3.09E-02	8.927E-01	8.875E+01	0.992
α_4	8.65E-09	2.25E-03	3.01E-04	1.13E-02	2.207E-01	9.787E+01	0.907

CCCG = 5, Gamma = 0.228

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9433131	0.9695282	0.9716230	0.9885843	1.434E+02	4.506E+00	--
α_2	3.15E-03	1.53E-02	1.32E-02	3.48E-02	2.242E+00	1.441E+02	1.058
α_3	1.32E-03	1.03E-02	8.28E-03	2.63E-02	1.578E+00	1.513E+02	1.013
α_4	4.39E-05	4.23E-03	2.27E-03	1.51E-02	6.132E-01	1.445E+02	1.067
α_5	5.54E-21	6.00E-04	3.47E-07	3.47E-03	7.248E-02	1.208E+02	1.281

CCCG = 6, Gamma = 0.228

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9480855	0.9711074	0.9728369	0.9882205	1.748E+02	5.199E+00	--
α_2	2.23E-03	1.20E-02	1.02E-02	2.80E-02	2.066E+00	1.703E+02	1.108
α_3	1.29E-03	8.97E-03	7.32E-03	2.23E-02	1.707E+00	1.886E+02	1.004
α_4	2.73E-04	5.39E-03	3.74E-03	1.61E-02	9.931E-01	1.833E+02	1.036
α_5	9.48E-07	2.09E-03	6.58E-04	9.02E-03	3.563E-01	1.704E+02	1.119
α_6	4.18E-20	4.58E-04	4.32E-07	2.66E-03	7.684E-02	1.675E+02	1.139

CCCG = 7, Gamma = 0.228

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9548698	0.9729392	0.9741128	0.9870008	2.597E+02	7.223E+00	--
α_2	2.59E-03	1.03E-02	9.13E-03	2.22E-02	2.717E+00	2.600E+02	1.060
α_3	1.20E-03	7.18E-03	5.98E-03	1.73E-02	1.895E+00	2.622E+02	1.055
α_4	6.22E-04	5.34E-03	4.22E-03	1.39E-02	1.490E+00	2.773E+02	0.999
α_5	1.04E-04	3.11E-03	2.02E-03	9.84E-03	8.534E-01	2.735E+02	1.015
α_6	1.05E-08	9.65E-04	1.56E-04	4.73E-03	2.405E-01	2.489E+02	1.118
α_7	6.85E-51	1.26E-04	2.58E-14	4.44E-04	2.734E-02	2.173E+02	1.282

CCCG = 8, Gamma = 0.229

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9562330	0.9737444	0.9748814	0.9873732	2.687E+02	7.246E+00	--
α_2	2.13E-03	9.10E-03	7.95E-03	2.00E-02	2.535E+00	2.762E+02	1.058
α_3	7.81E-04	6.13E-03	4.90E-03	1.57E-02	1.575E+00	2.556E+02	1.147
α_4	4.60E-04	4.76E-03	3.65E-03	1.29E-02	1.340E+00	2.798E+02	1.049
α_5	2.05E-04	3.58E-03	2.53E-03	1.05E-02	1.046E+00	2.915E+02	1.008
α_6	1.29E-05	1.96E-03	9.73E-04	7.25E-03	5.538E-01	2.820E+02	1.044
α_7	2.37E-15	4.33E-04	4.07E-06	2.50E-03	1.083E-01	2.498E+02	1.180
α_8	2.79E-18	3.00E-04	7.50E-07	1.75E-03	8.749E-02	2.912E+02	1.013

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.78E-01	9.65E-01	9.66E-01	9.70E-01	9.71E-01	9.73E-01	9.74E-01
α_2	2.18E-02	3.16E-02	2.15E-02	1.53E-02	1.20E-02	1.03E-02	9.10E-03
α_3		3.56E-03	9.96E-03	1.03E-02	8.97E-03	7.18E-03	6.13E-03
α_4			2.25E-03	4.23E-03	5.39E-03	5.34E-03	4.76E-03
α_5				6.00E-04	2.09E-03	3.11E-03	3.58E-03
α_6					4.58E-04	9.65E-04	1.96E-03
α_7						1.26E-04	4.33E-04
α_8							3.00E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.78E-01	9.65E-01	9.66E-01	9.70E-01	9.71E-01	9.73E-01	9.74E-01
Beta	2.18E-02	3.51E-02	3.37E-02	3.05E-02	2.89E-02	2.71E-02	2.63E-02
Gamma		1.01E-01	3.62E-01	4.97E-01	5.85E-01	6.18E-01	6.54E-01
Delta			1.84E-01	3.19E-01	4.69E-01	5.71E-01	6.43E-01
Epsilon				1.24E-01	3.21E-01	4.40E-01	5.68E-01
Mu					1.80E-01	2.60E-01	4.30E-01
Omega						1.15E-01	2.72E-01
Sigma							4.09E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	17.89	26.84	35.78	44.73	53.67	62.62	71.56
N_1	0.6667	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.3333	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313
N_3		0.0000	0.5000	0.5000	0.3750	0.2500	0.1563

N₄			0.0000	0.2500	0.3750	0.3750	0.3125
N₅				0.0000	0.1250	0.2500	0.3125
N₆					0.0000	0.0625	0.1563
N₇						0.0000	0.0313
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 10.1

Total Number of Common-Cause Failure Events: 4

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.114

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7432780	0.8899691	0.9059251	0.9818360	1.440E+01	1.780E+00	--
α_2	1.82E-02	1.10E-01	9.41E-02	2.57E-01	1.780E+00	1.440E+01	0.919

CCCG = 3, Gamma = 0.107

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7663434	0.8815229	0.8910565	0.9640076	2.351E+01	3.160E+00	--
α_2	1.24E-02	7.26E-02	6.17E-02	1.70E-01	1.867E+00	2.386E+01	1.035
α_3	4.30E-03	4.59E-02	3.56E-02	1.23E-01	1.293E+00	2.687E+01	0.945

CCCG = 4, Gamma = 0.102

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7848853	0.8802892	0.8869355	0.9529315	3.360E+01	4.569E+00	--
α_2	1.89E-02	7.37E-02	6.60E-02	1.55E-01	2.689E+00	3.381E+01	1.073
α_3	2.06E-03	2.89E-02	2.13E-02	8.14E-02	1.139E+00	3.831E+01	0.992
α_4	3.73E-04	1.72E-02	1.05E-02	5.68E-02	7.414E-01	4.242E+01	0.907

CCCG = 5, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8407860	0.9028097	0.9064543	0.9523728	6.645E+01	7.154E+00	--
α_2	1.82E-02	5.30E-02	4.90E-02	1.02E-01	3.895E+00	6.960E+01	1.058
α_3	4.48E-03	2.55E-02	2.15E-02	6.02E-02	1.957E+00	7.481E+01	1.013
α_4	7.05E-04	1.37E-02	9.55E-03	4.07E-02	9.965E-01	7.186E+01	1.067
α_5	6.30E-07	5.02E-03	1.27E-03	2.28E-02	3.049E-01	6.041E+01	1.281

CCCG = 6, Gamma = 0.095

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8507763	0.9060382	0.9090726	0.9509294	8.074E+01	8.373E+00	--
α_2	1.54E-02	4.52E-02	4.17E-02	8.68E-02	3.882E+00	8.208E+01	1.108
α_3	5.59E-03	2.52E-02	2.19E-02	5.59E-02	2.390E+00	9.253E+01	1.004
α_4	1.20E-03	1.38E-02	1.04E-02	3.77E-02	1.266E+00	9.065E+01	1.036
α_5	9.15E-05	7.48E-03	4.14E-03	2.63E-02	6.373E-01	8.452E+01	1.119
α_6	2.07E-09	2.37E-03	2.40E-04	1.22E-02	1.978E-01	8.341E+01	1.139

CCCG = 7, Gamma = 0.092

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.8840902	0.9239330	0.9259461	0.9568995	1.295E+02	1.066E+01	--
α_2	9.71E-03	2.84E-02	2.61E-02	5.47E-02	3.931E+00	1.346E+02	1.060
α_3	6.66E-03	2.29E-02	2.07E-02	4.68E-02	3.189E+00	1.360E+02	1.055
α_4	2.04E-03	1.26E-02	1.05E-02	3.04E-02	1.850E+00	1.451E+02	0.999
α_5	5.24E-04	7.75E-03	5.63E-03	2.22E-02	1.121E+00	1.435E+02	1.015
α_6	1.27E-05	3.71E-03	1.65E-03	1.44E-02	4.866E-01	1.308E+02	1.118
α_7	1.45E-18	7.30E-04	1.32E-06	4.26E-03	8.362E-02	1.145E+02	1.282

CCCG = 8, Gamma = 0.090

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8966825	0.9305735	0.9321940	0.9589306	1.645E+02	1.228E+01	--
α_2	6.95E-03	2.10E-02	1.92E-02	4.10E-02	3.779E+00	1.763E+02	1.058
α_3	6.38E-03	2.07E-02	1.88E-02	4.15E-02	3.436E+00	1.627E+02	1.147
α_4	2.77E-03	1.29E-02	1.11E-02	2.89E-02	2.337E+00	1.793E+02	1.049
α_5	8.43E-04	7.63E-03	5.98E-03	2.01E-02	1.443E+00	1.876E+02	1.008
α_6	1.92E-04	4.93E-03	3.28E-03	1.53E-02	9.000E-01	1.816E+02	1.044
α_7	6.31E-07	2.09E-03	6.15E-04	9.21E-03	3.381E-01	1.611E+02	1.180
α_8	5.24E-33	2.32E-04	4.01E-10	1.17E-03	4.370E-02	1.881E+02	1.013

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	8.90E-01	8.82E-01	8.80E-01	9.03E-01	9.06E-01	9.24E-01	9.31E-01
α_2	1.10E-01	7.26E-02	7.37E-02	5.30E-02	4.52E-02	2.84E-02	2.10E-02
α_3		4.59E-02	2.89E-02	2.55E-02	2.52E-02	2.29E-02	2.07E-02
α_4			1.72E-02	1.37E-02	1.38E-02	1.26E-02	1.29E-02
α_5				5.02E-03	7.48E-03	7.75E-03	7.63E-03
α_6					2.37E-03	3.71E-03	4.93E-03
α_7						7.30E-04	2.09E-03
α_8							2.32E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	8.90E-01	8.82E-01	8.80E-01	9.03E-01	9.06E-01	9.24E-01	9.31E-01
Beta	1.10E-01	1.18E-01	1.20E-01	9.72E-02	9.40E-02	7.61E-02	6.94E-02
Gamma		3.87E-01	3.85E-01	4.55E-01	5.19E-01	6.27E-01	6.98E-01
Delta			3.73E-01	4.23E-01	4.84E-01	5.20E-01	5.73E-01
Epsilon				2.69E-01	4.17E-01	4.92E-01	5.36E-01
Mu					2.40E-01	3.64E-01	4.87E-01
Omega						1.65E-01	3.21E-01
Sigma							9.98E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.51	8.26	11.02	13.77	16.53	19.28	22.04
N_1	2.5333	2.6000	2.5333	2.2083	1.6875	1.4766	1.2656
N_2	1.4000	1.2000	1.6500	2.1042	2.5469	2.3820	2.1957
N_3		1.0000	0.7500	0.7500	0.8594	1.2000	1.4499

N₄			0.5000	0.5625	0.5469	0.5625	0.6650
N₅				0.2500	0.3906	0.4297	0.4316
N₆					0.1250	0.2539	0.3291
N₇						0.0625	0.1572
N₈							0.0313

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 41.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.270

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9640071	0.9907949	0.9959895	0.9999736	5.065E+01	4.706E-01	--
α_2	2.64E-05	9.21E-03	4.01E-03	3.60E-02	4.706E-01	5.065E+01	0.919

CCCG = 3, Gamma = 0.274

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9665782	0.9883867	0.9915919	0.9992411	9.383E+01	1.103E+00	--
α_2	2.51E-04	8.74E-03	5.55E-03	2.81E-02	8.104E-01	9.194E+01	1.035
α_3	2.42E-07	2.88E-03	6.75E-04	1.33E-02	2.921E-01	1.013E+02	0.945

CCCG = 4, Gamma = 0.277

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9698044	0.9872948	0.9893398	0.9977915	1.517E+02	1.953E+00	--
α_2	8.23E-04	8.83E-03	6.74E-03	2.40E-02	1.312E+00	1.473E+02	1.073
α_3	4.50E-06	2.68E-03	1.06E-03	1.08E-02	4.307E-01	1.602E+02	0.992
α_4	2.38E-09	1.19E-03	1.41E-04	6.08E-03	2.099E-01	1.755E+02	0.907

CCCG = 5, Gamma = 0.279

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9747029	0.9877678	0.9890236	0.9965411	2.509E+02	3.107E+00	--
α_2	9.41E-04	6.66E-03	5.42E-03	1.67E-02	1.684E+00	2.510E+02	1.058
α_3	1.58E-04	3.57E-03	2.42E-03	1.09E-02	9.426E-01	2.630E+02	1.013
α_4	1.14E-06	1.52E-03	5.24E-04	6.43E-03	3.816E-01	2.501E+02	1.067
α_5	1.89E-16	4.73E-04	2.59E-06	2.75E-03	9.865E-02	2.086E+02	1.281

CCCG = 6, Gamma = 0.281

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9770456	0.9882524	0.9892375	0.9960933	3.215E+02	3.822E+00	--
α_2	7.92E-04	5.47E-03	4.46E-03	1.36E-02	1.714E+00	3.116E+02	1.108
α_3	2.10E-04	3.20E-03	2.31E-03	9.24E-03	1.108E+00	3.449E+02	1.004
α_4	2.57E-05	1.94E-03	1.08E-03	6.78E-03	6.509E-01	3.344E+02	1.036
α_5	1.62E-08	8.17E-04	1.47E-04	3.94E-03	2.536E-01	3.101E+02	1.119
α_6	5.09E-17	3.14E-04	1.43E-06	1.83E-03	9.572E-02	3.046E+02	1.139

CCCG = 7, Gamma = 0.282

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9798843	0.9888695	0.9895601	0.9954962	4.615E+02	5.195E+00	--
α_2	8.67E-04	4.57E-03	3.87E-03	1.06E-02	2.105E+00	4.588E+02	1.060
α_3	2.67E-04	2.85E-03	2.17E-03	7.74E-03	1.320E+00	4.620E+02	1.055
α_4	1.04E-04	2.04E-03	1.41E-03	6.10E-03	9.967E-01	4.882E+02	0.999
α_5	5.51E-06	1.09E-03	5.18E-04	4.12E-03	5.249E-01	4.808E+02	1.015
α_6	3.33E-10	4.48E-04	4.38E-05	2.32E-03	1.956E-01	4.369E+02	1.118
α_7	3.96E-28	1.39E-04	3.14E-09	7.53E-04	5.291E-02	3.812E+02	1.282

CCCG = 8, Gamma = 0.283

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9807844	0.9890706	0.9896757	0.9952907	5.278E+02	5.832E+00	--
α_2	8.37E-04	4.13E-03	3.53E-03	9.45E-03	2.229E+00	5.376E+02	1.058
α_3	2.17E-04	2.53E-03	1.90E-03	6.98E-03	1.260E+00	4.968E+02	1.147
α_4	1.09E-04	1.91E-03	1.35E-03	5.64E-03	1.042E+00	5.435E+02	1.049
α_5	3.16E-05	1.35E-03	8.23E-04	4.44E-03	7.626E-01	5.659E+02	1.008
α_6	1.37E-07	5.98E-04	1.67E-04	2.66E-03	3.271E-01	5.470E+02	1.044
α_7	2.69E-13	2.78E-04	7.44E-06	1.56E-03	1.344E-01	4.839E+02	1.180
α_8	1.23E-20	1.36E-04	1.28E-07	7.90E-04	7.682E-02	5.642E+02	1.013

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.88E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01
α_2	9.21E-03	8.74E-03	8.83E-03	6.66E-03	5.47E-03	4.57E-03	4.13E-03
α_3		2.88E-03	2.68E-03	3.57E-03	3.20E-03	2.85E-03	2.53E-03
α_4			1.19E-03	1.52E-03	1.94E-03	2.04E-03	1.91E-03
α_5				4.73E-04	8.17E-04	1.09E-03	1.35E-03
α_6					3.14E-04	4.48E-04	5.98E-04
α_7						1.39E-04	2.78E-04
α_8							1.36E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.88E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01
Beta	9.21E-03	1.16E-02	1.27E-02	1.22E-02	1.17E-02	1.11E-02	1.09E-02
Gamma		2.48E-01	3.05E-01	4.55E-01	5.34E-01	5.90E-01	6.22E-01
Delta			3.08E-01	3.59E-01	4.90E-01	5.66E-01	6.28E-01
Epsilon				2.37E-01	3.68E-01	4.51E-01	5.52E-01
Mu					2.78E-01	3.50E-01	4.29E-01
Omega						2.37E-01	4.09E-01
Sigma							3.29E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	22.42	33.63	44.84	56.05	67.25	78.46	89.67
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 16.6

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.119

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9823089	0.9948994	0.9971234	0.9999286	1.287E+02	6.599E-01	--
α_2	7.14E-05	5.10E-03	2.88E-03	1.77E-02	6.599E-01	1.287E+02	0.919

CCCG = 3, Gamma = 0.119

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845408	0.9939709	0.9951871	0.9992434	2.571E+02	1.560E+00	--
α_2	3.82E-04	4.78E-03	3.56E-03	1.34E-02	1.214E+00	2.525E+02	1.035
α_3	4.48E-07	1.24E-03	3.77E-04	5.43E-03	3.458E-01	2.774E+02	0.945

CCCG = 4, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9865617	0.9935117	0.9941833	0.9981669	4.769E+02	3.115E+00	--
α_2	1.27E-03	5.43E-03	4.74E-03	1.19E-02	2.549E+00	4.673E+02	1.073
α_3	1.63E-08	5.21E-04	1.02E-04	2.48E-03	2.646E-01	5.075E+02	0.992
α_4	5.99E-08	5.42E-04	1.33E-04	2.48E-03	3.010E-01	5.553E+02	0.907

CCCG = 5, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9919708	0.9953552	0.9955954	0.9979194	1.355E+03	6.325E+00	--
α_2	1.14E-03	3.19E-03	2.95E-03	6.06E-03	4.299E+00	1.344E+03	1.058
α_3	1.69E-04	1.20E-03	9.72E-04	3.00E-03	1.687E+00	1.407E+03	1.013
α_4	2.10E-08	2.21E-04	5.29E-05	1.02E-03	2.961E-01	1.337E+03	1.067
α_5	1.13E-34	3.81E-05	4.19E-11	1.89E-04	4.243E-02	1.114E+03	1.281

CCCG = 6, Gamma = 0.117

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9913912	0.9950921	0.9953622	0.9978706	1.203E+03	5.936E+00	--
α_2	8.62E-04	2.87E-03	2.59E-03	5.83E-03	3.359E+00	1.166E+03	1.108
α_3	1.88E-04	1.32E-03	1.07E-03	3.29E-03	1.701E+00	1.290E+03	1.004
α_4	5.11E-06	4.91E-04	2.63E-04	1.75E-03	6.142E-01	1.250E+03	1.036
α_5	2.89E-15	9.97E-05	1.32E-06	5.72E-04	1.155E-01	1.159E+03	1.119
α_6	5.96E-13	1.28E-04	4.67E-06	7.07E-04	1.451E-01	1.137E+03	1.139

CCCG = 7, Gamma = 0.117

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9937393	0.9959608	0.9960854	0.9977567	2.627E+03	1.065E+01	--
α_2	7.92E-04	1.97E-03	1.85E-03	3.59E-03	5.147E+00	2.602E+03	1.060
α_3	3.61E-04	1.24E-03	1.11E-03	2.54E-03	3.244E+00	2.618E+03	1.055
α_4	7.60E-05	5.80E-04	4.66E-04	1.48E-03	1.606E+00	2.766E+03	0.999
α_5	1.00E-06	1.94E-04	9.22E-05	7.30E-04	5.272E-01	2.722E+03	1.015
α_6	1.10E-15	4.63E-05	5.87E-07	2.66E-04	1.146E-01	2.472E+03	1.118
α_7	3.57E-93	6.79E-06	7.22E-25	8.06E-06	1.464E-02	2.157E+03	1.282

CCCG = 8, Gamma = 0.117

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931818	0.9958309	0.9959988	0.9979069	1.946E+03	8.148E+00	--
α_2	4.58E-04	1.60E-03	1.43E-03	3.30E-03	3.178E+00	1.986E+03	1.058
α_3	2.76E-04	1.28E-03	1.11E-03	2.89E-03	2.355E+00	1.833E+03	1.147
α_4	8.20E-05	7.29E-04	5.71E-04	1.91E-03	1.462E+00	2.005E+03	1.049
α_5	3.67E-06	3.05E-04	1.67E-04	1.07E-03	6.363E-01	2.087E+03	1.008
α_6	5.77E-11	9.56E-05	8.99E-06	4.97E-04	1.928E-01	2.016E+03	1.044
α_7	1.20E-35	2.32E-05	1.74E-11	1.13E-04	4.139E-02	1.784E+03	1.180
α_8	8.29E-09	1.36E-04	3.00E-05	6.34E-04	2.827E-01	2.079E+03	1.013

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.94E-01	9.94E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
α_2	5.10E-03	4.78E-03	5.43E-03	3.19E-03	2.87E-03	1.97E-03	1.60E-03
α_3		1.24E-03	5.21E-04	1.20E-03	1.32E-03	1.24E-03	1.28E-03
α_4			5.42E-04	2.21E-04	4.91E-04	5.80E-04	7.29E-04
α_5				3.81E-05	9.97E-05	1.94E-04	3.05E-04
α_6					1.28E-04	4.63E-05	9.56E-05
α_7						6.79E-06	2.32E-05
α_8							1.36E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.94E-01	9.94E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
Beta	5.10E-03	6.03E-03	6.49E-03	4.64E-03	4.91E-03	4.04E-03	4.17E-03
Gamma		2.06E-01	1.64E-01	3.14E-01	4.15E-01	5.11E-01	6.17E-01
Delta			5.10E-01	1.78E-01	3.53E-01	4.01E-01	5.01E-01
Epsilon				1.47E-01	3.16E-01	2.98E-01	4.34E-01
Mu					5.61E-01	2.15E-01	4.55E-01
Omega						1.28E-01	6.25E-01
Sigma							8.54E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	9.05	13.58	18.11	22.64	27.16	31.69	36.22
N_1	0.6667	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.1667	0.5000	1.0000	0.6667	0.4444	0.2963	0.1975
N_3		0.0000	0.0000	0.3333	0.4444	0.4444	0.3951

N₄			0.0000	0.0000	0.1111	0.2222	0.2963
N₅				0.0000	0.0000	0.0370	0.0988
N₆					0.0000	0.0000	0.0123
N₇						0.0000	0.0000
N₈							0.0000

2.1.1.6 ALL-MDP-FS-NS: Standby Systems Motor-Driven Pumps Fail to Start

Generic CCF Parameters

System Group: Clean Water, Electrical, Other, Raw Water
System: Auxiliary Feedwater, Containment Spray Recirculation, High Pressure Coolant Injection, High Pressure Core Spray, High Pressure Injection, Isolation Condenser, Low Pressure Core Spray, Reactor Core Isolation, Residual Heat Removal (LCI in BWRs; LPI in PWRs), Standby Liquid Control, Emergency power supply, Fuel Oil Transfer, Containment isolation system, Flex equipment, Standby Service Water
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Start
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 256.8

Total Number of Common-Cause Failure Events: 4

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9670410	0.9864359	0.9887655	0.9978527	0.9878572	1.323E+02	1.820E+00
α_2	2.15E-03	1.36E-02	1.12E-02	3.30E-02	1.21E-02	1.820E+00	1.323E+02

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9726257	0.9869774	0.9883921	0.9964999	0.9891358	2.222E+02	2.932E+00
α_2	8.27E-04	6.80E-03	5.40E-03	1.75E-02	4.09E-03	1.530E+00	2.236E+02
α_3	6.54E-04	6.23E-03	4.84E-03	1.65E-02	6.78E-03	1.402E+00	2.237E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9745002	0.9866255	0.9876500	0.9952548	0.9895974	3.090E+02	4.188E+00
α_2	1.46E-03	7.16E-03	6.14E-03	1.63E-02	4.45E-03	2.242E+00	3.109E+02
α_3	2.63E-04	3.68E-03	2.69E-03	1.05E-02	3.40E-03	1.152E+00	3.120E+02
α_4	6.79E-05	2.54E-03	1.59E-03	8.24E-03	2.55E-03	7.940E-01	3.124E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9774317	0.9870244	0.9877129	0.9942824	0.9903378	4.632E+02	6.090E+00
α_2	1.75E-03	6.39E-03	5.70E-03	1.34E-02	3.91E-03	2.999E+00	4.663E+02
α_3	5.14E-04	3.61E-03	2.94E-03	9.02E-03	2.35E-03	1.695E+00	4.676E+02
α_4	1.25E-04	2.21E-03	1.56E-03	6.53E-03	2.39E-03	1.038E+00	4.683E+02
α_5	3.58E-07	7.63E-04	2.41E-04	3.29E-03	1.02E-03	3.580E-01	4.690E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9792582	0.9877649	0.9883448	0.9943009	0.9908984	5.517E+02	6.834E+00
α_2	1.34E-03	5.13E-03	4.55E-03	1.09E-02	3.53E-03	2.863E+00	5.557E+02
α_3	5.07E-04	3.24E-03	2.67E-03	7.93E-03	1.83E-03	1.811E+00	5.567E+02
α_4	1.75E-04	2.18E-03	1.63E-03	6.10E-03	1.89E-03	1.219E+00	5.573E+02
α_5	2.04E-05	1.24E-03	7.13E-04	4.22E-03	1.42E-03	6.898E-01	5.578E+02
α_6	7.71E-09	4.48E-04	7.87E-05	2.17E-03	4.27E-04	2.504E-01	5.583E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9809720	0.9880825	0.9885096	0.9937433	0.9913338	7.523E+02	9.074E+00
α_2	1.43E-03	4.60E-03	4.18E-03	9.23E-03	3.29E-03	3.506E+00	7.579E+02
α_3	5.85E-04	2.91E-03	2.49E-03	6.67E-03	1.52E-03	2.214E+00	7.592E+02
α_4	2.94E-04	2.16E-03	1.74E-03	5.45E-03	1.47E-03	1.646E+00	7.597E+02
α_5	9.49E-05	1.45E-03	1.05E-03	4.20E-03	1.41E-03	1.107E+00	7.603E+02
α_6	2.47E-06	6.52E-04	2.95E-04	2.51E-03	7.94E-04	4.963E-01	7.609E+02
α_7	3.36E-16	1.38E-04	1.10E-06	7.99E-04	1.83E-04	1.051E-01	7.613E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9821705	0.9887599	0.9891458	0.9940276	0.9916751	8.245E+02	9.373E+00
α_2	1.24E-03	4.08E-03	3.69E-03	8.25E-03	3.15E-03	3.399E+00	8.305E+02
α_3	4.12E-04	2.36E-03	1.98E-03	5.62E-03	1.32E-03	1.968E+00	8.319E+02
α_4	2.36E-04	1.88E-03	1.50E-03	4.82E-03	1.15E-03	1.566E+00	8.323E+02
α_5	1.24E-04	1.49E-03	1.12E-03	4.13E-03	1.23E-03	1.242E+00	8.327E+02
α_6	2.26E-05	9.26E-04	5.70E-04	3.04E-03	9.64E-04	7.720E-01	8.331E+02
α_7	3.28E-08	3.54E-04	8.42E-05	1.63E-03	4.28E-04	2.953E-01	8.336E+02
α_8	7.12E-14	1.56E-04	3.59E-06	8.79E-04	8.02E-05	1.298E-01	8.338E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01
α_2	1.36E-02	6.80E-03	7.16E-03	6.39E-03	5.13E-03	4.60E-03	4.08E-03
α_3		6.23E-03	3.68E-03	3.61E-03	3.24E-03	2.91E-03	2.36E-03
α_4			2.54E-03	2.21E-03	2.18E-03	2.16E-03	1.88E-03
α_5				7.63E-04	1.24E-03	1.45E-03	1.49E-03
α_6					4.48E-04	6.52E-04	9.26E-04
α_7						1.38E-04	3.54E-04
α_8							1.56E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01
Beta	1.36E-02	1.30E-02	1.34E-02	1.30E-02	1.22E-02	1.19E-02	1.12E-02
Gamma		4.78E-01	4.65E-01	5.08E-01	5.81E-01	6.14E-01	6.37E-01
Delta			4.08E-01	4.52E-01	5.44E-01	6.02E-01	6.71E-01

Epsilon				2.56E-01	4.35E-01	5.09E-01	6.09E-01
Mu					2.66E-01	3.52E-01	4.91E-01
Omega						1.75E-01	3.55E-01
Sigma							3.05E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	108.13	162.19	216.25	270.32	324.38	378.44	432.51
N₁	1.7976	2.0179	2.0357	2.0908	2.0997	2.0674	1.9958
N₂	1.3512	0.6786	0.9821	1.0744	1.1620	1.2624	1.3810
N₃		1.1250	0.7500	0.6458	0.6042	0.5848	0.5779
N₄			0.5625	0.6563	0.6233	0.5628	0.5040
N₅				0.2813	0.4688	0.5414	0.5397
N₆					0.1406	0.3047	0.4223
N₇						0.0703	0.1875
N₈							0.0352

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 98.2

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.372

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9806869	0.9950222	0.9977891	0.9999835	9.663E+01	4.834E-01	--
α_2	1.65E-05	4.98E-03	2.21E-03	1.93E-02	4.834E-01	9.663E+01	0.882

CCCG = 3, Gamma = 0.374

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9861130	0.9950106	0.9962732	0.9995939	2.444E+02	1.226E+00	--
α_2	1.69E-04	3.48E-03	2.40E-03	1.05E-02	9.769E-01	2.796E+02	0.688
α_3	2.41E-08	1.51E-03	2.62E-04	7.31E-03	2.487E-01	1.647E+02	1.170

CCCG = 4, Gamma = 0.375

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9853514	0.9937523	0.9947198	0.9988458	3.272E+02	2.057E+00	--
α_2	4.27E-04	3.88E-03	3.03E-03	1.02E-02	1.442E+00	3.702E+02	0.717
α_3	1.89E-06	1.51E-03	5.67E-04	6.21E-03	4.114E-01	2.720E+02	0.979
α_4	1.12E-09	8.57E-04	9.35E-05	4.40E-03	2.036E-01	2.373E+02	1.123

CCCG = 5, Gamma = 0.376

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9864586	0.9931504	0.9937516	0.9977882	5.340E+02	3.683E+00	--
α_2	7.95E-04	3.89E-03	3.34E-03	8.89E-03	2.243E+00	5.740E+02	0.794
α_3	9.02E-05	1.80E-03	1.24E-03	5.39E-03	9.912E-01	5.512E+02	0.829
α_4	6.35E-07	9.32E-04	3.15E-04	3.95E-03	3.765E-01	4.037E+02	1.133
α_5	1.99E-21	2.30E-04	1.31E-07	1.33E-03	7.237E-02	3.145E+02	1.455

CCCG = 6, Gamma = 0.376

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9871450	0.9932930	0.9938181	0.9976475	6.130E+02	4.139E+00	--
α_2	6.28E-04	3.27E-03	2.78E-03	7.60E-03	2.128E+00	6.486E+02	0.812
α_3	1.16E-04	1.68E-03	1.22E-03	4.81E-03	1.134E+00	6.742E+02	0.783
α_4	6.57E-06	1.01E-03	4.98E-04	3.72E-03	5.533E-01	5.499E+02	0.960
α_5	1.98E-09	5.10E-04	6.81E-05	2.56E-03	2.210E-01	4.331E+02	1.220
α_6	3.09E-16	2.43E-04	1.69E-06	1.41E-03	1.027E-01	4.231E+02	1.249

CCCG = 7, Gamma = 0.377

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9882492	0.9931718	0.9935176	0.9969136	9.356E+02	6.432E+00	--
α_2	7.65E-04	2.94E-03	2.61E-03	6.27E-03	2.840E+00	9.619E+02	0.863
α_3	2.55E-04	1.72E-03	1.41E-03	4.26E-03	1.746E+00	1.014E+03	0.819
α_4	7.18E-05	1.15E-03	8.24E-04	3.35E-03	1.084E+00	9.396E+02	0.885
α_5	3.83E-06	6.74E-04	3.26E-04	2.52E-03	5.376E-01	7.973E+02	1.043
α_6	2.59E-10	2.94E-04	2.97E-05	1.52E-03	1.979E-01	6.722E+02	1.238
α_7	1.01E-52	4.49E-05	4.50E-15	1.53E-04	2.656E-02	5.916E+02	1.407

CCCG = 8, Gamma = 0.377

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9890108	0.9936896	0.9940261	0.9972194	9.625E+02	6.112E+00	--
α_2	5.27E-04	2.44E-03	2.10E-03	5.48E-03	2.364E+00	9.681E+02	0.879
α_3	1.69E-04	1.42E-03	1.12E-03	3.69E-03	1.512E+00	1.063E+03	0.801
α_4	6.13E-05	1.05E-03	7.41E-04	3.07E-03	1.056E+00	1.008E+03	0.845
α_5	1.13E-05	7.47E-04	4.25E-04	2.58E-03	6.745E-01	9.020E+02	0.945
α_6	5.33E-08	3.97E-04	1.01E-04	1.80E-03	3.076E-01	7.744E+02	1.101
α_7	1.16E-15	1.65E-04	1.63E-06	9.53E-04	1.093E-01	6.617E+02	1.288
α_8	1.53E-18	9.89E-05	2.74E-07	5.76E-04	8.885E-02	8.986E+02	0.949

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.95E-01	9.94E-01	9.93E-01	9.93E-01	9.93E-01	9.94E-01
α_2	4.98E-03	3.48E-03	3.88E-03	3.89E-03	3.27E-03	2.94E-03	2.44E-03
α_3		1.51E-03	1.51E-03	1.80E-03	1.68E-03	1.72E-03	1.42E-03
α_4			8.57E-04	9.32E-04	1.01E-03	1.15E-03	1.05E-03
α_5				2.30E-04	5.10E-04	6.74E-04	7.47E-04
α_6					2.43E-04	2.94E-04	3.97E-04
α_7						4.49E-05	1.65E-04
α_8							9.89E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.95E-01	9.94E-01	9.93E-01	9.93E-01	9.93E-01	9.94E-01
Beta	4.98E-03	4.99E-03	6.25E-03	6.85E-03	6.71E-03	6.83E-03	6.31E-03
Gamma		3.02E-01	3.79E-01	4.32E-01	5.12E-01	5.69E-01	6.14E-01
Delta			3.62E-01	3.93E-01	5.11E-01	5.57E-01	6.33E-01
Epsilon				1.98E-01	4.28E-01	4.68E-01	5.74E-01
Mu					3.22E-01	3.35E-01	4.69E-01
Omega						1.32E-01	3.99E-01
Sigma							3.74E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	41.35	62.02	82.69	103.37	124.04	144.72	165.39
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 48.0

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.197

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9378580	0.9808019	0.9879089	0.9994983	4.001E+01	7.831E-01	--
α_2	5.02E-04	1.92E-02	1.21E-02	6.21E-02	7.831E-01	4.001E+01	0.882

CCCG = 3, Gamma = 0.195

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9476701	0.9779763	0.9815048	0.9962090	8.563E+01	1.928E+00	--
α_2	2.00E-03	1.58E-02	1.26E-02	4.02E-02	1.564E+00	9.759E+01	0.688
α_3	3.40E-06	6.25E-03	2.05E-03	2.68E-02	3.646E-01	5.794E+01	1.170

CCCG = 4, Gamma = 0.194

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9458609	0.9737295	0.9763729	0.9925591	1.144E+02	3.086E+00	--
α_2	3.21E-03	1.63E-02	1.39E-02	3.75E-02	2.160E+00	1.303E+02	0.717
α_3	8.36E-05	6.62E-03	3.68E-03	2.32E-02	6.427E-01	9.645E+01	0.979
α_4	2.09E-07	3.35E-03	7.45E-04	1.56E-02	2.832E-01	8.436E+01	1.123

CCCG = 5, Gamma = 0.193

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9523776	0.9737880	0.9754326	0.9895796	1.852E+02	4.985E+00	--
α_2	3.75E-03	1.41E-02	1.26E-02	2.98E-02	2.888E+00	2.015E+02	0.794
α_3	8.62E-04	7.53E-03	5.93E-03	1.97E-02	1.474E+00	1.944E+02	0.829
α_4	1.75E-05	3.62E-03	1.71E-03	1.37E-02	5.195E-01	1.428E+02	1.133
α_5	1.57E-15	9.30E-04	6.88E-06	5.40E-03	1.037E-01	1.115E+02	1.455

CCCG = 6, Gamma = 0.193

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9558079	0.9746576	0.9759988	0.9889262	2.281E+02	5.930E+00	--
α_2	3.00E-03	1.15E-02	1.02E-02	2.45E-02	2.835E+00	2.432E+02	0.812
α_3	1.11E-03	7.09E-03	5.85E-03	1.73E-02	1.811E+00	2.535E+02	0.783
α_4	1.46E-04	4.16E-03	2.72E-03	1.31E-02	8.664E-01	2.072E+02	0.960
α_5	4.32E-07	1.98E-03	5.50E-04	8.84E-03	3.251E-01	1.635E+02	1.220
α_6	3.22E-17	5.78E-04	2.10E-06	3.37E-03	9.247E-02	1.599E+02	1.249

CCCG = 7, Gamma = 0.192

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9592640	0.9749390	0.9759041	0.9873188	3.180E+02	8.174E+00	--
α_2	3.32E-03	1.06E-02	9.62E-03	2.11E-02	3.541E+00	3.311E+02	0.863
α_3	1.21E-03	6.15E-03	5.25E-03	1.42E-02	2.167E+00	3.501E+02	0.819
α_4	4.74E-04	4.38E-03	3.41E-03	1.16E-02	1.428E+00	3.249E+02	0.885
α_5	6.74E-05	2.78E-03	1.71E-03	9.14E-03	7.698E-01	2.760E+02	1.043
α_6	7.35E-09	9.98E-04	1.50E-04	4.93E-03	2.327E-01	2.330E+02	1.238
α_7	2.75E-40	1.71E-04	7.71E-12	7.58E-04	3.515E-02	2.052E+02	1.407

CCCG = 8, Gamma = 0.192

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9609449	0.9758473	0.9767549	0.9876506	3.391E+02	8.393E+00	--
α_2	2.94E-03	9.71E-03	8.78E-03	1.96E-02	3.385E+00	3.454E+02	0.879
α_3	8.96E-04	5.14E-03	4.30E-03	1.22E-02	1.966E+00	3.807E+02	0.801
α_4	3.84E-04	3.79E-03	2.93E-03	1.01E-02	1.375E+00	3.614E+02	0.845
α_5	1.38E-04	2.96E-03	2.02E-03	8.99E-03	9.609E-01	3.235E+02	0.945
α_6	7.75E-06	1.82E-03	8.41E-04	6.96E-03	5.073E-01	2.779E+02	1.101
α_7	2.49E-15	4.55E-04	4.28E-06	2.63E-03	1.083E-01	2.377E+02	1.288
α_8	1.09E-17	2.83E-04	9.52E-07	1.65E-03	9.140E-02	3.229E+02	0.949

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.78E-01	9.74E-01	9.74E-01	9.75E-01	9.75E-01	9.76E-01
α_2	1.92E-02	1.58E-02	1.63E-02	1.41E-02	1.15E-02	1.06E-02	9.71E-03
α_3		6.25E-03	6.62E-03	7.53E-03	7.09E-03	6.15E-03	5.14E-03
α_4			3.35E-03	3.62E-03	4.16E-03	4.38E-03	3.79E-03
α_5				9.30E-04	1.98E-03	2.78E-03	2.96E-03
α_6					5.78E-04	9.98E-04	1.82E-03
α_7						1.71E-04	4.55E-04
α_8							2.83E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.78E-01	9.74E-01	9.74E-01	9.75E-01	9.75E-01	9.76E-01
Beta	1.92E-02	2.20E-02	2.63E-02	2.62E-02	2.53E-02	2.51E-02	2.42E-02
Gamma		2.84E-01	3.79E-01	4.61E-01	5.45E-01	5.78E-01	5.98E-01
Delta			3.36E-01	3.77E-01	4.87E-01	5.75E-01	6.44E-01
Epsilon				2.04E-01	3.81E-01	4.74E-01	5.93E-01
Mu					2.26E-01	2.96E-01	4.64E-01
Omega						1.47E-01	2.88E-01
Sigma							3.83E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	20.21	30.32	40.42	50.53	60.63	70.74	80.84
N_1	1.3333	1.3750	1.2500	1.1979	1.1354	1.0674	0.9958
N_2	0.3333	0.6250	0.8750	0.8958	0.8941	0.8874	0.8810
N_3		0.1250	0.2500	0.3958	0.4792	0.5223	0.5467

N₄			0.0625	0.1563	0.2483	0.3128	0.3477
N₅				0.0313	0.0938	0.1664	0.2272
N₆					0.0156	0.0547	0.1098
N₇						0.0078	0.0313
N₈							0.0039

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 8.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.032

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8447028	0.9627543	0.9864652	0.9999709	9.825E+00	3.801E-01	--
α_2	2.91E-05	3.72E-02	1.35E-02	1.55E-01	3.801E-01	9.825E+00	0.882

CCCG = 3, Gamma = 0.032

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8741858	0.9576706	0.9702890	0.9979571	2.172E+01	9.600E-01	--
α_2	3.63E-04	2.42E-02	1.40E-02	8.29E-02	6.673E-01	2.686E+01	0.688
α_3	1.60E-06	1.81E-02	4.40E-03	8.32E-02	2.927E-01	1.589E+01	1.170

CCCG = 4, Gamma = 0.032

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8849351	0.9532086	0.9614379	0.9932805	3.400E+01	1.669E+00	--
α_2	1.44E-03	2.50E-02	1.78E-02	7.29E-02	1.039E+00	4.058E+01	0.717
α_3	1.11E-05	1.27E-02	4.56E-03	5.33E-02	3.887E-01	3.011E+01	0.979
α_4	1.05E-07	9.08E-03	1.51E-03	4.44E-02	2.414E-01	2.635E+01	1.123

CCCG = 5, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9116543	0.9553510	0.9591926	0.9859070	7.461E+01	3.487E+00	--
α_2	3.31E-03	2.12E-02	1.76E-02	5.16E-02	1.791E+00	8.265E+01	0.794
α_3	1.19E-03	1.49E-02	1.11E-02	4.15E-02	1.207E+00	7.971E+01	0.829
α_4	1.30E-05	7.33E-03	2.94E-03	2.95E-02	4.340E-01	5.878E+01	1.133
α_5	2.66E-26	1.19E-03	4.26E-08	6.59E-03	5.493E-02	4.604E+01	1.455

CCCG = 6, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9223344	0.9596168	0.9627514	0.9861806	9.278E+01	3.905E+00	--
α_2	1.26E-03	1.30E-02	1.00E-02	3.50E-02	1.335E+00	1.013E+02	0.812
α_3	1.76E-03	1.44E-02	1.15E-02	3.70E-02	1.531E+00	1.049E+02	0.783
α_4	1.60E-04	8.29E-03	4.94E-03	2.78E-02	7.191E-01	8.605E+01	0.960
α_5	5.30E-08	3.61E-03	6.19E-04	1.76E-02	2.467E-01	6.806E+01	1.220
α_6	1.20E-20	1.09E-03	6.58E-07	6.33E-03	7.279E-02	6.664E+01	1.249

CCCG = 7, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9327550	0.9615282	0.9635649	0.9833423	1.442E+02	5.770E+00	--
α_2	1.24E-03	9.99E-03	7.98E-03	2.56E-02	1.549E+00	1.534E+02	0.863
α_3	2.17E-03	1.22E-02	1.03E-02	2.88E-02	1.989E+00	1.612E+02	0.819
α_4	7.66E-04	8.52E-03	6.47E-03	2.33E-02	1.287E+00	1.498E+02	0.885
α_5	9.01E-05	5.39E-03	3.13E-03	1.84E-02	6.913E-01	1.275E+02	1.043
α_6	1.59E-08	2.15E-03	3.25E-04	1.07E-02	2.327E-01	1.078E+02	1.238
α_7	1.51E-64	2.22E-04	3.37E-17	5.61E-04	2.112E-02	9.502E+01	1.407

CCCG = 8, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9409233	0.9647179	0.9662664	0.9832235	1.918E+02	7.016E+00	--
α_2	1.01E-03	7.89E-03	6.32E-03	2.01E-02	1.583E+00	1.991E+02	0.879
α_3	1.60E-03	9.02E-03	7.58E-03	2.14E-02	1.986E+00	2.182E+02	0.801
α_4	1.12E-03	8.01E-03	6.50E-03	2.01E-02	1.672E+00	2.071E+02	0.845
α_5	2.87E-04	5.42E-03	3.78E-03	1.61E-02	1.011E+00	1.857E+02	0.945
α_6	2.70E-05	3.56E-03	1.81E-03	1.30E-02	5.709E-01	1.597E+02	1.101
α_7	3.04E-10	1.32E-03	1.04E-04	6.99E-03	1.809E-01	1.367E+02	1.288
α_8	9.67E-108	6.70E-05	2.03E-27	5.02E-05	1.245E-02	1.858E+02	0.949

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.63E-01	9.58E-01	9.53E-01	9.55E-01	9.60E-01	9.62E-01	9.65E-01
α_2	3.72E-02	2.42E-02	2.50E-02	2.12E-02	1.30E-02	9.99E-03	7.89E-03
α_3		1.81E-02	1.27E-02	1.49E-02	1.44E-02	1.22E-02	9.02E-03
α_4			9.08E-03	7.33E-03	8.29E-03	8.52E-03	8.01E-03
α_5				1.19E-03	3.61E-03	5.39E-03	5.42E-03
α_6					1.09E-03	2.15E-03	3.56E-03
α_7						2.22E-04	1.32E-03
α_8							6.70E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.63E-01	9.58E-01	9.53E-01	9.55E-01	9.60E-01	9.62E-01	9.65E-01
Beta	3.72E-02	4.23E-02	4.68E-02	4.46E-02	4.04E-02	3.85E-02	3.53E-02
Gamma		4.27E-01	4.66E-01	5.25E-01	6.78E-01	7.40E-01	7.76E-01
Delta			4.16E-01	3.64E-01	4.75E-01	5.72E-01	6.71E-01
Epsilon				1.40E-01	3.62E-01	4.77E-01	5.64E-01
Mu					2.32E-01	3.06E-01	4.78E-01
Omega						9.35E-02	2.80E-01
Sigma							4.82E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.58	5.37	7.16	8.95	10.74	12.53	14.32
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 64.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.252

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9360263	0.9753119	0.9804111	0.9971433	5.810E+01	1.471E+00	--
α_2	2.86E-03	2.47E-02	1.96E-02	6.40E-02	1.471E+00	5.810E+01	0.882

CCCG = 3, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9538931	0.9800814	0.9830286	0.9961877	1.035E+02	2.103E+00	--
α_2	1.54E-04	5.37E-03	3.40E-03	1.73E-02	8.104E-01	1.502E+02	0.688
α_3	1.32E-03	1.46E-02	1.11E-02	3.96E-02	1.292E+00	8.750E+01	1.170

CCCG = 4, Gamma = 0.249

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9672497	0.9843710	0.9860467	0.9957644	1.860E+02	2.953E+00	--
α_2	5.16E-04	5.55E-03	4.23E-03	1.51E-02	1.312E+00	2.350E+02	0.717
α_3	2.30E-04	5.37E-03	3.63E-03	1.65E-02	9.307E-01	1.722E+02	0.979
α_4	8.65E-05	4.70E-03	2.77E-03	1.59E-02	7.099E-01	1.503E+02	1.123

CCCG = 5, Gamma = 0.249

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9737603	0.9863047	0.9873708	0.9952066	2.958E+02	4.107E+00	--
α_2	6.74E-04	4.78E-03	3.88E-03	1.20E-02	1.684E+00	3.506E+02	0.794
α_3	2.72E-04	3.53E-03	2.61E-03	9.93E-03	1.193E+00	3.364E+02	0.829
α_4	1.31E-04	3.57E-03	2.35E-03	1.12E-02	8.816E-01	2.462E+02	1.133
α_5	6.96E-07	1.81E-03	5.55E-04	7.89E-03	3.487E-01	1.920E+02	1.455

CCCG = 6, Gamma = 0.249

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9777086	0.9878857	0.9886932	0.9953050	3.932E+02	4.822E+00	--
α_2	5.56E-04	3.85E-03	3.13E-03	9.57E-03	1.714E+00	4.439E+02	0.812
α_3	2.19E-04	2.67E-03	1.99E-03	7.41E-03	1.233E+00	4.612E+02	0.783
α_4	1.49E-04	2.72E-03	1.91E-03	8.07E-03	1.026E+00	3.759E+02	0.960
α_5	2.43E-05	2.12E-03	1.15E-03	7.49E-03	6.286E-01	2.961E+02	1.220
α_6	2.92E-09	7.62E-04	1.01E-04	3.82E-03	2.207E-01	2.896E+02	1.249

CCCG = 7, Gamma = 0.249

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9804444	0.9887191	0.9893070	0.9949865	5.430E+02	6.195E+00	--
α_2	6.81E-04	3.59E-03	3.04E-03	8.37E-03	2.105E+00	5.841E+02	0.863
α_3	2.29E-04	2.24E-03	1.73E-03	5.99E-03	1.383E+00	6.157E+02	0.819
α_4	1.83E-04	2.18E-03	1.64E-03	6.04E-03	1.247E+00	5.703E+02	0.885
α_5	7.22E-05	1.86E-03	1.23E-03	5.77E-03	8.999E-01	4.839E+02	1.043
α_6	2.25E-06	1.09E-03	4.45E-04	4.36E-03	4.456E-01	4.081E+02	1.238
α_7	9.13E-15	3.21E-04	4.22E-06	1.84E-03	1.154E-01	3.593E+02	1.407

CCCG = 8, Gamma = 0.249

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9821965	0.9895026	0.9899999	0.9951108	6.440E+02	6.832E+00	--
α_2	6.72E-04	3.32E-03	2.84E-03	7.59E-03	2.229E+00	6.701E+02	0.879
α_3	1.57E-04	1.75E-03	1.33E-03	4.79E-03	1.291E+00	7.364E+02	0.801
α_4	1.33E-04	1.71E-03	1.27E-03	4.81E-03	1.198E+00	6.981E+02	0.845
α_5	1.05E-04	1.72E-03	1.23E-03	5.02E-03	1.075E+00	6.243E+02	0.945
α_6	1.47E-05	1.19E-03	6.56E-04	4.19E-03	6.396E-01	5.361E+02	1.101
α_7	5.06E-08	6.34E-04	1.47E-04	2.93E-03	2.907E-01	4.582E+02	1.288
α_8	8.98E-16	1.74E-04	1.61E-06	1.00E-03	1.081E-01	6.225E+02	0.949

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.75E-01	9.80E-01	9.84E-01	9.86E-01	9.88E-01	9.89E-01	9.90E-01
α_2	2.47E-02	5.37E-03	5.55E-03	4.78E-03	3.85E-03	3.59E-03	3.32E-03
α_3		1.46E-02	5.37E-03	3.53E-03	2.67E-03	2.24E-03	1.75E-03
α_4			4.70E-03	3.57E-03	2.72E-03	2.18E-03	1.71E-03
α_5				1.81E-03	2.12E-03	1.86E-03	1.72E-03
α_6					7.62E-04	1.09E-03	1.19E-03
α_7						3.21E-04	6.34E-04
α_8							1.74E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.75E-01	9.80E-01	9.84E-01	9.86E-01	9.88E-01	9.89E-01	9.90E-01
Beta	2.47E-02	1.99E-02	1.56E-02	1.37E-02	1.21E-02	1.13E-02	1.05E-02
Gamma		7.31E-01	6.45E-01	6.51E-01	6.83E-01	6.82E-01	6.84E-01
Delta			4.67E-01	6.04E-01	6.78E-01	7.09E-01	7.56E-01
Epsilon				3.37E-01	5.14E-01	6.00E-01	6.85E-01
Mu					2.64E-01	4.32E-01	5.38E-01
Omega						2.27E-01	4.04E-01
Sigma							2.15E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	26.99	40.48	53.98	67.47	80.97	94.46	107.96
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		1.0000	0.5000	0.2500	0.1250	0.0625	0.0313

N₄			0.5000	0.5000	0.3750	0.2500	0.1563
N₅				0.2500	0.3750	0.3750	0.3125
N₆					0.1250	0.2500	0.3125
N₇						0.0625	0.1563
N₈							0.0313

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 38.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.148

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9863255	0.9964068	0.9983262	0.9999841	1.417E+02	5.111E-01	--
α_2	1.59E-05	3.59E-03	1.67E-03	1.37E-02	5.111E-01	1.417E+02	0.882

CCCG = 3, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9901541	0.9965815	0.9975288	0.9997735	3.245E+02	1.113E+00	--
α_2	4.64E-05	1.94E-03	1.19E-03	6.37E-03	7.673E-01	3.957E+02	0.688
α_3	5.34E-07	1.48E-03	4.49E-04	6.47E-03	3.458E-01	2.328E+02	1.170

CCCG = 4, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9920968	0.9965516	0.9970499	0.9993034	6.421E+02	2.222E+00	--
α_2	3.15E-04	2.30E-03	1.86E-03	5.78E-03	1.656E+00	7.199E+02	0.717
α_3	1.56E-08	5.00E-04	9.78E-05	2.38E-03	2.646E-01	5.286E+02	0.979
α_4	7.21E-08	6.53E-04	1.60E-04	2.98E-03	3.010E-01	4.607E+02	1.123

CCCG = 5, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9943768	0.9968528	0.9970401	0.9986891	1.743E+03	5.503E+00	--
α_2	6.92E-04	2.10E-03	1.92E-03	4.11E-03	3.811E+00	1.815E+03	0.794
α_3	7.63E-05	7.77E-04	5.96E-04	2.09E-03	1.354E+00	1.741E+03	0.829
α_4	2.20E-08	2.32E-04	5.54E-05	1.07E-03	2.961E-01	1.275E+03	1.133
α_5	1.27E-34	4.27E-05	4.71E-11	2.12E-04	4.243E-02	9.928E+02	1.455

CCCG = 6, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9939870	0.9966796	0.9968884	0.9986594	1.562E+03	5.204E+00	--
α_2	5.63E-04	1.96E-03	1.76E-03	4.05E-03	3.183E+00	1.619E+03	0.812
α_3	6.37E-05	7.47E-04	5.61E-04	2.06E-03	1.257E+00	1.682E+03	0.783
α_4	1.49E-06	3.67E-04	1.68E-04	1.41E-03	5.031E-01	1.371E+03	0.960
α_5	3.10E-15	1.07E-04	1.41E-06	6.13E-04	1.155E-01	1.080E+03	1.220
α_6	6.43E-13	1.38E-04	5.04E-06	7.62E-04	1.451E-01	1.055E+03	1.249

CCCG = 7, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9951069	0.9968803	0.9969828	0.9983042	3.205E+03	1.003E+01	--
α_2	6.54E-04	1.62E-03	1.51E-03	2.93E-03	5.226E+00	3.228E+03	0.863
α_3	2.11E-04	8.23E-04	7.27E-04	1.76E-03	2.800E+00	3.401E+03	0.819
α_4	4.49E-05	4.39E-04	3.39E-04	1.17E-03	1.384E+00	3.151E+03	0.885
α_5	6.49E-07	1.83E-04	8.20E-05	7.09E-04	4.902E-01	2.673E+03	1.043
α_6	1.21E-15	5.09E-05	6.44E-07	2.92E-04	1.146E-01	2.253E+03	1.238
α_7	3.88E-93	7.38E-06	7.86E-25	8.77E-06	1.464E-02	1.983E+03	1.407

CCCG = 8, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9948406	0.9968882	0.9970219	0.9984793	2.450E+03	7.648E+00	--
α_2	4.42E-04	1.43E-03	1.30E-03	2.88E-03	3.480E+00	2.425E+03	0.879
α_3	1.27E-04	7.36E-04	6.15E-04	1.76E-03	1.960E+00	2.663E+03	0.801
α_4	3.37E-05	4.62E-04	3.38E-04	1.31E-03	1.166E+00	2.525E+03	0.845
α_5	1.35E-06	2.38E-04	1.15E-04	8.91E-04	5.375E-01	2.258E+03	0.945
α_6	2.06E-11	9.31E-05	7.22E-06	4.92E-04	1.805E-01	1.939E+03	1.101
α_7	1.29E-35	2.50E-05	1.87E-11	1.22E-04	4.139E-02	1.656E+03	1.288
α_8	7.67E-09	1.26E-04	2.77E-05	5.86E-04	2.827E-01	2.249E+03	0.949

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	3.59E-03	1.94E-03	2.30E-03	2.10E-03	1.96E-03	1.62E-03	1.43E-03
α_3		1.48E-03	5.00E-04	7.77E-04	7.47E-04	8.23E-04	7.36E-04
α_4			6.53E-04	2.32E-04	3.67E-04	4.39E-04	4.62E-04
α_5				4.27E-05	1.07E-04	1.83E-04	2.38E-04
α_6					1.38E-04	5.09E-05	9.31E-05
α_7						7.38E-06	2.50E-05
α_8							1.26E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	3.59E-03	3.42E-03	3.45E-03	3.15E-03	3.32E-03	3.12E-03	3.11E-03
Gamma		4.34E-01	3.34E-01	3.34E-01	4.09E-01	4.82E-01	5.40E-01
Delta			5.66E-01	2.61E-01	4.50E-01	4.53E-01	5.62E-01
Epsilon				1.55E-01	4.00E-01	3.55E-01	5.11E-01
Mu					5.63E-01	2.41E-01	5.06E-01
Omega						1.27E-01	6.18E-01
Sigma							8.34E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	16.00	24.00	32.00	40.00	48.00	56.00	64.00
N_1	0.4643	0.6429	0.7857	0.8929	0.9643	1.0000	1.0000
N_2	0.0179	0.0536	0.1071	0.1786	0.2679	0.3750	0.5000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.1.7 ALL-MDP-FS-NR: Normally Running Systems Motor-Driven Pumps Fail to Start

Generic CCF Parameters

System Group: Clean Water, Raw Water, Reactor
System: Chemical and Volume Control, Component Cooling Water, Condensate System, Condensate Transfer System, Main Feedwater, Reactor Coolant, Circulating water system, Firewater, Generic dirty water system for relief valves, Normally Operating Service Water, Control rod drive
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Start
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 84.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9828157	0.9956205	0.9981150	0.9999865	1.0000000	1.065E+02	4.685E-01
α_2	1.22E-05	4.38E-03	1.89E-03	1.72E-02	0.00E+00	4.685E-01	1.065E+02

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9774669	0.9921230	0.9942676	0.9994575	1.0000000	1.421E+02	1.128E+00
α_2	1.98E-04	5.94E-03	3.86E-03	1.88E-02	0.00E+00	8.512E-01	1.424E+02
α_3	9.62E-08	1.93E-03	4.12E-04	9.07E-03	0.00E+00	2.768E-01	1.429E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9742556	0.9892816	0.9910676	0.9982100	1.0000000	1.748E+02	1.894E+00
α_2	6.14E-04	7.13E-03	5.38E-03	1.96E-02	0.00E+00	1.260E+00	1.754E+02
α_3	2.47E-06	2.28E-03	8.35E-04	9.44E-03	0.00E+00	4.024E-01	1.763E+02
α_4	9.07E-09	1.31E-03	1.95E-04	6.49E-03	0.00E+00	2.315E-01	1.764E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9751986	0.9876705	0.9888153	0.9962207	1.0000000	2.749E+02	3.432E+00
α_2	1.17E-03	6.91E-03	5.77E-03	1.65E-02	0.00E+00	1.924E+00	2.764E+02
α_3	2.18E-04	3.77E-03	2.67E-03	1.11E-02	0.00E+00	1.049E+00	2.773E+02
α_4	1.04E-06	1.37E-03	4.73E-04	5.79E-03	0.00E+00	3.822E-01	2.780E+02
α_5	2.39E-20	2.76E-04	2.57E-07	1.60E-03	0.00E+00	7.674E-02	2.783E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9760989	0.9877539	0.9887732	0.9959207	1.0000000	3.093E+02	3.835E+00
α_2	7.78E-04	5.43E-03	4.42E-03	1.35E-02	0.00E+00	1.701E+00	3.115E+02
α_3	3.04E-04	3.85E-03	2.86E-03	1.08E-02	0.00E+00	1.207E+00	3.119E+02
α_4	1.74E-05	1.90E-03	9.99E-04	6.86E-03	0.00E+00	5.960E-01	3.126E+02
α_5	2.76E-09	7.06E-04	9.44E-05	3.54E-03	0.00E+00	2.211E-01	3.129E+02
α_6	2.76E-15	3.51E-04	3.55E-06	2.02E-03	0.00E+00	1.098E-01	3.130E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9780442	0.9875503	0.9882499	0.9946715	1.0000000	4.559E+02	5.747E+00
α_2	9.93E-04	4.86E-03	4.17E-03	1.11E-02	0.00E+00	2.243E+00	4.594E+02
α_3	4.73E-04	3.53E-03	2.84E-03	8.93E-03	0.00E+00	1.630E+00	4.600E+02
α_4	1.46E-04	2.35E-03	1.68E-03	6.82E-03	0.00E+00	1.083E+00	4.606E+02
α_5	8.85E-06	1.22E-03	6.17E-04	4.50E-03	0.00E+00	5.654E-01	4.611E+02
α_6	2.28E-10	4.15E-04	3.83E-05	2.16E-03	0.00E+00	1.916E-01	4.615E+02
α_7	5.16E-41	7.54E-05	2.80E-12	3.31E-04	0.00E+00	3.480E-02	4.616E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9789342	0.9880679	0.9887412	0.9949091	1.0000000	4.741E+02	5.726E+00
α_2	7.58E-04	4.21E-03	3.54E-03	9.93E-03	0.00E+00	2.018E+00	4.778E+02
α_3	2.99E-04	2.90E-03	2.24E-03	7.73E-03	0.00E+00	1.391E+00	4.785E+02
α_4	1.32E-04	2.21E-03	1.57E-03	6.48E-03	0.00E+00	1.062E+00	4.788E+02
α_5	2.58E-05	1.46E-03	8.55E-04	4.97E-03	0.00E+00	7.026E-01	4.791E+02
α_6	2.86E-07	7.29E-04	2.24E-04	3.17E-03	0.00E+00	3.497E-01	4.795E+02
α_7	1.10E-15	2.25E-04	2.06E-06	1.30E-03	0.00E+00	1.078E-01	4.797E+02
α_8	2.30E-17	1.97E-04	8.36E-07	1.15E-03	0.00E+00	9.469E-02	4.798E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.92E-01	9.89E-01	9.88E-01	9.88E-01	9.88E-01	9.88E-01
α_2	4.38E-03	5.94E-03	7.13E-03	6.91E-03	5.43E-03	4.86E-03	4.21E-03
α_3		1.93E-03	2.28E-03	3.77E-03	3.85E-03	3.53E-03	2.90E-03
α_4			1.31E-03	1.37E-03	1.90E-03	2.35E-03	2.21E-03
α_5				2.76E-04	7.06E-04	1.22E-03	1.46E-03
α_6					3.51E-04	4.15E-04	7.29E-04
α_7						7.54E-05	2.25E-04
α_8							1.97E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.92E-01	9.89E-01	9.88E-01	9.88E-01	9.88E-01	9.88E-01
Beta	4.38E-03	7.88E-03	1.07E-02	1.23E-02	1.22E-02	1.24E-02	1.19E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01

Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	84.10	84.10	84.10	84.10	84.10	84.10	84.10
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 37.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.440

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9880613	0.9969253	0.9986378	0.9999899	1.567E+02	4.834E-01	--
α_2	1.01E-05	3.07E-03	1.36E-03	1.19E-02	4.834E-01	1.567E+02	0.517

CCCG = 3, Gamma = 0.440

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9856460	0.9948424	0.9961472	0.9995801	2.364E+02	1.226E+00	--
α_2	1.96E-04	4.03E-03	2.77E-03	1.21E-02	9.769E-01	2.415E+02	0.693
α_3	1.80E-08	1.13E-03	1.96E-04	5.47E-03	2.487E-01	2.201E+02	0.762

CCCG = 4, Gamma = 0.440

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9822966	0.9924451	0.9936123	0.9986031	2.702E+02	2.057E+00	--
α_2	5.68E-04	5.15E-03	4.03E-03	1.36E-02	1.442E+00	2.785E+02	0.789
α_3	1.96E-06	1.57E-03	5.89E-04	6.45E-03	4.114E-01	2.620E+02	0.842
α_4	1.10E-09	8.36E-04	9.12E-05	4.29E-03	2.036E-01	2.432E+02	0.908

CCCG = 5, Gamma = 0.440

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9822273	0.9910032	0.9917897	0.9970919	4.057E+02	3.683E+00	--
α_2	1.09E-03	5.32E-03	4.56E-03	1.21E-02	2.243E+00	4.193E+02	0.928
α_3	1.28E-04	2.54E-03	1.76E-03	7.62E-03	9.912E-01	3.893E+02	1.003
α_4	6.57E-07	9.63E-04	3.25E-04	4.09E-03	3.765E-01	3.904E+02	1.001
α_5	1.50E-21	1.73E-04	9.87E-08	1.00E-03	7.237E-02	4.177E+02	0.937

CCCG = 6, Gamma = 0.440

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9826312	0.9909306	0.9916375	0.9968155	4.522E+02	4.139E+00	--
α_2	8.31E-04	4.32E-03	3.67E-03	1.00E-02	2.128E+00	4.903E+02	0.896
α_3	1.85E-04	2.68E-03	1.95E-03	7.66E-03	1.134E+00	4.224E+02	1.042
α_4	8.41E-06	1.29E-03	6.38E-04	4.76E-03	5.533E-01	4.295E+02	1.027
α_5	1.94E-09	4.99E-04	6.65E-05	2.50E-03	2.210E-01	4.430E+02	0.996
α_6	3.64E-16	2.86E-04	1.99E-06	1.66E-03	1.027E-01	3.595E+02	1.228

CCCG = 7, Gamma = 0.440

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9842558	0.9908452	0.9913068	0.9958586	6.962E+02	6.432E+00	--
α_2	9.59E-04	3.69E-03	3.27E-03	7.85E-03	2.840E+00	7.674E+02	0.941
α_3	3.95E-04	2.66E-03	2.18E-03	6.59E-03	1.746E+00	6.535E+02	1.106
α_4	1.02E-04	1.64E-03	1.17E-03	4.77E-03	1.084E+00	6.602E+02	1.096
α_5	4.67E-06	8.20E-04	3.97E-04	3.07E-03	5.376E-01	6.548E+02	1.106
α_6	2.66E-10	3.03E-04	3.06E-05	1.57E-03	1.979E-01	6.527E+02	1.110
α_7	8.99E-53	4.01E-05	4.02E-15	1.37E-04	2.656E-02	6.619E+02	1.095

CCCG = 8, Gamma = 0.440

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9848850	0.9913143	0.9917754	0.9961694	6.976E+02	6.112E+00	--
α_2	6.53E-04	3.02E-03	2.61E-03	6.79E-03	2.364E+00	7.810E+02	0.925
α_3	2.67E-04	2.24E-03	1.77E-03	5.82E-03	1.512E+00	6.728E+02	1.074
α_4	9.55E-05	1.63E-03	1.15E-03	4.78E-03	1.056E+00	6.472E+02	1.117
α_5	1.52E-05	1.00E-03	5.72E-04	3.46E-03	6.745E-01	6.709E+02	1.078
α_6	6.41E-08	4.77E-04	1.21E-04	2.17E-03	3.076E-01	6.442E+02	1.124
α_7	1.23E-15	1.75E-04	1.73E-06	1.01E-03	1.093E-01	6.229E+02	1.162
α_8	2.15E-18	1.40E-04	3.88E-07	8.14E-04	8.885E-02	6.364E+02	1.138

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.95E-01	9.92E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01
α_2	3.07E-03	4.03E-03	5.15E-03	5.32E-03	4.32E-03	3.69E-03	3.02E-03
α_3		1.13E-03	1.57E-03	2.54E-03	2.68E-03	2.66E-03	2.24E-03
α_4			8.36E-04	9.63E-04	1.29E-03	1.64E-03	1.63E-03
α_5				1.73E-04	4.99E-04	8.20E-04	1.00E-03
α_6					2.86E-04	3.03E-04	4.77E-04
α_7						4.01E-05	1.75E-04
α_8							1.40E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.95E-01	9.92E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01
Beta	3.07E-03	5.16E-03	7.55E-03	9.00E-03	9.07E-03	9.15E-03	8.69E-03
Gamma		2.19E-01	3.18E-01	4.09E-01	5.24E-01	5.97E-01	6.53E-01
Delta			3.48E-01	3.09E-01	4.36E-01	5.13E-01	6.04E-01
Epsilon				1.52E-01	3.79E-01	4.15E-01	5.24E-01
Mu					3.64E-01	2.95E-01	4.41E-01
Omega						1.17E-01	3.98E-01
Sigma							4.43E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	37.00	37.00	37.00	37.00	37.00	37.00	37.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 14.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.166

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9670980	0.9917231	0.9965527	0.9999817	5.389E+01	4.498E-01	--
α_2	1.83E-05	8.28E-03	3.45E-03	3.29E-02	4.498E-01	5.389E+01	0.517

CCCG = 3, Gamma = 0.166

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9530511	0.9832617	0.9875724	0.9987304	6.922E+01	1.178E+00	--
α_2	5.77E-04	1.31E-02	8.91E-03	3.98E-02	9.387E-01	7.089E+01	0.693
α_3	3.85E-08	3.67E-03	5.92E-04	1.80E-02	2.396E-01	6.505E+01	0.762

CCCG = 4, Gamma = 0.166

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9442888	0.9766549	0.9804427	0.9960588	7.942E+01	1.898E+00	--
α_2	1.38E-03	1.53E-02	1.17E-02	4.17E-02	1.285E+00	8.258E+01	0.789
α_3	4.61E-06	5.00E-03	1.79E-03	2.09E-02	3.927E-01	7.820E+01	0.842
α_4	1.17E-08	3.03E-03	4.05E-04	1.52E-02	2.207E-01	7.270E+01	0.908

CCCG = 5, Gamma = 0.166

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9457027	0.9726970	0.9751160	0.9914213	1.249E+02	3.506E+00	--
α_2	2.68E-03	1.50E-02	1.27E-02	3.54E-02	1.992E+00	1.306E+02	0.928
α_3	5.44E-04	8.78E-03	6.30E-03	2.55E-02	1.078E+00	1.217E+02	1.003
α_4	1.55E-06	2.95E-03	9.57E-04	1.27E-02	3.632E-01	1.226E+02	1.001
α_5	5.10E-21	5.51E-04	3.19E-07	3.19E-03	7.248E-02	1.314E+02	0.937

CCCG = 6, Gamma = 0.166

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9484365	0.9728052	0.9748225	0.9902795	1.502E+02	4.199E+00	--
α_2	2.00E-03	1.16E-02	9.70E-03	2.76E-02	1.941E+00	1.657E+02	0.896
α_3	8.86E-04	9.24E-03	7.09E-03	2.49E-02	1.332E+00	1.429E+02	1.042
α_4	4.53E-05	4.22E-03	2.28E-03	1.50E-02	6.181E-01	1.458E+02	1.027
α_5	1.05E-08	1.53E-03	2.28E-04	7.59E-03	2.313E-01	1.507E+02	0.996
α_6	5.73E-20	6.28E-04	5.92E-07	3.65E-03	7.684E-02	1.224E+02	1.228

CCCG = 7, Gamma = 0.166

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9515841	0.9719042	0.9733139	0.9874092	2.153E+02	6.223E+00	--
α_2	2.67E-03	1.09E-02	9.60E-03	2.36E-02	2.654E+00	2.407E+02	0.941
α_3	1.08E-03	7.95E-03	6.43E-03	2.00E-02	1.645E+00	2.054E+02	1.106
α_4	3.56E-04	5.34E-03	3.86E-03	1.53E-02	1.115E+00	2.078E+02	1.096
α_5	2.82E-05	2.91E-03	1.54E-03	1.05E-02	6.034E-01	2.064E+02	1.106
α_6	1.53E-10	8.63E-04	6.43E-05	4.58E-03	1.780E-01	2.061E+02	1.110
α_7	7.12E-51	1.31E-04	2.69E-14	4.62E-04	2.734E-02	2.091E+02	1.095

CCCG = 8, Gamma = 0.166

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9532855	0.9728766	0.9742352	0.9878271	2.240E+02	6.246E+00	--
α_2	2.26E-03	9.79E-03	8.54E-03	2.16E-02	2.504E+00	2.532E+02	0.925
α_3	6.92E-04	6.45E-03	5.03E-03	1.71E-02	1.419E+00	2.187E+02	1.074
α_4	2.67E-04	4.85E-03	3.41E-03	1.44E-02	1.027E+00	2.106E+02	1.117
α_5	6.90E-05	3.35E-03	2.01E-03	1.12E-02	7.337E-01	2.185E+02	1.078
α_6	1.88E-06	1.89E-03	6.82E-04	7.86E-03	3.975E-01	2.100E+02	1.124
α_7	3.79E-20	3.79E-04	3.64E-07	2.20E-03	7.703E-02	2.033E+02	1.162
α_8	3.91E-18	4.21E-04	1.05E-06	2.46E-03	8.749E-02	2.077E+02	1.138

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.83E-01	9.77E-01	9.73E-01	9.73E-01	9.72E-01	9.73E-01
α_2	8.28E-03	1.31E-02	1.53E-02	1.50E-02	1.16E-02	1.09E-02	9.79E-03
α_3		3.67E-03	5.00E-03	8.78E-03	9.24E-03	7.95E-03	6.45E-03
α_4			3.03E-03	2.95E-03	4.22E-03	5.34E-03	4.85E-03
α_5				5.51E-04	1.53E-03	2.91E-03	3.35E-03
α_6					6.28E-04	8.63E-04	1.89E-03
α_7						1.31E-04	3.79E-04
α_8							4.21E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.83E-01	9.77E-01	9.73E-01	9.73E-01	9.72E-01	9.73E-01
Beta	8.28E-03	1.67E-02	2.33E-02	2.73E-02	2.72E-02	2.81E-02	2.71E-02
Gamma		2.19E-01	3.44E-01	4.50E-01	5.74E-01	6.12E-01	6.39E-01
Delta			3.77E-01	2.85E-01	4.09E-01	5.38E-01	6.28E-01
Epsilon				1.57E-01	3.38E-01	4.23E-01	5.54E-01
Mu					2.91E-01	2.54E-01	4.46E-01
Omega						1.32E-01	2.97E-01
Sigma							5.26E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	14.00	14.00	14.00	14.00	14.00	14.00	14.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 22.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.263

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9795671	0.9947831	0.9977394	0.9999851	8.974E+01	4.706E-01	--
α_2	1.49E-05	5.22E-03	2.26E-03	2.04E-02	4.706E-01	8.974E+01	0.517

CCCG = 3, Gamma = 0.263

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9732604	0.9907196	0.9932903	0.9993948	1.177E+02	1.103E+00	--
α_2	1.91E-04	6.65E-03	4.21E-03	2.14E-02	8.104E-01	1.211E+02	0.693
α_3	2.21E-07	2.64E-03	6.18E-04	1.22E-02	2.921E-01	1.106E+02	0.762

CCCG = 4, Gamma = 0.263

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9723565	0.9883743	0.9902491	0.9979807	1.660E+02	1.953E+00	--
α_2	7.06E-04	7.58E-03	5.78E-03	2.06E-02	1.312E+00	1.718E+02	0.789
α_3	4.46E-06	2.65E-03	1.05E-03	1.07E-02	4.307E-01	1.618E+02	0.842
α_4	2.78E-09	1.39E-03	1.65E-04	7.10E-03	2.099E-01	1.503E+02	0.908

CCCG = 5, Gamma = 0.263

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9735797	0.9872220	0.9885324	0.9963857	2.400E+02	3.107E+00	--
α_2	9.46E-04	6.70E-03	5.44E-03	1.67E-02	1.684E+00	2.498E+02	0.928
α_3	1.79E-04	4.05E-03	2.75E-03	1.24E-02	9.426E-01	2.319E+02	1.003
α_4	1.23E-06	1.64E-03	5.63E-04	6.91E-03	3.816E-01	2.327E+02	1.001
α_5	1.58E-16	3.96E-04	2.17E-06	2.30E-03	9.865E-02	2.491E+02	0.937

CCCG = 6, Gamma = 0.263

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9758770	0.9876517	0.9886860	0.9958924	3.057E+02	3.822E+00	--
α_2	7.36E-04	5.09E-03	4.15E-03	1.27E-02	1.714E+00	3.352E+02	0.896
α_3	2.51E-04	3.82E-03	2.76E-03	1.10E-02	1.108E+00	2.887E+02	1.042
α_4	2.92E-05	2.21E-03	1.23E-03	7.72E-03	6.509E-01	2.936E+02	1.027
α_5	1.66E-08	8.36E-04	1.51E-04	4.03E-03	2.536E-01	3.030E+02	0.996
α_6	6.31E-17	3.89E-04	1.77E-06	2.27E-03	9.572E-02	2.459E+02	1.228

CCCG = 7, Gamma = 0.263

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9774881	0.9875384	0.9883096	0.9949549	4.117E+02	5.195E+00	--
α_2	8.69E-04	4.58E-03	3.88E-03	1.07E-02	2.105E+00	4.574E+02	0.941
α_3	3.17E-04	3.38E-03	2.58E-03	9.17E-03	1.320E+00	3.897E+02	1.106
α_4	1.29E-04	2.53E-03	1.75E-03	7.57E-03	9.967E-01	3.936E+02	1.096
α_5	6.79E-06	1.34E-03	6.38E-04	5.07E-03	5.249E-01	3.905E+02	1.106
α_6	3.73E-10	5.02E-04	4.91E-05	2.60E-03	1.956E-01	3.894E+02	1.110
α_7	3.82E-28	1.34E-04	3.04E-09	7.27E-04	5.291E-02	3.949E+02	1.095

CCCG = 8, Gamma = 0.263

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9790284	0.9880683	0.9887276	0.9948569	4.829E+02	5.832E+00	--
α_2	8.30E-04	4.09E-03	3.50E-03	9.36E-03	2.229E+00	5.427E+02	0.925
α_3	2.31E-04	2.69E-03	2.02E-03	7.41E-03	1.260E+00	4.678E+02	1.074
α_4	1.31E-04	2.31E-03	1.63E-03	6.81E-03	1.042E+00	4.500E+02	1.117
α_5	3.83E-05	1.63E-03	9.99E-04	5.38E-03	7.626E-01	4.665E+02	1.078
α_6	1.67E-07	7.29E-04	2.04E-04	3.24E-03	3.271E-01	4.481E+02	1.124
α_7	3.00E-13	3.10E-04	8.31E-06	1.74E-03	1.344E-01	4.333E+02	1.162
α_8	1.56E-20	1.73E-04	1.63E-07	1.01E-03	7.682E-02	4.427E+02	1.138

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.91E-01	9.88E-01	9.87E-01	9.88E-01	9.88E-01	9.88E-01
α_2	5.22E-03	6.65E-03	7.58E-03	6.70E-03	5.09E-03	4.58E-03	4.09E-03
α_3		2.64E-03	2.65E-03	4.05E-03	3.82E-03	3.38E-03	2.69E-03
α_4			1.39E-03	1.64E-03	2.21E-03	2.53E-03	2.31E-03
α_5				3.96E-04	8.36E-04	1.34E-03	1.63E-03
α_6					3.89E-04	5.02E-04	7.29E-04
α_7						1.34E-04	3.10E-04
α_8							1.73E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.91E-01	9.88E-01	9.87E-01	9.88E-01	9.88E-01	9.88E-01
Beta	5.22E-03	9.28E-03	1.16E-02	1.28E-02	1.23E-02	1.25E-02	1.19E-02
Gamma		2.84E-01	3.48E-01	4.76E-01	5.88E-01	6.32E-01	6.57E-01
Delta			3.44E-01	3.34E-01	4.73E-01	5.72E-01	6.57E-01
Epsilon				1.95E-01	3.56E-01	4.39E-01	5.52E-01
Mu					3.18E-01	3.21E-01	4.26E-01
Omega						2.11E-01	3.99E-01
Sigma							3.59E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	22.10	22.10	22.10	22.10	22.10	22.10	22.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 11.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.131

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9918002	0.9978739	0.9990419	0.9999922	2.315E+02	4.932E-01	--
α_2	7.80E-06	2.13E-03	9.58E-04	8.20E-03	4.932E-01	2.315E+02	0.517

CCCG = 3, Gamma = 0.131

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9914228	0.9970737	0.9979224	0.9998269	3.610E+02	1.060E+00	--
α_2	3.57E-05	1.91E-03	1.13E-03	6.45E-03	7.137E-01	3.732E+02	0.693
α_3	3.66E-07	1.02E-03	3.08E-04	4.44E-03	3.458E-01	3.395E+02	0.762

CCCG = 4, Gamma = 0.131

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9919335	0.9965339	0.9970591	0.9993391	6.080E+02	2.115E+00	--
α_2	3.05E-04	2.47E-03	1.96E-03	6.35E-03	1.549E+00	6.267E+02	0.789
α_3	1.40E-08	4.49E-04	8.79E-05	2.14E-03	2.646E-01	5.885E+02	0.842
α_4	6.09E-08	5.51E-04	1.35E-04	2.52E-03	3.010E-01	5.459E+02	0.908

CCCG = 5, Gamma = 0.131

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9935516	0.9964190	0.9966390	0.9985351	1.482E+03	5.325E+00	--
α_2	7.60E-04	2.38E-03	2.17E-03	4.74E-03	3.632E+00	1.520E+03	0.928
α_3	9.43E-05	9.60E-04	7.37E-04	2.59E-03	1.354E+00	1.409E+03	1.003
α_4	1.99E-08	2.10E-04	5.00E-05	9.63E-04	2.961E-01	1.412E+03	1.001
α_5	8.36E-35	2.81E-05	3.09E-11	1.39E-04	4.243E-02	1.510E+03	0.937

CCCG = 6, Gamma = 0.131

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9932117	0.9962995	0.9965445	0.9985508	1.329E+03	4.936E+00	--
α_2	5.43E-04	2.04E-03	1.82E-03	4.32E-03	2.915E+00	1.424E+03	0.896
α_3	8.74E-05	1.02E-03	7.70E-04	2.83E-03	1.257E+00	1.226E+03	1.042
α_4	1.64E-06	4.04E-04	1.85E-04	1.55E-03	5.031E-01	1.245E+03	1.027
α_5	2.60E-15	8.99E-05	1.19E-06	5.16E-04	1.155E-01	1.284E+03	0.996
α_6	6.51E-13	1.39E-04	5.10E-06	7.71E-04	1.451E-01	1.042E+03	1.228

CCCG = 7, Gamma = 0.131

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9943190	0.9964046	0.9965271	0.9980721	2.676E+03	9.654E+00	--
α_2	6.44E-04	1.66E-03	1.55E-03	3.07E-03	4.851E+00	2.911E+03	0.941
α_3	2.89E-04	1.13E-03	9.98E-04	2.42E-03	2.800E+00	2.478E+03	1.106
α_4	5.65E-05	5.53E-04	4.27E-04	1.48E-03	1.384E+00	2.502E+03	1.096
α_5	6.99E-07	1.98E-04	8.83E-05	7.64E-04	4.902E-01	2.480E+03	1.106
α_6	1.10E-15	4.64E-05	5.88E-07	2.66E-04	1.146E-01	2.471E+03	1.110
α_7	3.07E-93	5.84E-06	6.22E-25	6.94E-06	1.464E-02	2.506E+03	1.095

CCCG = 8, Gamma = 0.131

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940811	0.9964818	0.9966433	0.9983310	2.025E+03	7.148E+00	--
α_2	3.59E-04	1.33E-03	1.18E-03	2.78E-03	2.980E+00	2.246E+03	0.925
α_3	1.75E-04	1.01E-03	8.47E-04	2.42E-03	1.960E+00	1.934E+03	1.074
α_4	4.58E-05	6.26E-04	4.59E-04	1.78E-03	1.166E+00	1.860E+03	1.117
α_5	1.58E-06	2.79E-04	1.35E-04	1.04E-03	5.375E-01	1.928E+03	1.078
α_6	2.16E-11	9.75E-05	7.57E-06	5.16E-04	1.805E-01	1.850E+03	1.124
α_7	1.20E-35	2.31E-05	1.73E-11	1.13E-04	4.139E-02	1.789E+03	1.162
α_8	9.44E-09	1.55E-04	3.41E-05	7.21E-04	2.827E-01	1.827E+03	1.138

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.97E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	2.13E-03	1.91E-03	2.47E-03	2.38E-03	2.04E-03	1.66E-03	1.33E-03
α_3		1.02E-03	4.49E-04	9.60E-04	1.02E-03	1.13E-03	1.01E-03
α_4			5.51E-04	2.10E-04	4.04E-04	5.53E-04	6.26E-04
α_5				2.81E-05	8.99E-05	1.98E-04	2.79E-04
α_6					1.39E-04	4.64E-05	9.75E-05
α_7						5.84E-06	2.31E-05
α_8							1.55E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.97E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	2.13E-03	2.93E-03	3.47E-03	3.58E-03	3.70E-03	3.60E-03	3.52E-03
Gamma		3.48E-01	2.89E-01	3.34E-01	4.48E-01	5.37E-01	6.23E-01
Delta			5.51E-01	1.98E-01	3.82E-01	4.16E-01	5.38E-01
Epsilon				1.18E-01	3.62E-01	3.11E-01	4.69E-01
Mu					6.08E-01	2.09E-01	4.97E-01
Omega						1.12E-01	6.46E-01
Sigma							8.70E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	11.00	11.00	11.00	11.00	11.00	11.00	11.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.2 Pooled Pump Volutes

2.1.2.1 CLN-PMP-FR: Clean Systems Pump Volutes Fail to Run

Generic CCF Parameters

System Group:	Clean Water
System:	Auxiliary Feedwater, Chemical and Volume Control, Component Cooling Water, Containment Spray Recirculation, Low Pressure Core Spray, Residual Heat Removal (LCI in BWRs; LPI in PWRs), Standby Liquid Control
Component Group:	Pump
Component Type:	Engine Driven Pump, Motor Driven Pump, Turbine Driven Pump
Component Subtype:	Centrifugal
Failure Mode:	Fail to Run, Fail to Run < 1H, Fail to Run > 1H
Date Range:	2006 through 2020
Prior:	Default 2015

Total Number of Independent Failure Events: 51.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9753318	0.9937094	0.9972847	0.9999807	1.0000000	7.401E+01	4.685E-01
α_2	1.75E-05	6.29E-03	2.72E-03	2.47E-02	0.00E+00	4.685E-01	7.401E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9708909	0.9898106	0.9925676	0.9992975	1.0000000	1.096E+02	1.128E+00
α_2	2.57E-04	7.69E-03	5.00E-03	2.43E-02	0.00E+00	8.512E-01	1.099E+02
α_3	1.25E-07	2.50E-03	5.34E-04	1.17E-02	0.00E+00	2.768E-01	1.104E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9684870	0.9868653	0.9890385	0.9978072	1.0000000	1.423E+02	1.894E+00
α_2	7.54E-04	8.74E-03	6.59E-03	2.40E-02	0.00E+00	1.260E+00	1.429E+02
α_3	3.03E-06	2.79E-03	1.02E-03	1.16E-02	0.00E+00	4.024E-01	1.438E+02
α_4	1.11E-08	1.61E-03	2.39E-04	7.95E-03	0.00E+00	2.315E-01	1.439E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9719426	0.9860408	0.9873390	0.9957158	1.0000000	2.424E+02	3.432E+00
α_2	1.33E-03	7.83E-03	6.54E-03	1.87E-02	0.00E+00	1.924E+00	2.439E+02
α_3	2.47E-04	4.27E-03	3.02E-03	1.25E-02	0.00E+00	1.049E+00	2.448E+02
α_4	1.18E-06	1.55E-03	5.36E-04	6.56E-03	0.00E+00	3.822E-01	2.455E+02
α_5	2.71E-20	3.12E-04	2.91E-07	1.81E-03	0.00E+00	7.674E-02	2.458E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9733448	0.9863358	0.9874764	0.9954382	1.0000000	2.768E+02	3.835E+00
α_2	8.68E-04	6.06E-03	4.94E-03	1.51E-02	0.00E+00	1.701E+00	2.790E+02
α_3	3.39E-04	4.30E-03	3.20E-03	1.20E-02	0.00E+00	1.207E+00	2.794E+02
α_4	1.95E-05	2.12E-03	1.11E-03	7.65E-03	0.00E+00	5.960E-01	2.801E+02
α_5	3.08E-09	7.88E-04	1.05E-04	3.95E-03	0.00E+00	2.211E-01	2.804E+02
α_6	3.08E-15	3.91E-04	3.96E-06	2.26E-03	0.00E+00	1.098E-01	2.805E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9763882	0.9866075	0.9873594	0.9942712	1.0000000	4.234E+02	5.747E+00
α_2	1.07E-03	5.23E-03	4.48E-03	1.19E-02	0.00E+00	2.243E+00	4.269E+02
α_3	5.09E-04	3.80E-03	3.06E-03	9.61E-03	0.00E+00	1.630E+00	4.275E+02
α_4	1.57E-04	2.52E-03	1.81E-03	7.34E-03	0.00E+00	1.083E+00	4.281E+02
α_5	9.52E-06	1.32E-03	6.64E-04	4.84E-03	0.00E+00	5.654E-01	4.286E+02
α_6	2.45E-10	4.46E-04	4.12E-05	2.33E-03	0.00E+00	1.916E-01	4.290E+02
α_7	5.55E-41	8.11E-05	3.02E-12	3.56E-04	0.00E+00	3.480E-02	4.291E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9774156	0.9872010	0.9879228	0.9945319	1.0000000	4.416E+02	5.726E+00
α_2	8.13E-04	4.51E-03	3.80E-03	1.06E-02	0.00E+00	2.018E+00	4.453E+02
α_3	3.21E-04	3.11E-03	2.41E-03	8.29E-03	0.00E+00	1.391E+00	4.460E+02
α_4	1.41E-04	2.37E-03	1.69E-03	6.95E-03	0.00E+00	1.062E+00	4.463E+02
α_5	2.77E-05	1.57E-03	9.17E-04	5.33E-03	0.00E+00	7.026E-01	4.466E+02
α_6	3.07E-07	7.82E-04	2.40E-04	3.40E-03	0.00E+00	3.497E-01	4.470E+02
α_7	1.18E-15	2.41E-04	2.21E-06	1.39E-03	0.00E+00	1.078E-01	4.472E+02
α_8	2.46E-17	2.12E-04	8.97E-07	1.23E-03	0.00E+00	9.469E-02	4.473E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.90E-01	9.87E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01
α_2	6.29E-03	7.69E-03	8.74E-03	7.83E-03	6.06E-03	5.23E-03	4.51E-03
α_3		2.50E-03	2.79E-03	4.27E-03	4.30E-03	3.80E-03	3.11E-03
α_4			1.61E-03	1.55E-03	2.12E-03	2.52E-03	2.37E-03
α_5				3.12E-04	7.88E-04	1.32E-03	1.57E-03
α_6					3.91E-04	4.46E-04	7.82E-04
α_7						8.11E-05	2.41E-04
α_8							2.12E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.90E-01	9.87E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01
Beta	6.29E-03	1.02E-02	1.31E-02	1.40E-02	1.37E-02	1.34E-02	1.28E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01

Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	51.60	51.60	51.60	51.60	51.60	51.60	51.60
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 12.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9832059	0.9956726	0.9980796	0.9999857	1.112E+02	4.834E-01	--
α_2	1.43E-05	4.33E-03	1.92E-03	1.68E-02	4.834E-01	1.112E+02	0.505

CCCG = 3, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9844709	0.9944190	0.9958300	0.9995455	2.184E+02	1.226E+00	--
α_2	2.20E-04	4.53E-03	3.12E-03	1.37E-02	9.769E-01	2.145E+02	0.664
α_3	1.67E-08	1.05E-03	1.82E-04	5.08E-03	2.487E-01	2.370E+02	0.603

CCCG = 4, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9820280	0.9923301	0.9935148	0.9985817	2.661E+02	2.057E+00	--
α_2	5.95E-04	5.40E-03	4.23E-03	1.42E-02	1.442E+00	2.656E+02	0.734
α_3	1.88E-06	1.50E-03	5.64E-04	6.17E-03	4.114E-01	2.736E+02	0.715
α_4	1.01E-09	7.68E-04	8.37E-05	3.94E-03	2.036E-01	2.650E+02	0.739

CCCG = 5, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9833547	0.9915756	0.9923129	0.9972777	4.335E+02	3.683E+00	--
α_2	1.07E-03	5.22E-03	4.47E-03	1.19E-02	2.243E+00	4.275E+02	0.853
α_3	1.11E-04	2.22E-03	1.53E-03	6.66E-03	9.912E-01	4.460E+02	0.820
α_4	5.62E-07	8.25E-04	2.79E-04	3.50E-03	3.765E-01	4.561E+02	0.803
α_5	1.41E-21	1.63E-04	9.28E-08	9.41E-04	7.237E-02	4.442E+02	0.825

CCCG = 6, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9834700	0.9913700	0.9920431	0.9969704	4.755E+02	4.139E+00	--
α_2	8.73E-04	4.54E-03	3.86E-03	1.05E-02	2.128E+00	4.667E+02	0.888
α_3	1.58E-04	2.29E-03	1.67E-03	6.57E-03	1.134E+00	4.930E+02	0.843
α_4	7.10E-06	1.09E-03	5.39E-04	4.02E-03	5.533E-01	5.088E+02	0.818
α_5	1.69E-09	4.36E-04	5.81E-05	2.19E-03	2.210E-01	5.070E+02	0.821
α_6	3.49E-16	2.74E-04	1.91E-06	1.59E-03	1.027E-01	3.745E+02	1.112

CCCG = 7, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9855870	0.9916212	0.9920443	0.9962107	7.612E+02	6.432E+00	--
α_2	9.97E-04	3.84E-03	3.40E-03	8.17E-03	2.840E+00	7.374E+02	0.945
α_3	3.32E-04	2.24E-03	1.83E-03	5.54E-03	1.746E+00	7.787E+02	0.896
α_4	8.47E-05	1.36E-03	9.72E-04	3.96E-03	1.084E+00	7.964E+02	0.877
α_5	3.82E-06	6.71E-04	3.25E-04	2.51E-03	5.376E-01	8.005E+02	0.873
α_6	2.12E-10	2.41E-04	2.44E-05	1.25E-03	1.979E-01	8.199E+02	0.853
α_7	7.48E-53	3.34E-05	3.35E-15	1.14E-04	2.656E-02	7.954E+02	0.880

CCCG = 8, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9860321	0.9919750	0.9924015	0.9964617	7.555E+02	6.112E+00	--
α_2	6.92E-04	3.20E-03	2.76E-03	7.19E-03	2.364E+00	7.371E+02	0.946
α_3	2.34E-04	1.97E-03	1.55E-03	5.10E-03	1.512E+00	7.676E+02	0.909
α_4	7.77E-05	1.33E-03	9.39E-04	3.89E-03	1.056E+00	7.958E+02	0.878
α_5	1.28E-05	8.43E-04	4.80E-04	2.91E-03	6.745E-01	7.991E+02	0.874
α_6	5.24E-08	3.90E-04	9.91E-05	1.77E-03	3.076E-01	7.877E+02	0.887
α_7	8.93E-16	1.28E-04	1.26E-06	7.36E-04	1.093E-01	8.561E+02	0.817
α_8	2.71E-18	1.75E-04	4.87E-07	1.02E-03	8.885E-02	5.063E+02	1.381

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.94E-01	9.92E-01	9.92E-01	9.91E-01	9.92E-01	9.92E-01
α_2	4.33E-03	4.53E-03	5.40E-03	5.22E-03	4.54E-03	3.84E-03	3.20E-03
α_3		1.05E-03	1.50E-03	2.22E-03	2.29E-03	2.24E-03	1.97E-03
α_4			7.68E-04	8.25E-04	1.09E-03	1.36E-03	1.33E-03
α_5				1.63E-04	4.36E-04	6.71E-04	8.43E-04
α_6					2.74E-04	2.41E-04	3.90E-04
α_7						3.34E-05	1.28E-04
α_8							1.75E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.94E-01	9.92E-01	9.92E-01	9.91E-01	9.92E-01	9.92E-01
Beta	4.33E-03	5.58E-03	7.67E-03	8.42E-03	8.63E-03	8.38E-03	8.02E-03
Gamma		1.88E-01	2.96E-01	3.80E-01	4.74E-01	5.42E-01	6.02E-01
Delta			3.38E-01	3.08E-01	4.39E-01	5.07E-01	5.93E-01
Epsilon				1.65E-01	3.95E-01	4.10E-01	5.37E-01
Mu					3.86E-01	2.90E-01	4.51E-01
Omega						1.22E-01	4.37E-01
Sigma							5.79E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	12.10	12.10	12.10	12.10	12.10	12.10	12.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 3.7

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.072

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9493848	0.9872432	0.9946529	0.9999717	3.481E+01	4.498E-01	--
α_2	2.83E-05	1.28E-02	5.35E-03	5.06E-02	4.498E-01	3.481E+01	0.505

CCCG = 3, Gamma = 0.072

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9455121	0.9805470	0.9855348	0.9985209	5.939E+01	1.178E+00	--
α_2	6.99E-04	1.58E-02	1.08E-02	4.80E-02	9.387E-01	5.851E+01	0.664
α_3	3.84E-08	3.66E-03	5.91E-04	1.80E-02	2.396E-01	6.519E+01	0.603

CCCG = 4, Gamma = 0.072

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9407851	0.9751698	0.9791878	0.9958038	7.456E+01	1.898E+00	--
α_2	1.52E-03	1.69E-02	1.29E-02	4.60E-02	1.285E+00	7.483E+01	0.734
α_3	4.64E-06	5.03E-03	1.80E-03	2.10E-02	3.927E-01	7.772E+01	0.715
α_4	1.12E-08	2.92E-03	3.91E-04	1.47E-02	2.207E-01	7.537E+01	0.739

CCCG = 5, Gamma = 0.072

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9482655	0.9739983	0.9763079	0.9918354	1.313E+02	3.506E+00	--
α_2	2.69E-03	1.51E-02	1.27E-02	3.55E-02	1.992E+00	1.303E+02	0.853
α_3	4.85E-04	7.83E-03	5.61E-03	2.28E-02	1.078E+00	1.365E+02	0.820
α_4	1.36E-06	2.58E-03	8.36E-04	1.11E-02	3.632E-01	1.402E+02	0.803
α_5	4.90E-21	5.30E-04	3.07E-07	3.07E-03	7.248E-02	1.367E+02	0.825

CCCG = 6, Gamma = 0.072

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9508395	0.9740840	0.9760114	0.9907419	1.578E+02	4.199E+00	--
α_2	2.12E-03	1.23E-02	1.03E-02	2.93E-02	1.941E+00	1.556E+02	0.888
α_3	7.69E-04	8.02E-03	6.15E-03	2.17E-02	1.332E+00	1.647E+02	0.843
α_4	3.87E-05	3.61E-03	1.95E-03	1.28E-02	6.181E-01	1.706E+02	0.818
α_5	9.31E-09	1.36E-03	2.01E-04	6.72E-03	2.313E-01	1.703E+02	0.821
α_6	5.57E-20	6.10E-04	5.76E-07	3.55E-03	7.684E-02	1.258E+02	1.112

CCCG = 7, Gamma = 0.072

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9553249	0.9740917	0.9753974	0.9883987	2.340E+02	6.223E+00	--
α_2	2.81E-03	1.15E-02	1.01E-02	2.48E-02	2.654E+00	2.287E+02	0.945
α_3	9.20E-04	6.75E-03	5.45E-03	1.70E-02	1.645E+00	2.422E+02	0.896
α_4	2.98E-04	4.47E-03	3.24E-03	1.29E-02	1.115E+00	2.481E+02	0.877
α_5	2.33E-05	2.41E-03	1.28E-03	8.65E-03	6.034E-01	2.497E+02	0.873
α_6	1.23E-10	6.95E-04	5.18E-05	3.69E-03	1.780E-01	2.561E+02	0.853
α_7	5.99E-51	1.10E-04	2.26E-14	3.88E-04	2.734E-02	2.485E+02	0.880

CCCG = 8, Gamma = 0.072

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9562802	0.9746284	0.9759038	0.9886206	2.399E+02	6.246E+00	--
α_2	2.42E-03	1.05E-02	9.14E-03	2.31E-02	2.504E+00	2.366E+02	0.946
α_3	6.12E-04	5.71E-03	4.45E-03	1.51E-02	1.419E+00	2.473E+02	0.909
α_4	2.19E-04	3.99E-03	2.80E-03	1.18E-02	1.027E+00	2.567E+02	0.878
α_5	5.85E-05	2.84E-03	1.70E-03	9.48E-03	7.337E-01	2.579E+02	0.874
α_6	1.55E-06	1.56E-03	5.63E-04	6.49E-03	3.975E-01	2.544E+02	0.887
α_7	2.78E-20	2.78E-04	2.67E-07	1.62E-03	7.703E-02	2.768E+02	0.817
α_8	4.97E-18	5.34E-04	1.34E-06	3.12E-03	8.749E-02	1.637E+02	1.381

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.81E-01	9.75E-01	9.74E-01	9.74E-01	9.74E-01	9.75E-01
α_2	1.28E-02	1.58E-02	1.69E-02	1.51E-02	1.23E-02	1.15E-02	1.05E-02
α_3		3.66E-03	5.03E-03	7.83E-03	8.02E-03	6.75E-03	5.71E-03
α_4			2.92E-03	2.58E-03	3.61E-03	4.47E-03	3.99E-03
α_5				5.30E-04	1.36E-03	2.41E-03	2.84E-03
α_6					6.10E-04	6.95E-04	1.56E-03
α_7						1.10E-04	2.78E-04
α_8							5.34E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.81E-01	9.75E-01	9.74E-01	9.74E-01	9.74E-01	9.75E-01
Beta	1.28E-02	1.95E-02	2.48E-02	2.60E-02	2.59E-02	2.59E-02	2.54E-02
Gamma		1.88E-01	3.20E-01	4.21E-01	5.25E-01	5.57E-01	5.87E-01
Delta			3.67E-01	2.84E-01	4.10E-01	5.33E-01	6.17E-01
Epsilon				1.70E-01	3.53E-01	4.18E-01	5.67E-01
Mu					3.10E-01	2.50E-01	4.55E-01
Omega						1.37E-01	3.42E-01
Sigma							6.58E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.70	3.70	3.70	3.70	3.70	3.70	3.70
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 5.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.099

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9233318	0.9817571	0.9935821	0.9999863	2.046E+01	3.801E-01	--
α_2	1.37E-05	1.82E-02	6.42E-03	7.67E-02	3.801E-01	2.046E+01	0.505

CCCG = 3, Gamma = 0.099

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9008576	0.9668115	0.9768523	0.9984134	2.797E+01	9.600E-01	--
α_2	3.55E-04	2.37E-02	1.37E-02	8.12E-02	6.673E-01	2.745E+01	0.664
α_3	8.22E-07	9.46E-03	2.26E-03	4.36E-02	2.927E-01	3.066E+01	0.603

CCCG = 4, Gamma = 0.099

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8919660	0.9561308	0.9638884	0.9937141	3.638E+01	1.669E+00	--
α_2	1.59E-03	2.74E-02	1.96E-02	8.00E-02	1.039E+00	3.682E+01	0.734
α_3	8.68E-06	1.00E-02	3.57E-03	4.18E-02	3.887E-01	3.847E+01	0.715
α_4	7.40E-08	6.42E-03	1.06E-03	3.14E-02	2.414E-01	3.736E+01	0.739

CCCG = 5, Gamma = 0.099

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9089690	0.9539698	0.9579191	0.9854609	7.227E+01	3.487E+00	--
α_2	3.77E-03	2.42E-02	2.00E-02	5.87E-02	1.791E+00	7.236E+01	0.853
α_3	1.25E-03	1.57E-02	1.17E-02	4.36E-02	1.207E+00	7.591E+01	0.820
α_4	9.75E-06	5.51E-03	2.20E-03	2.22E-02	4.340E-01	7.832E+01	0.803
α_5	1.59E-26	7.17E-04	2.55E-08	3.95E-03	5.493E-02	7.661E+01	0.825

CCCG = 6, Gamma = 0.099

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9171778	0.9568931	0.9602206	0.9852296	8.667E+01	3.905E+00	--
α_2	1.48E-03	1.53E-02	1.18E-02	4.11E-02	1.335E+00	8.609E+01	0.888
α_3	2.04E-03	1.66E-02	1.33E-02	4.27E-02	1.531E+00	9.061E+01	0.843
α_4	1.46E-04	7.57E-03	4.51E-03	2.54E-02	7.191E-01	9.426E+01	0.818
α_5	3.82E-08	2.61E-03	4.46E-04	1.27E-02	2.467E-01	9.434E+01	0.821
α_6	1.15E-20	1.04E-03	6.28E-07	6.05E-03	7.279E-02	6.978E+01	1.112

CCCG = 7, Gamma = 0.099

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9281189	0.9588418	0.9610087	0.9821608	1.344E+02	5.770E+00	--
α_2	1.45E-03	1.16E-02	9.26E-03	2.97E-02	1.549E+00	1.321E+02	0.945
α_3	2.52E-03	1.41E-02	1.19E-02	3.33E-02	1.989E+00	1.389E+02	0.896
α_4	8.04E-04	8.94E-03	6.79E-03	2.44E-02	1.287E+00	1.426E+02	0.877
α_5	7.98E-05	4.78E-03	2.77E-03	1.63E-02	6.913E-01	1.439E+02	0.873
α_6	1.16E-08	1.57E-03	2.37E-04	7.77E-03	2.327E-01	1.478E+02	0.853
α_7	9.99E-65	1.47E-04	2.23E-17	3.70E-04	2.112E-02	1.435E+02	0.880

CCCG = 8, Gamma = 0.099

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9366650	0.9621474	0.9637999	0.9819853	1.783E+02	7.016E+00	--
α_2	1.15E-03	8.96E-03	7.19E-03	2.28E-02	1.583E+00	1.751E+02	0.946
α_3	1.92E-03	1.08E-02	9.09E-03	2.56E-02	1.986E+00	1.818E+02	0.909
α_4	1.23E-03	8.78E-03	7.13E-03	2.20E-02	1.672E+00	1.887E+02	0.878
α_5	2.80E-04	5.29E-03	3.69E-03	1.57E-02	1.011E+00	1.901E+02	0.874
α_6	2.30E-05	3.03E-03	1.54E-03	1.11E-02	5.709E-01	1.877E+02	0.887
α_7	2.03E-10	8.84E-04	6.92E-05	4.67E-03	1.809E-01	2.044E+02	0.817
α_8	1.49E-107	1.03E-04	3.12E-27	7.72E-05	1.245E-02	1.210E+02	1.381

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.67E-01	9.56E-01	9.54E-01	9.57E-01	9.59E-01	9.62E-01
α_2	1.82E-02	2.37E-02	2.74E-02	2.42E-02	1.53E-02	1.16E-02	8.96E-03
α_3		9.46E-03	1.00E-02	1.57E-02	1.66E-02	1.41E-02	1.08E-02
α_4			6.42E-03	5.51E-03	7.57E-03	8.94E-03	8.78E-03
α_5				7.17E-04	2.61E-03	4.78E-03	5.29E-03
α_6					1.04E-03	1.57E-03	3.03E-03
α_7						1.47E-04	8.84E-04
α_8							1.03E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.67E-01	9.56E-01	9.54E-01	9.57E-01	9.59E-01	9.62E-01
Beta	1.82E-02	3.32E-02	4.39E-02	4.60E-02	4.31E-02	4.12E-02	3.79E-02
Gamma		2.85E-01	3.74E-01	4.75E-01	6.46E-01	7.18E-01	7.63E-01
Delta			3.91E-01	2.85E-01	4.03E-01	5.22E-01	6.26E-01
Epsilon				1.15E-01	3.25E-01	4.21E-01	5.15E-01
Mu					2.85E-01	2.64E-01	4.32E-01
Omega						8.56E-02	2.46E-01
Sigma							1.04E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.10	5.10	5.10	5.10	5.10	5.10	5.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 24.2

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.469

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9809039	0.9951251	0.9978886	0.9999861	9.607E+01	4.706E-01	--
α_2	1.39E-05	4.87E-03	2.11E-03	1.91E-02	4.706E-01	9.607E+01	0.505

CCCG = 3, Gamma = 0.469

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9762250	0.9917528	0.9940410	0.9994627	1.326E+02	1.103E+00	--
α_2	1.78E-04	6.21E-03	3.94E-03	2.00E-02	8.104E-01	1.296E+02	0.664
α_3	1.71E-07	2.03E-03	4.76E-04	9.38E-03	2.921E-01	1.433E+02	0.603

CCCG = 4, Gamma = 0.469

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9755354	0.9897173	0.9913795	0.9982156	1.879E+02	1.953E+00	--
α_2	6.47E-04	6.94E-03	5.30E-03	1.89E-02	1.312E+00	1.876E+02	0.734
α_3	3.73E-06	2.22E-03	8.77E-04	8.99E-03	4.307E-01	1.935E+02	0.715
α_4	2.22E-09	1.12E-03	1.32E-04	5.69E-03	2.099E-01	1.875E+02	0.739

CCCG = 5, Gamma = 0.469

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9771936	0.9889773	0.9901114	0.9968850	2.788E+02	3.107E+00	--
α_2	8.60E-04	6.10E-03	4.95E-03	1.52E-02	1.684E+00	2.746E+02	0.853
α_3	1.45E-04	3.28E-03	2.22E-03	1.00E-02	9.426E-01	2.864E+02	0.820
α_4	9.76E-07	1.30E-03	4.47E-04	5.49E-03	3.816E-01	2.930E+02	0.803
α_5	1.38E-16	3.45E-04	1.89E-06	2.01E-03	9.865E-02	2.855E+02	0.825

CCCG = 6, Gamma = 0.469

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787665	0.9891365	0.9900490	0.9963888	3.480E+02	3.822E+00	--
α_2	7.25E-04	5.01E-03	4.08E-03	1.25E-02	1.714E+00	3.406E+02	0.888
α_3	2.01E-04	3.07E-03	2.22E-03	8.86E-03	1.108E+00	3.597E+02	0.843
α_4	2.31E-05	1.75E-03	9.75E-04	6.11E-03	6.509E-01	3.712E+02	0.818
α_5	1.36E-08	6.85E-04	1.23E-04	3.30E-03	2.536E-01	3.701E+02	0.821
α_6	5.67E-17	3.50E-04	1.59E-06	2.04E-03	9.572E-02	2.734E+02	1.112

CCCG = 7, Gamma = 0.469

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9803651	0.9891364	0.9898108	0.9956047	4.730E+02	5.195E+00	--
α_2	8.69E-04	4.58E-03	3.88E-03	1.07E-02	2.105E+00	4.575E+02	0.945
α_3	2.56E-04	2.72E-03	2.08E-03	7.40E-03	1.320E+00	4.832E+02	0.896
α_4	1.03E-04	2.01E-03	1.40E-03	6.03E-03	9.967E-01	4.941E+02	0.877
α_5	5.34E-06	1.06E-03	5.01E-04	3.98E-03	5.249E-01	4.969E+02	0.873
α_6	2.85E-10	3.84E-04	3.76E-05	1.99E-03	1.956E-01	5.090E+02	0.853
α_7	3.06E-28	1.07E-04	2.43E-09	5.81E-04	5.291E-02	4.938E+02	0.880

CCCG = 8, Gamma = 0.469

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9814371	0.9894431	0.9900279	0.9954518	5.466E+02	5.832E+00	--
α_2	8.45E-04	4.17E-03	3.57E-03	9.54E-03	2.229E+00	5.327E+02	0.946
α_3	1.94E-04	2.26E-03	1.70E-03	6.25E-03	1.260E+00	5.552E+02	0.909
α_4	1.03E-04	1.81E-03	1.27E-03	5.33E-03	1.042E+00	5.754E+02	0.878
α_5	3.09E-05	1.32E-03	8.06E-04	4.35E-03	7.626E-01	5.779E+02	0.874
α_6	1.31E-07	5.74E-04	1.60E-04	2.55E-03	3.271E-01	5.698E+02	0.887
α_7	2.10E-13	2.17E-04	5.81E-06	1.22E-03	1.344E-01	6.193E+02	0.817
α_8	1.89E-20	2.10E-04	1.97E-07	1.22E-03	7.682E-02	3.663E+02	1.381

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.92E-01	9.90E-01	9.89E-01	9.89E-01	9.89E-01	9.89E-01
α_2	4.87E-03	6.21E-03	6.94E-03	6.10E-03	5.01E-03	4.58E-03	4.17E-03
α_3		2.03E-03	2.22E-03	3.28E-03	3.07E-03	2.72E-03	2.26E-03
α_4			1.12E-03	1.30E-03	1.75E-03	2.01E-03	1.81E-03
α_5				3.45E-04	6.85E-04	1.06E-03	1.32E-03
α_6					3.50E-04	3.84E-04	5.74E-04
α_7						1.07E-04	2.17E-04
α_8							2.10E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.92E-01	9.90E-01	9.89E-01	9.89E-01	9.89E-01	9.89E-01
Beta	4.87E-03	8.25E-03	1.03E-02	1.10E-02	1.09E-02	1.09E-02	1.06E-02
Gamma		2.47E-01	3.25E-01	4.47E-01	5.39E-01	5.78E-01	6.05E-01
Delta			3.35E-01	3.34E-01	4.76E-01	5.66E-01	6.46E-01
Epsilon				2.10E-01	3.72E-01	4.34E-01	5.62E-01
Mu					3.38E-01	3.18E-01	4.32E-01
Omega						2.18E-01	4.26E-01
Sigma							4.91E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	24.20	24.20	24.20	24.20	24.20	24.20	24.20
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 6.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.126

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9916811	0.9978430	0.9990279	0.9999921	2.282E+02	4.932E-01	--
α_2	7.91E-06	2.16E-03	9.72E-04	8.32E-03	4.932E-01	2.282E+02	0.505

CCCG = 3, Gamma = 0.126

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9921421	0.9973194	0.9980971	0.9998415	3.942E+02	1.059E+00	--
α_2	3.48E-05	1.86E-03	1.10E-03	6.29E-03	7.137E-01	3.827E+02	0.664
α_3	2.94E-07	8.19E-04	2.48E-04	3.58E-03	3.458E-01	4.217E+02	0.603

CCCG = 4, Gamma = 0.126

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9926603	0.9968466	0.9973247	0.9993989	6.685E+02	2.115E+00	--
α_2	2.87E-04	2.32E-03	1.84E-03	5.96E-03	1.549E+00	6.675E+02	0.734
α_3	1.20E-08	3.85E-04	7.53E-05	1.83E-03	2.646E-01	6.864E+02	0.715
α_4	5.00E-08	4.53E-04	1.11E-04	2.07E-03	3.010E-01	6.642E+02	0.739

CCCG = 5, Gamma = 0.126

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9942786	0.9968231	0.9970185	0.9987006	1.671E+03	5.325E+00	--
α_2	7.00E-04	2.20E-03	2.00E-03	4.37E-03	3.632E+00	1.650E+03	0.853
α_3	7.73E-05	7.87E-04	6.04E-04	2.12E-03	1.354E+00	1.719E+03	0.820
α_4	1.60E-08	1.69E-04	4.02E-05	7.74E-04	2.961E-01	1.756E+03	0.803
α_5	7.39E-35	2.48E-05	2.73E-11	1.23E-04	4.243E-02	1.710E+03	0.825

CCCG = 6, Gamma = 0.126

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9937853	0.9966125	0.9968369	0.9986736	1.452E+03	4.936E+00	--
α_2	5.40E-04	2.03E-03	1.81E-03	4.30E-03	2.915E+00	1.432E+03	0.888
α_3	7.09E-05	8.31E-04	6.25E-04	2.30E-03	1.257E+00	1.511E+03	0.843
α_4	1.31E-06	3.23E-04	1.48E-04	1.24E-03	5.031E-01	1.558E+03	0.818
α_5	2.15E-15	7.44E-05	9.82E-07	4.27E-04	1.155E-01	1.552E+03	0.821
α_6	5.92E-13	1.27E-04	4.64E-06	7.01E-04	1.451E-01	1.146E+03	1.112

CCCG = 7, Gamma = 0.126

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9948938	0.9967687	0.9968788	0.9982675	2.978E+03	9.654E+00	--
α_2	6.48E-04	1.67E-03	1.56E-03	3.09E-03	4.851E+00	2.892E+03	0.945
α_3	2.35E-04	9.17E-04	8.10E-04	1.96E-03	2.800E+00	3.052E+03	0.896
α_4	4.53E-05	4.43E-04	3.42E-04	1.19E-03	1.384E+00	3.120E+03	0.877
α_5	5.53E-07	1.56E-04	6.99E-05	6.05E-04	4.902E-01	3.135E+03	0.873
α_6	8.49E-16	3.57E-05	4.52E-07	2.05E-04	1.146E-01	3.209E+03	0.853
α_7	2.47E-93	4.70E-06	5.00E-25	5.59E-06	1.464E-02	3.113E+03	0.880

CCCG = 8, Gamma = 0.126

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9945842	0.9967811	0.9969290	0.9984732	2.214E+03	7.148E+00	--
α_2	3.68E-04	1.36E-03	1.21E-03	2.85E-03	2.980E+00	2.191E+03	0.946
α_3	1.49E-04	8.59E-04	7.18E-04	2.05E-03	1.960E+00	2.280E+03	0.909
α_4	3.61E-05	4.93E-04	3.62E-04	1.40E-03	1.166E+00	2.363E+03	0.878
α_5	1.29E-06	2.27E-04	1.10E-04	8.48E-04	5.375E-01	2.372E+03	0.874
α_6	1.71E-11	7.72E-05	5.99E-06	4.08E-04	1.805E-01	2.338E+03	0.887
α_7	8.43E-36	1.63E-05	1.22E-11	7.97E-05	4.139E-02	2.540E+03	0.817
α_8	1.15E-08	1.88E-04	4.15E-05	8.77E-04	2.827E-01	1.502E+03	1.381

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	2.16E-03	1.86E-03	2.32E-03	2.20E-03	2.03E-03	1.67E-03	1.36E-03
α_3		8.19E-04	3.85E-04	7.87E-04	8.31E-04	9.17E-04	8.59E-04
α_4			4.53E-04	1.69E-04	3.23E-04	4.43E-04	4.93E-04
α_5				2.48E-05	7.44E-05	1.56E-04	2.27E-04
α_6					1.27E-04	3.57E-05	7.72E-05
α_7						4.70E-06	1.63E-05
α_8							1.88E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	2.16E-03	2.68E-03	3.15E-03	3.18E-03	3.39E-03	3.23E-03	3.22E-03
Gamma		3.06E-01	2.66E-01	3.09E-01	4.00E-01	4.82E-01	5.78E-01
Delta			5.40E-01	1.97E-01	3.87E-01	4.11E-01	5.38E-01
Epsilon				1.28E-01	3.84E-01	3.07E-01	5.07E-01
Mu					6.30E-01	2.05E-01	5.54E-01
Omega						1.16E-01	7.26E-01
Sigma							9.20E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.50	6.50	6.50	6.50	6.50	6.50	6.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.3 Pooled Clean System Motor-Driven Pumps

2.1.3.1 CLN-MDP-FS: Clean Systems Motor-Driven Pumps Fail to Start

Generic CCF Parameters

System Group:	Clean Water
System:	Auxiliary Feedwater, Chemical and Volume Control, Component Cooling Water, Condensate System, Condensate Transfer System, Containment Spray Recirculation, Generic water system for relief valves, High Pressure Coolant Injection, High Pressure Core Spray, High Pressure Injection, Isolation Condenser, Low Pressure Core Spray, Main Feedwater, Reactor Coolant, Reactor Core Isolation, Residual Heat Removal (LCI in BWRs; LPI in PWRs), Standby Liquid Control
Component Group:	Pump
Component Type:	Motor Driven Pump
Component Subtype:	Centrifugal
Failure Mode:	Fail to Start
Date Range:	2006 through 2020
Prior:	Default 2015

Total Number of Independent Failure Events: 194.3

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9686354	0.9873321	0.9896342	0.9981468	0.9889163	1.339E+02	1.719E+00
α_2	1.85E-03	1.27E-02	1.04E-02	3.14E-02	1.11E-02	1.719E+00	1.339E+02

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9749191	0.9884494	0.9898501	0.9972005	0.9910936	2.249E+02	2.628E+00
α_2	4.39E-04	5.39E-03	4.03E-03	1.50E-02	2.23E-03	1.226E+00	2.263E+02
α_3	6.47E-04	6.16E-03	4.79E-03	1.64E-02	6.68E-03	1.402E+00	2.261E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9774988	0.9886875	0.9897023	0.9964123	0.9924663	3.130E+02	3.581E+00
α_2	6.97E-04	5.16E-03	4.17E-03	1.30E-02	1.67E-03	1.635E+00	3.149E+02
α_3	2.60E-04	3.64E-03	2.66E-03	1.04E-02	3.35E-03	1.152E+00	3.154E+02
α_4	6.72E-05	2.51E-03	1.57E-03	8.15E-03	2.51E-03	7.940E-01	3.158E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9800391	0.9889309	0.9896136	0.9954950	0.9935161	4.686E+02	5.245E+00
α_2	9.62E-04	4.72E-03	4.04E-03	1.08E-02	1.12E-03	2.237E+00	4.716E+02
α_3	4.48E-04	3.40E-03	2.73E-03	8.64E-03	2.01E-03	1.612E+00	4.722E+02
α_4	1.24E-04	2.19E-03	1.54E-03	6.47E-03	2.35E-03	1.038E+00	4.728E+02

α_5	3.55E-07	7.56E-04	2.39E-04	3.26E-03	1.01E-03	3.580E-01	4.735E+02
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CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9820765	0.9898506	0.9904255	0.9956719	0.9943575	5.584E+02	5.726E+00
α_2	5.86E-04	3.43E-03	2.86E-03	8.21E-03	6.99E-04	1.935E+00	5.622E+02
α_3	3.96E-04	2.92E-03	2.35E-03	7.36E-03	1.31E-03	1.645E+00	5.625E+02
α_4	1.68E-04	2.14E-03	1.59E-03	5.99E-03	1.82E-03	1.205E+00	5.629E+02
α_5	2.02E-05	1.22E-03	7.06E-04	4.18E-03	1.40E-03	6.898E-01	5.634E+02
α_6	7.63E-09	4.44E-04	7.79E-05	2.15E-03	4.20E-04	2.504E-01	5.639E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9834580	0.9899955	0.9904201	0.9950918	0.9950396	7.605E+02	7.685E+00
α_2	6.91E-04	3.13E-03	2.71E-03	7.01E-03	4.20E-04	2.407E+00	7.657E+02
α_3	4.45E-04	2.56E-03	2.14E-03	6.10E-03	8.60E-04	1.965E+00	7.662E+02
α_4	2.74E-04	2.09E-03	1.68E-03	5.32E-03	1.34E-03	1.606E+00	7.665E+02
α_5	9.34E-05	1.44E-03	1.04E-03	4.16E-03	1.38E-03	1.104E+00	7.670E+02
α_6	2.44E-06	6.46E-04	2.92E-04	2.49E-03	7.80E-04	4.963E-01	7.676E+02
α_7	3.33E-16	1.37E-04	1.09E-06	7.92E-04	1.80E-04	1.051E-01	7.680E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9848943	0.9908649	0.9912482	0.9955194	0.9955956	8.342E+02	7.690E+00
α_2	4.85E-04	2.53E-03	2.15E-03	5.87E-03	2.45E-04	2.127E+00	8.397E+02
α_3	2.64E-04	1.95E-03	1.57E-03	4.92E-03	5.60E-04	1.641E+00	8.402E+02
α_4	2.06E-04	1.77E-03	1.40E-03	4.62E-03	9.63E-04	1.492E+00	8.404E+02
α_5	1.21E-04	1.47E-03	1.09E-03	4.08E-03	1.19E-03	1.234E+00	8.406E+02
α_6	2.24E-05	9.17E-04	5.64E-04	3.01E-03	9.46E-04	7.716E-01	8.411E+02
α_7	3.25E-08	3.51E-04	8.34E-05	1.61E-03	4.20E-04	2.953E-01	8.416E+02
α_8	7.05E-14	1.54E-04	3.55E-06	8.71E-04	7.88E-05	1.298E-01	8.417E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01
α_2	1.27E-02	5.39E-03	5.16E-03	4.72E-03	3.43E-03	3.13E-03	2.53E-03
α_3		6.16E-03	3.64E-03	3.40E-03	2.92E-03	2.56E-03	1.95E-03
α_4			2.51E-03	2.19E-03	2.14E-03	2.09E-03	1.77E-03
α_5				7.56E-04	1.22E-03	1.44E-03	1.47E-03
α_6					4.44E-04	6.46E-04	9.17E-04
α_7						1.37E-04	3.51E-04
α_8							1.54E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01
Beta	1.27E-02	1.16E-02	1.13E-02	1.11E-02	1.01E-02	1.00E-02	9.14E-03

Gamma		5.33E-01	5.44E-01	5.74E-01	6.62E-01	6.87E-01	7.23E-01
Delta			4.08E-01	4.64E-01	5.66E-01	6.28E-01	7.05E-01
Epsilon				2.56E-01	4.38E-01	5.15E-01	6.20E-01
Mu					2.66E-01	3.53E-01	4.92E-01
Omega						1.75E-01	3.55E-01
Sigma							3.05E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	111.03	166.54	222.06	277.57	333.09	388.60	444.11
N₁	0.5000	0.3750	0.2500	0.1563	0.0938	0.0547	0.0313
N₂	1.2500	0.3750	0.3750	0.3125	0.2344	0.1641	0.1094
N₃		1.1250	0.7500	0.5625	0.4375	0.3359	0.2500
N₄			0.5625	0.6563	0.6094	0.5234	0.4297
N₅				0.2813	0.4688	0.5391	0.5313
N₆					0.1406	0.3047	0.4219
N₇						0.0703	0.1875
N₈							0.0352

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 76.2

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.386

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9813251	0.9951870	0.9978628	0.9999841	9.995E+01	4.834E-01	--
α_2	1.59E-05	4.81E-03	2.14E-03	1.87E-02	4.834E-01	9.995E+01	0.875

CCCG = 3, Gamma = 0.388

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9871495	0.9953839	0.9965527	0.9996244	2.643E+02	1.226E+00	--
α_2	1.51E-04	3.12E-03	2.15E-03	9.41E-03	9.769E-01	3.120E+02	0.627
α_3	2.39E-08	1.49E-03	2.59E-04	7.25E-03	2.487E-01	1.662E+02	1.179

CCCG = 4, Gamma = 0.389

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9867053	0.9943312	0.9952099	0.9989531	3.608E+02	2.057E+00	--
α_2	3.60E-04	3.27E-03	2.56E-03	8.62E-03	1.442E+00	4.394E+02	0.615
α_3	1.92E-06	1.53E-03	5.75E-04	6.31E-03	4.114E-01	2.679E+02	1.010
α_4	1.13E-09	8.65E-04	9.42E-05	4.44E-03	2.036E-01	2.353E+02	1.151

CCCG = 5, Gamma = 0.389

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9875272	0.9936921	0.9942464	0.9979637	5.802E+02	3.683E+00	--
α_2	6.76E-04	3.31E-03	2.84E-03	7.57E-03	2.243E+00	6.752E+02	0.684
α_3	9.19E-05	1.83E-03	1.26E-03	5.49E-03	9.912E-01	5.411E+02	0.854
α_4	6.44E-07	9.46E-04	3.19E-04	4.01E-03	3.765E-01	3.978E+02	1.163
α_5	1.93E-21	2.23E-04	1.27E-07	1.29E-03	7.237E-02	3.243E+02	1.428

CCCG = 6, Gamma = 0.390

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9885155	0.9940095	0.9944791	0.9978995	6.868E+02	4.139E+00	--
α_2	4.86E-04	2.53E-03	2.15E-03	5.88E-03	2.128E+00	8.389E+02	0.636
α_3	1.15E-04	1.68E-03	1.22E-03	4.80E-03	1.134E+00	6.759E+02	0.790
α_4	6.74E-06	1.03E-03	5.11E-04	3.82E-03	5.533E-01	5.359E+02	0.997
α_5	1.99E-09	5.12E-04	6.84E-05	2.57E-03	2.210E-01	4.312E+02	1.240
α_6	3.08E-16	2.42E-04	1.68E-06	1.40E-03	1.027E-01	4.251E+02	1.258

CCCG = 7, Gamma = 0.390

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9893381	0.9938057	0.9941198	0.9972008	1.032E+03	6.432E+00	--
α_2	5.91E-04	2.28E-03	2.02E-03	4.85E-03	2.840E+00	1.245E+03	0.673
α_3	2.51E-04	1.69E-03	1.38E-03	4.19E-03	1.746E+00	1.030E+03	0.814
α_4	7.40E-05	1.19E-03	8.50E-04	3.46E-03	1.084E+00	9.113E+02	0.921
α_5	3.96E-06	6.96E-04	3.37E-04	2.60E-03	5.376E-01	7.722E+02	1.087
α_6	2.62E-10	2.98E-04	3.01E-05	1.54E-03	1.979E-01	6.628E+02	1.267
α_7	9.77E-53	4.36E-05	4.37E-15	1.49E-04	2.656E-02	6.088E+02	1.380

CCCG = 8, Gamma = 0.390

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9902579	0.9944068	0.9947055	0.9975361	1.087E+03	6.112E+00	--
α_2	3.76E-04	1.74E-03	1.50E-03	3.92E-03	2.364E+00	1.356E+03	0.634
α_3	1.59E-04	1.34E-03	1.06E-03	3.47E-03	1.512E+00	1.130E+03	0.761
α_4	6.27E-05	1.07E-03	7.58E-04	3.15E-03	1.056E+00	9.851E+02	0.873
α_5	1.17E-05	7.70E-04	4.38E-04	2.65E-03	6.745E-01	8.755E+02	0.983
α_6	5.52E-08	4.11E-04	1.04E-04	1.86E-03	3.076E-01	7.485E+02	1.150
α_7	1.17E-15	1.68E-04	1.66E-06	9.67E-04	1.093E-01	6.517E+02	1.322
α_8	1.50E-18	9.73E-05	2.70E-07	5.67E-04	8.885E-02	9.132E+02	0.943

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.95E-01	9.94E-01	9.94E-01	9.94E-01	9.94E-01	9.94E-01
α_2	4.81E-03	3.12E-03	3.27E-03	3.31E-03	2.53E-03	2.28E-03	1.74E-03
α_3		1.49E-03	1.53E-03	1.83E-03	1.68E-03	1.69E-03	1.34E-03
α_4			8.65E-04	9.46E-04	1.03E-03	1.19E-03	1.07E-03
α_5				2.23E-04	5.12E-04	6.96E-04	7.70E-04
α_6					2.42E-04	2.98E-04	4.11E-04
α_7						4.36E-05	1.68E-04
α_8							9.73E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.95E-01	9.94E-01	9.94E-01	9.94E-01	9.94E-01	9.94E-01
Beta	4.81E-03	4.62E-03	5.67E-03	6.31E-03	5.99E-03	6.19E-03	5.59E-03
Gamma		3.24E-01	4.23E-01	4.75E-01	5.78E-01	6.33E-01	6.89E-01
Delta			3.61E-01	3.90E-01	5.16E-01	5.68E-01	6.53E-01
Epsilon				1.91E-01	4.22E-01	4.66E-01	5.74E-01
Mu					3.20E-01	3.30E-01	4.67E-01
Omega						1.28E-01	3.92E-01
Sigma							3.67E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	43.54	65.31	87.09	108.86	130.63	152.40	174.17
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 35.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.184

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9407437	0.9824377	0.9896117	0.9996886	3.915E+01	6.998E-01	--
α_2	3.11E-04	1.76E-02	1.04E-02	5.93E-02	6.998E-01	3.915E+01	0.875

CCCG = 3, Gamma = 0.183

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9531799	0.9811816	0.9846453	0.9973321	8.751E+01	1.678E+00	--
α_2	1.16E-03	1.24E-02	9.47E-03	3.35E-02	1.314E+00	1.049E+02	0.627
α_3	3.51E-06	6.45E-03	2.11E-03	2.76E-02	3.646E-01	5.613E+01	1.179

CCCG = 4, Gamma = 0.183

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9534354	0.9785689	0.9811558	0.9948556	1.181E+02	2.586E+00	--
α_2	1.52E-03	1.10E-02	8.89E-03	2.75E-02	1.660E+00	1.498E+02	0.615
α_3	8.81E-05	6.97E-03	3.87E-03	2.44E-02	6.427E-01	9.155E+01	1.010
α_4	2.19E-07	3.50E-03	7.80E-04	1.63E-02	2.832E-01	8.062E+01	1.151

CCCG = 5, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9585806	0.9780375	0.9796388	0.9920227	1.923E+02	4.318E+00	--
α_2	2.08E-03	9.84E-03	8.48E-03	2.22E-02	2.305E+00	2.318E+02	0.684
α_3	7.69E-04	7.42E-03	5.76E-03	1.98E-02	1.391E+00	1.860E+02	0.854
α_4	1.82E-05	3.77E-03	1.78E-03	1.43E-02	5.195E-01	1.371E+02	1.163
α_5	1.57E-15	9.25E-04	6.84E-06	5.37E-03	1.037E-01	1.120E+02	1.428

CCCG = 6, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9627923	0.9794533	0.9807304	0.9917517	2.426E+02	5.090E+00	--
α_2	1.39E-03	7.01E-03	5.99E-03	1.62E-02	2.175E+00	3.079E+02	0.636
α_3	8.98E-04	6.59E-03	5.33E-03	1.66E-02	1.645E+00	2.480E+02	0.790
α_4	1.44E-04	4.31E-03	2.80E-03	1.36E-02	8.525E-01	1.969E+02	0.997
α_5	4.45E-07	2.04E-03	5.67E-04	9.10E-03	3.251E-01	1.587E+02	1.240
α_6	3.29E-17	5.90E-04	2.15E-06	3.44E-03	9.247E-02	1.567E+02	1.258

CCCG = 7, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9653753	0.9793140	0.9802307	0.9901227	3.390E+02	7.160E+00	--
α_2	1.72E-03	6.64E-03	5.88E-03	1.41E-02	2.818E+00	4.219E+02	0.673
α_3	9.23E-04	5.46E-03	4.56E-03	1.31E-02	1.918E+00	3.493E+02	0.814
α_4	4.61E-04	4.47E-03	3.46E-03	1.19E-02	1.388E+00	3.092E+02	0.921
α_5	7.01E-05	2.92E-03	1.79E-03	9.59E-03	7.675E-01	2.623E+02	1.087
α_6	7.60E-09	1.03E-03	1.55E-04	5.10E-03	2.327E-01	2.255E+02	1.267
α_7	2.72E-40	1.70E-04	7.63E-12	7.50E-04	3.515E-02	2.072E+02	1.380

CCCG = 8, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9681027	0.9809229	0.9817651	0.9908673	3.708E+02	7.211E+00	--
α_2	1.31E-03	5.46E-03	4.79E-03	1.19E-02	2.613E+00	4.759E+02	0.634
α_3	5.56E-04	4.11E-03	3.32E-03	1.04E-02	1.638E+00	3.969E+02	0.761
α_4	3.42E-04	3.74E-03	2.84E-03	1.02E-02	1.300E+00	3.461E+02	0.873
α_5	1.40E-04	3.09E-03	2.10E-03	9.39E-03	9.525E-01	3.077E+02	0.983
α_6	8.14E-06	1.92E-03	8.87E-04	7.34E-03	5.069E-01	2.633E+02	1.150
α_7	2.57E-15	4.72E-04	4.43E-06	2.72E-03	1.083E-01	2.295E+02	1.322
α_8	1.09E-17	2.84E-04	9.56E-07	1.66E-03	9.140E-02	3.216E+02	0.943

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.81E-01	9.79E-01	9.78E-01	9.79E-01	9.79E-01	9.81E-01
α_2	1.76E-02	1.24E-02	1.10E-02	9.84E-03	7.01E-03	6.64E-03	5.46E-03
α_3		6.45E-03	6.97E-03	7.42E-03	6.59E-03	5.46E-03	4.11E-03
α_4			3.50E-03	3.77E-03	4.31E-03	4.47E-03	3.74E-03
α_5				9.25E-04	2.04E-03	2.92E-03	3.09E-03
α_6					5.90E-04	1.03E-03	1.92E-03
α_7						1.70E-04	4.72E-04
α_8							2.84E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.81E-01	9.79E-01	9.78E-01	9.79E-01	9.79E-01	9.81E-01
Beta	1.76E-02	1.88E-02	2.14E-02	2.20E-02	2.05E-02	2.07E-02	1.91E-02
Gamma		3.43E-01	4.89E-01	5.52E-01	6.59E-01	6.79E-01	7.14E-01
Delta			3.34E-01	3.88E-01	5.13E-01	6.11E-01	6.98E-01
Epsilon				1.97E-01	3.79E-01	4.79E-01	6.06E-01
Mu					2.24E-01	2.92E-01	4.65E-01
Omega						1.41E-01	2.82E-01
Sigma							3.76E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	20.00	30.00	40.00	50.00	60.00	70.00	80.00
N_1	0.5000	0.3750	0.2500	0.1563	0.0938	0.0547	0.0313
N_2	0.2500	0.3750	0.3750	0.3125	0.2344	0.1641	0.1094
N_3		0.1250	0.2500	0.3125	0.3125	0.2734	0.2188

N₄			0.0625	0.1563	0.2344	0.2734	0.2734
N₅				0.0313	0.0938	0.1641	0.2188
N₆					0.0156	0.0547	0.1094
N₇						0.0078	0.0313
N₈							0.0039

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.015

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8066404	0.9534167	0.9827951	0.9999630	7.779E+00	3.801E-01	--
α_2	3.70E-05	4.66E-02	1.72E-02	1.93E-01	3.801E-01	7.779E+00	0.875

CCCG = 3, Gamma = 0.015

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8596959	0.9526629	0.9666579	0.9977034	1.932E+01	9.600E-01	--
α_2	3.89E-04	2.59E-02	1.50E-02	8.87E-02	6.673E-01	2.506E+01	0.627
α_3	1.91E-06	2.14E-02	5.24E-03	9.83E-02	2.927E-01	1.339E+01	1.179

CCCG = 4, Gamma = 0.015

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8769718	0.9498884	0.9586465	0.9927855	3.164E+01	1.669E+00	--
α_2	1.41E-03	2.44E-02	1.75E-02	7.14E-02	1.039E+00	4.146E+01	0.615
α_3	1.32E-05	1.50E-02	5.40E-03	6.27E-02	3.887E-01	2.548E+01	1.010
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	1.151

CCCG = 5, Gamma = 0.015

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9100169	0.9545090	0.9584163	0.9856351	7.316E+01	3.487E+00	--
α_2	3.05E-03	1.96E-02	1.62E-02	4.78E-02	1.791E+00	8.949E+01	0.684
α_3	1.32E-03	1.65E-02	1.24E-02	4.60E-02	1.207E+00	7.184E+01	0.854
α_4	1.44E-05	8.09E-03	3.25E-03	3.26E-02	4.340E-01	5.322E+01	1.163
α_5	2.80E-26	1.26E-03	4.50E-08	6.95E-03	5.493E-02	4.365E+01	1.428

CCCG = 6, Gamma = 0.015

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9214632	0.9591570	0.9623244	0.9860203	9.170E+01	3.905E+00	--
α_2	1.05E-03	1.09E-02	8.40E-03	2.95E-02	1.335E+00	1.208E+02	0.636
α_3	1.91E-03	1.56E-02	1.24E-02	4.00E-02	1.531E+00	9.680E+01	0.790
α_4	1.79E-04	9.23E-03	5.50E-03	3.10E-02	7.191E-01	7.719E+01	0.997
α_5	5.78E-08	3.94E-03	6.76E-04	1.91E-02	2.467E-01	6.241E+01	1.240
α_6	1.30E-20	1.18E-03	7.11E-07	6.84E-03	7.279E-02	6.169E+01	1.258

CCCG = 7, Gamma = 0.015

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9323537	0.9612958	0.9633439	0.9832402	1.433E+02	5.770E+00	--
α_2	1.02E-03	8.20E-03	6.54E-03	2.11E-02	1.549E+00	1.874E+02	0.673
α_3	2.27E-03	1.27E-02	1.07E-02	3.01E-02	1.989E+00	1.542E+02	0.814
α_4	8.38E-04	9.32E-03	7.08E-03	2.54E-02	1.287E+00	1.369E+02	0.921
α_5	9.88E-05	5.91E-03	3.43E-03	2.01E-02	6.913E-01	1.163E+02	1.087
α_6	1.71E-08	2.32E-03	3.50E-04	1.15E-02	2.327E-01	1.002E+02	1.267
α_7	1.56E-64	2.29E-04	3.48E-17	5.78E-04	2.112E-02	9.215E+01	1.380

CCCG = 8, Gamma = 0.015

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9417131	0.9651943	0.9667234	0.9834527	1.946E+02	7.016E+00	--
α_2	7.64E-04	5.94E-03	4.76E-03	1.52E-02	1.583E+00	2.647E+02	0.634
α_3	1.59E-03	8.95E-03	7.53E-03	2.12E-02	1.986E+00	2.198E+02	0.761
α_4	1.21E-03	8.65E-03	7.02E-03	2.16E-02	1.672E+00	1.917E+02	0.873
α_5	3.12E-04	5.89E-03	4.11E-03	1.75E-02	1.011E+00	1.708E+02	0.983
α_6	2.95E-05	3.89E-03	1.98E-03	1.42E-02	5.709E-01	1.462E+02	1.150
α_7	3.25E-10	1.42E-03	1.11E-04	7.49E-03	1.809E-01	1.276E+02	1.322
α_8	1.00E-107	6.95E-05	2.10E-27	5.21E-05	1.245E-02	1.790E+02	0.943

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.53E-01	9.53E-01	9.50E-01	9.55E-01	9.59E-01	9.61E-01	9.65E-01
α_2	4.66E-02	2.59E-02	2.44E-02	1.96E-02	1.09E-02	8.20E-03	5.94E-03
α_3		2.14E-02	1.50E-02	1.65E-02	1.56E-02	1.27E-02	8.95E-03
α_4			1.06E-02	8.09E-03	9.23E-03	9.32E-03	8.65E-03
α_5				1.26E-03	3.94E-03	5.91E-03	5.89E-03
α_6					1.18E-03	2.32E-03	3.89E-03
α_7						2.29E-04	1.42E-03
α_8							6.95E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.53E-01	9.53E-01	9.50E-01	9.55E-01	9.59E-01	9.61E-01	9.65E-01
Beta	4.66E-02	4.73E-02	5.01E-02	4.55E-02	4.08E-02	3.87E-02	3.48E-02
Gamma		4.52E-01	5.12E-01	5.69E-01	7.32E-01	7.88E-01	8.29E-01
Delta			4.14E-01	3.61E-01	4.80E-01	5.83E-01	6.90E-01
Epsilon				1.34E-01	3.57E-01	4.76E-01	5.66E-01
Mu					2.30E-01	3.01E-01	4.77E-01
Omega						9.00E-02	2.76E-01
Sigma							4.68E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.71	2.57	3.43	4.29	5.14	6.00	6.86
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 53.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.278

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9403160	0.9769862	0.9817534	0.9973406	6.243E+01	1.471E+00	--
α_2	2.66E-03	2.30E-02	1.82E-02	5.97E-02	1.471E+00	6.243E+01	0.875

CCCG = 3, Gamma = 0.276

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9567773	0.9813377	0.9841053	0.9964311	1.106E+02	2.103E+00	--
α_2	1.34E-04	4.67E-03	2.96E-03	1.50E-02	8.104E-01	1.728E+02	0.627
α_3	1.27E-03	1.40E-02	1.07E-02	3.81E-02	1.292E+00	9.104E+01	1.179

CCCG = 4, Gamma = 0.275

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9695022	0.9854521	0.9870150	0.9960597	2.000E+02	2.953E+00	--
α_2	4.25E-04	4.58E-03	3.49E-03	1.24E-02	1.312E+00	2.853E+02	0.615
α_3	2.28E-04	5.33E-03	3.60E-03	1.63E-02	9.307E-01	1.735E+02	1.010
α_4	8.52E-05	4.64E-03	2.73E-03	1.57E-02	7.099E-01	1.524E+02	1.151

CCCG = 5, Gamma = 0.275

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9754365	0.9871834	0.9881828	0.9955160	3.163E+02	4.107E+00	--
α_2	5.63E-04	4.00E-03	3.24E-03	1.00E-02	1.684E+00	4.198E+02	0.684
α_3	2.72E-04	3.54E-03	2.62E-03	9.94E-03	1.193E+00	3.361E+02	0.854
α_4	1.31E-04	3.56E-03	2.34E-03	1.11E-02	8.816E-01	2.469E+02	1.163
α_5	6.63E-07	1.73E-03	5.29E-04	7.52E-03	3.487E-01	2.015E+02	1.428

CCCG = 6, Gamma = 0.275

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794845	0.9888543	0.9895986	0.9956821	4.278E+02	4.822E+00	--
α_2	4.24E-04	2.93E-03	2.39E-03	7.30E-03	1.714E+00	5.830E+02	0.636
α_3	2.15E-04	2.62E-03	1.96E-03	7.29E-03	1.233E+00	4.694E+02	0.790
α_4	1.51E-04	2.75E-03	1.93E-03	8.16E-03	1.026E+00	3.719E+02	0.997
α_5	2.41E-05	2.10E-03	1.14E-03	7.41E-03	6.286E-01	2.993E+02	1.240
α_6	2.86E-09	7.47E-04	9.94E-05	3.75E-03	2.207E-01	2.954E+02	1.258

CCCG = 7, Gamma = 0.274

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9819297	0.9895785	0.9901225	0.9953698	5.883E+02	6.195E+00	--
α_2	5.19E-04	2.74E-03	2.32E-03	6.39E-03	2.105E+00	7.665E+02	0.673
α_3	2.22E-04	2.18E-03	1.68E-03	5.82E-03	1.383E+00	6.342E+02	0.814
α_4	1.86E-04	2.22E-03	1.66E-03	6.15E-03	1.247E+00	5.608E+02	0.921
α_5	7.36E-05	1.89E-03	1.26E-03	5.87E-03	8.999E-01	4.751E+02	1.087
α_6	2.25E-06	1.09E-03	4.46E-04	4.36E-03	4.456E-01	4.080E+02	1.267
α_7	8.75E-15	3.08E-04	4.05E-06	1.77E-03	1.154E-01	3.749E+02	1.380

CCCG = 8, Gamma = 0.274

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9839312	0.9905281	0.9909777	0.9955900	7.145E+02	6.832E+00	--
α_2	4.74E-04	2.34E-03	2.00E-03	5.36E-03	2.229E+00	9.504E+02	0.634
α_3	1.46E-04	1.63E-03	1.23E-03	4.46E-03	1.291E+00	7.922E+02	0.761
α_4	1.34E-04	1.73E-03	1.28E-03	4.87E-03	1.198E+00	6.904E+02	0.873
α_5	1.07E-04	1.75E-03	1.25E-03	5.11E-03	1.075E+00	6.134E+02	0.983
α_6	1.50E-05	1.22E-03	6.70E-04	4.28E-03	6.396E-01	5.245E+02	1.150
α_7	5.07E-08	6.36E-04	1.47E-04	2.94E-03	2.907E-01	4.568E+02	1.322
α_8	8.73E-16	1.69E-04	1.57E-06	9.74E-04	1.081E-01	6.404E+02	0.943

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.77E-01	9.81E-01	9.85E-01	9.87E-01	9.89E-01	9.90E-01	9.91E-01
α_2	2.30E-02	4.67E-03	4.58E-03	4.00E-03	2.93E-03	2.74E-03	2.34E-03
α_3		1.40E-02	5.33E-03	3.54E-03	2.62E-03	2.18E-03	1.63E-03
α_4			4.64E-03	3.56E-03	2.75E-03	2.22E-03	1.73E-03
α_5				1.73E-03	2.10E-03	1.89E-03	1.75E-03
α_6					7.47E-04	1.09E-03	1.22E-03
α_7						3.08E-04	6.36E-04
α_8							1.69E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.77E-01	9.81E-01	9.85E-01	9.87E-01	9.89E-01	9.90E-01	9.91E-01
Beta	2.30E-02	1.87E-02	1.45E-02	1.28E-02	1.11E-02	1.04E-02	9.47E-03
Gamma		7.50E-01	6.85E-01	6.88E-01	7.37E-01	7.37E-01	7.53E-01
Delta			4.65E-01	5.99E-01	6.81E-01	7.17E-01	7.72E-01
Epsilon				3.27E-01	5.08E-01	5.97E-01	6.85E-01
Mu					2.63E-01	4.25E-01	5.36E-01
Omega						2.20E-01	3.98E-01
Sigma							2.10E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	30.34	45.51	60.69	75.86	91.03	106.20	121.37
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		1.0000	0.5000	0.2500	0.1250	0.0625	0.0313

N₄			0.5000	0.5000	0.3750	0.2500	0.1563
N₅				0.2500	0.3750	0.3750	0.3125
N₆					0.1250	0.2500	0.3125
N₇						0.0625	0.1563
N₈							0.0313

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 27.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.137

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9866329	0.9965322	0.9984346	0.9999873	1.417E+02	4.932E-01	--
α_2	1.27E-05	3.47E-03	1.57E-03	1.34E-02	4.932E-01	1.417E+02	0.875

CCCG = 3, Gamma = 0.137

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9907536	0.9968450	0.9977597	0.9998133	3.348E+02	1.060E+00	--
α_2	3.08E-05	1.65E-03	9.73E-04	5.58E-03	7.137E-01	4.316E+02	0.627
α_3	5.41E-07	1.50E-03	4.55E-04	6.56E-03	3.458E-01	2.295E+02	1.179

CCCG = 4, Gamma = 0.138

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9929307	0.9969630	0.9974235	0.9994211	6.942E+02	2.115E+00	--
α_2	2.29E-04	1.85E-03	1.47E-03	4.76E-03	1.549E+00	8.372E+02	0.615
α_3	1.62E-08	5.18E-04	1.01E-04	2.47E-03	2.646E-01	5.103E+02	1.010
α_4	7.42E-08	6.72E-04	1.65E-04	3.07E-03	3.010E-01	4.477E+02	1.151

CCCG = 5, Gamma = 0.138

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9949476	0.9971949	0.9973675	0.9988529	1.893E+03	5.325E+00	--
α_2	5.49E-04	1.72E-03	1.57E-03	3.42E-03	3.632E+00	2.106E+03	0.684
α_3	7.88E-05	8.02E-04	6.16E-04	2.16E-03	1.354E+00	1.686E+03	0.854
α_4	2.27E-08	2.39E-04	5.70E-05	1.10E-03	2.961E-01	1.239E+03	1.163
α_5	1.25E-34	4.20E-05	4.63E-11	2.08E-04	4.243E-02	1.010E+03	1.428

CCCG = 6, Gamma = 0.138

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9948680	0.9972032	0.9973887	0.9989051	1.760E+03	4.936E+00	--
α_2	3.75E-04	1.41E-03	1.25E-03	2.98E-03	2.915E+00	2.063E+03	0.636
α_3	6.45E-05	7.56E-04	5.68E-04	2.09E-03	1.257E+00	1.662E+03	0.790
α_4	1.55E-06	3.82E-04	1.75E-04	1.46E-03	5.031E-01	1.317E+03	0.997
α_5	3.16E-15	1.09E-04	1.44E-06	6.25E-04	1.155E-01	1.059E+03	1.240
α_6	6.50E-13	1.39E-04	5.09E-06	7.70E-04	1.451E-01	1.044E+03	1.258

CCCG = 7, Gamma = 0.138

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9957352	0.9973014	0.9973935	0.9985534	3.568E+03	9.654E+00	--
α_2	4.54E-04	1.17E-03	1.09E-03	2.16E-03	4.851E+00	4.133E+03	0.673
α_3	2.10E-04	8.18E-04	7.23E-04	1.75E-03	2.800E+00	3.419E+03	0.814
α_4	4.67E-05	4.57E-04	3.53E-04	1.22E-03	1.384E+00	3.025E+03	0.921
α_5	6.77E-07	1.91E-04	8.55E-05	7.40E-04	4.902E-01	2.562E+03	1.087
α_6	1.24E-15	5.21E-05	6.60E-07	2.99E-04	1.146E-01	2.199E+03	1.267
α_7	3.81E-93	7.25E-06	7.71E-25	8.62E-06	1.464E-02	2.019E+03	1.380

CCCG = 8, Gamma = 0.138

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9956878	0.9974375	0.9975553	0.9987848	2.782E+03	7.148E+00	--
α_2	2.41E-04	8.87E-04	7.90E-04	1.87E-03	2.980E+00	3.356E+03	0.634
α_3	1.21E-04	7.01E-04	5.86E-04	1.67E-03	1.960E+00	2.796E+03	0.761
α_4	3.50E-05	4.78E-04	3.51E-04	1.36E-03	1.166E+00	2.437E+03	0.873
α_5	1.41E-06	2.48E-04	1.20E-04	9.29E-04	5.375E-01	2.166E+03	0.983
α_6	2.15E-11	9.75E-05	7.56E-06	5.15E-04	1.805E-01	1.851E+03	1.150
α_7	1.33E-35	2.57E-05	1.92E-11	1.26E-04	4.139E-02	1.612E+03	1.322
α_8	7.63E-09	1.25E-04	2.76E-05	5.84E-04	2.827E-01	2.258E+03	0.943

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	3.47E-03	1.65E-03	1.85E-03	1.72E-03	1.41E-03	1.17E-03	8.87E-04
α_3		1.50E-03	5.18E-04	8.02E-04	7.56E-04	8.18E-04	7.01E-04
α_4			6.72E-04	2.39E-04	3.82E-04	4.57E-04	4.78E-04
α_5				4.20E-05	1.09E-04	1.91E-04	2.48E-04
α_6					1.39E-04	5.21E-05	9.75E-05
α_7						7.25E-06	2.57E-05
α_8							1.25E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	3.47E-03	3.16E-03	3.04E-03	2.81E-03	2.80E-03	2.70E-03	2.56E-03
Gamma		4.77E-01	3.92E-01	3.86E-01	4.95E-01	5.66E-01	6.54E-01
Delta			5.65E-01	2.59E-01	4.54E-01	4.64E-01	5.82E-01
Epsilon				1.50E-01	3.94E-01	3.54E-01	5.09E-01
Mu					5.60E-01	2.37E-01	5.00E-01
Omega						1.22E-01	6.07E-01
Sigma							8.30E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	15.43	23.14	30.86	38.57	46.29	54.00	61.71
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.3.2 CLN-MDP-FH: Clean Systems Motor-Driven Pumps Fail to Run Less Than One Hour

Generic CCF Parameters

System Group: Clean Water
System: Auxiliary Feedwater, Chemical and Volume Control, Component Cooling Water, Condensate System, Condensate Transfer System, Containment Spray Recirculation, Generic water system for relief valves, High Pressure Coolant Injection, High Pressure Core Spray, High Pressure Injection, Isolation Condenser, Low Pressure Core Spray, Main Feedwater, Reactor Coolant, Reactor Core Isolation, Residual Heat Removal (LCI in BWRs; LPI in PWRs), Standby Liquid Control
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run < 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 15.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9517531	0.9876643	0.9946216	0.9999626	1.0000000	3.751E+01	4.685E-01
α_2	3.47E-05	1.23E-02	5.38E-03	4.82E-02	0.00E+00	4.685E-01	3.751E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9566767	0.9847987	0.9888814	0.9989494	1.0000000	7.308E+01	1.128E+00
α_2	3.84E-04	1.15E-02	7.48E-03	3.62E-02	0.00E+00	8.512E-01	7.336E+01
α_3	1.86E-07	3.73E-03	7.99E-04	1.75E-02	0.00E+00	2.768E-01	7.393E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9578837	0.9824127	0.9853053	0.9970552	1.0000000	1.058E+02	1.894E+00
α_2	1.01E-03	1.17E-02	8.84E-03	3.22E-02	0.00E+00	1.260E+00	1.064E+02
α_3	4.06E-06	3.74E-03	1.37E-03	1.55E-02	0.00E+00	4.024E-01	1.073E+02
α_4	1.49E-08	2.15E-03	3.20E-04	1.06E-02	0.00E+00	2.315E-01	1.074E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9670800	0.9836073	0.9851200	0.9949630	1.0000000	2.059E+02	3.432E+00
α_2	1.56E-03	9.19E-03	7.68E-03	2.20E-02	0.00E+00	1.924E+00	2.074E+02
α_3	2.90E-04	5.01E-03	3.55E-03	1.47E-02	0.00E+00	1.049E+00	2.083E+02
α_4	1.39E-06	1.83E-03	6.29E-04	7.70E-03	0.00E+00	3.822E-01	2.090E+02
α_5	3.18E-20	3.67E-04	3.42E-07	2.13E-03	0.00E+00	7.674E-02	2.093E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9693815	0.9842930	0.9855943	0.9947563	1.0000000	2.403E+02	3.835E+00
α_2	9.99E-04	6.97E-03	5.68E-03	1.74E-02	0.00E+00	1.701E+00	2.425E+02
α_3	3.90E-04	4.94E-03	3.67E-03	1.38E-02	0.00E+00	1.207E+00	2.429E+02
α_4	2.24E-05	2.44E-03	1.28E-03	8.79E-03	0.00E+00	5.960E-01	2.436E+02
α_5	3.55E-09	9.06E-04	1.21E-04	4.54E-03	0.00E+00	2.211E-01	2.439E+02
α_6	3.54E-15	4.50E-04	4.55E-06	2.59E-03	0.00E+00	1.098E-01	2.440E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9742037	0.9853625	0.9861768	0.9937352	1.0000000	3.869E+02	5.747E+00
α_2	1.17E-03	5.71E-03	4.90E-03	1.30E-02	0.00E+00	2.243E+00	3.904E+02
α_3	5.57E-04	4.15E-03	3.34E-03	1.05E-02	0.00E+00	1.630E+00	3.910E+02
α_4	1.72E-04	2.76E-03	1.97E-03	8.02E-03	0.00E+00	1.083E+00	3.916E+02
α_5	1.04E-05	1.44E-03	7.26E-04	5.29E-03	0.00E+00	5.654E-01	3.921E+02
α_6	2.68E-10	4.88E-04	4.51E-05	2.54E-03	0.00E+00	1.916E-01	3.925E+02
α_7	6.07E-41	8.86E-05	3.30E-12	3.89E-04	0.00E+00	3.480E-02	3.926E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9754121	0.9860640	0.9868433	0.9940433	1.0000000	4.051E+02	5.726E+00
α_2	8.86E-04	4.91E-03	4.14E-03	1.16E-02	0.00E+00	2.018E+00	4.088E+02
α_3	3.49E-04	3.38E-03	2.62E-03	9.03E-03	0.00E+00	1.391E+00	4.095E+02
α_4	1.54E-04	2.59E-03	1.84E-03	7.57E-03	0.00E+00	1.062E+00	4.098E+02
α_5	3.02E-05	1.71E-03	9.99E-04	5.81E-03	0.00E+00	7.026E-01	4.101E+02
α_6	3.34E-07	8.51E-04	2.61E-04	3.70E-03	0.00E+00	3.497E-01	4.105E+02
α_7	1.28E-15	2.62E-04	2.41E-06	1.52E-03	0.00E+00	1.078E-01	4.107E+02
α_8	2.68E-17	2.30E-04	9.76E-07	1.34E-03	0.00E+00	9.469E-02	4.108E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.85E-01	9.82E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.23E-02	1.15E-02	1.17E-02	9.19E-03	6.97E-03	5.71E-03	4.91E-03
α_3		3.73E-03	3.74E-03	5.01E-03	4.94E-03	4.15E-03	3.38E-03
α_4			2.15E-03	1.83E-03	2.44E-03	2.76E-03	2.59E-03
α_5				3.67E-04	9.06E-04	1.44E-03	1.71E-03
α_6					4.50E-04	4.88E-04	8.51E-04
α_7						8.86E-05	2.62E-04
α_8							2.30E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.85E-01	9.82E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.23E-02	1.52E-02	1.76E-02	1.64E-02	1.57E-02	1.46E-02	1.39E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01

Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	15.10	15.10	15.10	15.10	15.10	15.10	15.10
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9705265	0.9923948	0.9966104	0.9999748	6.308E+01	4.834E-01	--
α_2	2.52E-05	7.61E-03	3.39E-03	2.95E-02	4.834E-01	6.308E+01	0.729

CCCG = 3, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9786158	0.9923067	0.9942452	0.9993723	1.581E+02	1.226E+00	--
α_2	3.08E-04	6.32E-03	4.36E-03	1.90E-02	9.769E-01	1.536E+02	0.860
α_3	2.19E-08	1.37E-03	2.38E-04	6.65E-03	2.487E-01	1.810E+02	0.733

CCCG = 4, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9768614	0.9901155	0.9916364	0.9981696	2.060E+02	2.057E+00	--
α_2	7.73E-04	7.01E-03	5.49E-03	1.84E-02	1.442E+00	2.044E+02	0.903
α_3	2.43E-06	1.94E-03	7.29E-04	7.98E-03	4.114E-01	2.116E+02	0.877
α_4	1.23E-09	9.38E-04	1.02E-04	4.81E-03	2.036E-01	2.169E+02	0.856

CCCG = 5, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9805475	0.9901498	0.9910096	0.9968148	3.702E+02	3.683E+00	--
α_2	1.25E-03	6.12E-03	5.24E-03	1.40E-02	2.243E+00	3.645E+02	0.971
α_3	1.28E-04	2.55E-03	1.76E-03	7.65E-03	9.912E-01	3.877E+02	0.917
α_4	6.64E-07	9.74E-04	3.29E-04	4.13E-03	3.765E-01	3.860E+02	0.922
α_5	1.82E-21	2.09E-04	1.19E-07	1.21E-03	7.237E-02	3.454E+02	1.031

CCCG = 6, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9807953	0.9899687	0.9907491	0.9964763	4.085E+02	4.139E+00	--
α_2	1.03E-03	5.37E-03	4.57E-03	1.25E-02	2.128E+00	3.940E+02	1.026
α_3	1.77E-04	2.57E-03	1.87E-03	7.35E-03	1.134E+00	4.405E+02	0.920
α_4	8.17E-06	1.25E-03	6.20E-04	4.63E-03	5.533E-01	4.420E+02	0.918
α_5	2.01E-09	5.17E-04	6.90E-05	2.59E-03	2.210E-01	4.272E+02	0.951
α_6	4.12E-16	3.24E-04	2.25E-06	1.88E-03	1.027E-01	3.172E+02	1.281

CCCG = 7, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839128	0.9906452	0.9911167	0.9957679	6.811E+02	6.432E+00	--
α_2	1.15E-03	4.42E-03	3.92E-03	9.41E-03	2.840E+00	6.398E+02	1.073
α_3	3.55E-04	2.39E-03	1.96E-03	5.92E-03	1.746E+00	7.278E+02	0.945
α_4	9.27E-05	1.49E-03	1.06E-03	4.33E-03	1.084E+00	7.270E+02	0.947
α_5	4.21E-06	7.40E-04	3.58E-04	2.77E-03	5.376E-01	7.264E+02	0.949
α_6	2.39E-10	2.72E-04	2.74E-05	1.40E-03	1.979E-01	7.287E+02	0.946
α_7	9.44E-53	4.21E-05	4.22E-15	1.44E-04	2.656E-02	6.301E+02	1.094

CCCG = 8, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9843323	0.9909958	0.9914735	0.9960285	6.727E+02	6.112E+00	--
α_2	8.11E-04	3.75E-03	3.24E-03	8.42E-03	2.364E+00	6.286E+02	1.092
α_3	2.52E-04	2.12E-03	1.68E-03	5.50E-03	1.512E+00	7.117E+02	0.966
α_4	8.39E-05	1.43E-03	1.01E-03	4.20E-03	1.056E+00	7.366E+02	0.934
α_5	1.43E-05	9.41E-04	5.36E-04	3.24E-03	6.745E-01	7.161E+02	0.962
α_6	5.71E-08	4.25E-04	1.08E-04	1.93E-03	3.076E-01	7.233E+02	0.953
α_7	1.00E-15	1.44E-04	1.42E-06	8.28E-04	1.093E-01	7.608E+02	0.906
α_8	3.03E-18	1.96E-04	5.45E-07	1.14E-03	8.885E-02	4.530E+02	1.521

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.92E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	7.61E-03	6.32E-03	7.01E-03	6.12E-03	5.37E-03	4.42E-03	3.75E-03
α_3		1.37E-03	1.94E-03	2.55E-03	2.57E-03	2.39E-03	2.12E-03
α_4			9.38E-04	9.74E-04	1.25E-03	1.49E-03	1.43E-03
α_5				2.09E-04	5.17E-04	7.40E-04	9.41E-04
α_6					3.24E-04	2.72E-04	4.25E-04
α_7						4.21E-05	1.44E-04
α_8							1.96E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.92E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	7.61E-03	7.69E-03	9.88E-03	9.85E-03	1.00E-02	9.35E-03	9.00E-03
Gamma		1.78E-01	2.91E-01	3.79E-01	4.64E-01	5.28E-01	5.84E-01
Delta			3.26E-01	3.17E-01	4.49E-01	5.15E-01	5.97E-01
Epsilon				1.77E-01	4.02E-01	4.14E-01	5.44E-01
Mu					3.85E-01	2.98E-01	4.48E-01
Omega						1.34E-01	4.44E-01
Sigma							5.77E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9142574	0.9783047	0.9907890	0.9999511	2.028E+01	4.498E-01	--
α_2	4.89E-05	2.17E-02	9.21E-03	8.57E-02	4.498E-01	2.028E+01	0.729

CCCG = 3, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9253474	0.9732477	0.9800252	0.9979524	4.287E+01	1.178E+00	--
α_2	9.79E-04	2.20E-02	1.51E-02	6.66E-02	9.387E-01	4.179E+01	0.860
α_3	5.03E-08	4.78E-03	7.74E-04	2.35E-02	2.396E-01	4.986E+01	0.733

CCCG = 4, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9242705	0.9681419	0.9732313	0.9945897	5.769E+01	1.898E+00	--
α_2	1.98E-03	2.18E-02	1.67E-02	5.93E-02	1.285E+00	5.758E+01	0.903
α_3	5.99E-06	6.48E-03	2.32E-03	2.70E-02	3.927E-01	6.024E+01	0.877
α_4	1.37E-08	3.55E-03	4.77E-04	1.78E-02	2.207E-01	6.188E+01	0.856

CCCG = 5, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9398663	0.9697288	0.9723953	0.9904746	1.123E+02	3.506E+00	--
α_2	3.14E-03	1.76E-02	1.48E-02	4.14E-02	1.992E+00	1.113E+02	0.971
α_3	5.56E-04	8.97E-03	6.44E-03	2.61E-02	1.078E+00	1.190E+02	0.917
α_4	1.60E-06	3.04E-03	9.85E-04	1.31E-02	3.632E-01	1.190E+02	0.922
α_5	6.28E-21	6.79E-04	3.93E-07	3.93E-03	7.248E-02	1.067E+02	1.031

CCCG = 6, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9433821	0.9701116	0.9723169	0.9893037	1.363E+02	4.199E+00	--
α_2	2.51E-03	1.45E-02	1.22E-02	3.45E-02	1.941E+00	1.319E+02	1.026
α_3	8.57E-04	8.93E-03	6.85E-03	2.41E-02	1.332E+00	1.478E+02	0.920
α_4	4.44E-05	4.13E-03	2.23E-03	1.47E-02	6.181E-01	1.489E+02	0.918
α_5	1.10E-08	1.60E-03	2.38E-04	7.93E-03	2.313E-01	1.442E+02	0.951
α_6	6.55E-20	7.17E-04	6.77E-07	4.17E-03	7.684E-02	1.071E+02	1.281

CCCG = 7, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9502970	0.9711509	0.9725962	0.9870680	2.095E+02	6.223E+00	--
α_2	3.23E-03	1.32E-02	1.16E-02	2.85E-02	2.654E+00	1.986E+02	1.073
α_3	9.82E-04	7.20E-03	5.82E-03	1.81E-02	1.645E+00	2.268E+02	0.945
α_4	3.26E-04	4.89E-03	3.54E-03	1.41E-02	1.115E+00	2.269E+02	0.947
α_5	2.56E-05	2.65E-03	1.40E-03	9.51E-03	6.034E-01	2.270E+02	0.949
α_6	1.39E-10	7.80E-04	5.81E-05	4.14E-03	1.780E-01	2.281E+02	0.946
α_7	7.55E-51	1.39E-04	2.85E-14	4.90E-04	2.734E-02	1.973E+02	1.094

CCCG = 8, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9510508	0.9715682	0.9729886	0.9872338	2.134E+02	6.246E+00	--
α_2	2.83E-03	1.22E-02	1.07E-02	2.70E-02	2.504E+00	2.021E+02	1.092
α_3	6.58E-04	6.14E-03	4.78E-03	1.62E-02	1.419E+00	2.298E+02	0.966
α_4	2.36E-04	4.29E-03	3.02E-03	1.27E-02	1.027E+00	2.381E+02	0.934
α_5	6.51E-05	3.16E-03	1.89E-03	1.05E-02	7.337E-01	2.316E+02	0.962
α_6	1.69E-06	1.69E-03	6.12E-04	7.05E-03	3.975E-01	2.342E+02	0.953
α_7	3.12E-20	3.12E-04	3.00E-07	1.81E-03	7.703E-02	2.466E+02	0.906
α_8	5.54E-18	5.96E-04	1.49E-06	3.48E-03	8.749E-02	1.468E+02	1.521

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.78E-01	9.73E-01	9.68E-01	9.70E-01	9.70E-01	9.71E-01	9.72E-01
α_2	2.17E-02	2.20E-02	2.18E-02	1.76E-02	1.45E-02	1.32E-02	1.22E-02
α_3		4.78E-03	6.48E-03	8.97E-03	8.93E-03	7.20E-03	6.14E-03
α_4			3.55E-03	3.04E-03	4.13E-03	4.89E-03	4.29E-03
α_5				6.79E-04	1.60E-03	2.65E-03	3.16E-03
α_6					7.17E-04	7.80E-04	1.69E-03
α_7						1.39E-04	3.12E-04
α_8							5.96E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.78E-01	9.73E-01	9.68E-01	9.70E-01	9.70E-01	9.71E-01	9.72E-01
Beta	2.17E-02	2.68E-02	3.19E-02	3.03E-02	2.99E-02	2.88E-02	2.84E-02
Gamma		1.79E-01	3.15E-01	4.19E-01	5.15E-01	5.43E-01	5.69E-01
Delta			3.54E-01	2.93E-01	4.20E-01	5.40E-01	6.21E-01
Epsilon				1.82E-01	3.59E-01	4.22E-01	5.73E-01
Mu					3.09E-01	2.57E-01	4.52E-01
Omega						1.51E-01	3.49E-01
Sigma							6.56E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8444273	0.9626871	0.9864392	0.9999709	9.807E+00	3.801E-01	--
α_2	2.91E-05	3.73E-02	1.36E-02	1.56E-01	3.801E-01	9.807E+00	0.729

CCCG = 3, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8500649	0.9493176	0.9642181	0.9975325	1.798E+01	9.600E-01	--
α_2	5.61E-04	3.69E-02	2.16E-02	1.25E-01	6.673E-01	1.742E+01	0.860
α_3	1.21E-06	1.38E-02	3.32E-03	6.35E-02	2.927E-01	2.092E+01	0.733

CCCG = 4, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8529881	0.9398181	0.9501347	0.9912688	2.607E+01	1.669E+00	--
α_2	2.22E-03	3.80E-02	2.74E-02	1.10E-01	1.039E+00	2.630E+01	0.903
α_3	1.21E-05	1.38E-02	4.95E-03	5.77E-02	3.887E-01	2.777E+01	0.877
α_4	9.70E-08	8.37E-03	1.39E-03	4.10E-02	2.414E-01	2.860E+01	0.856

CCCG = 5, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8917043	0.9450537	0.9496820	0.9825662	5.997E+01	3.487E+00	--
α_2	4.54E-03	2.89E-02	2.40E-02	7.02E-02	1.791E+00	6.009E+01	0.971
α_3	1.47E-03	1.84E-02	1.38E-02	5.12E-02	1.207E+00	6.437E+01	0.917
α_4	1.18E-05	6.66E-03	2.67E-03	2.68E-02	4.340E-01	6.476E+01	0.922
α_5	2.10E-26	9.42E-04	3.36E-08	5.20E-03	5.493E-02	5.825E+01	1.031

CCCG = 6, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9032029	0.9494840	0.9533243	0.9826299	7.339E+01	3.905E+00	--
α_2	1.78E-03	1.84E-02	1.42E-02	4.93E-02	1.335E+00	7.134E+01	1.026
α_3	2.33E-03	1.89E-02	1.51E-02	4.84E-02	1.531E+00	7.949E+01	0.920
α_4	1.71E-04	8.86E-03	5.28E-03	2.97E-02	7.191E-01	8.048E+01	0.918
α_5	4.61E-08	3.15E-03	5.39E-04	1.53E-02	2.467E-01	7.818E+01	0.951
α_6	1.38E-20	1.25E-03	7.55E-07	7.26E-03	7.279E-02	5.814E+01	1.281

CCCG = 7, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9198667	0.9540490	0.9564440	0.9800468	1.198E+02	5.770E+00	--
α_2	1.68E-03	1.35E-02	1.08E-02	3.46E-02	1.549E+00	1.132E+02	1.073
α_3	2.72E-03	1.53E-02	1.29E-02	3.60E-02	1.989E+00	1.283E+02	0.945
α_4	8.91E-04	9.90E-03	7.52E-03	2.70E-02	1.287E+00	1.288E+02	0.947
α_5	8.89E-05	5.32E-03	3.09E-03	1.82E-02	6.913E-01	1.292E+02	0.949
α_6	1.32E-08	1.79E-03	2.69E-04	8.84E-03	2.327E-01	1.300E+02	0.946
α_7	1.28E-64	1.88E-04	2.84E-17	4.73E-04	2.112E-02	1.125E+02	1.094

CCCG = 8, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9295994	0.9578738	0.9596964	0.9799219	1.595E+02	7.016E+00	--
α_2	1.36E-03	1.05E-02	8.46E-03	2.68E-02	1.583E+00	1.486E+02	1.092
α_3	2.08E-03	1.17E-02	9.85E-03	2.77E-02	1.986E+00	1.677E+02	0.966
α_4	1.33E-03	9.53E-03	7.74E-03	2.38E-02	1.672E+00	1.739E+02	0.934
α_5	3.14E-04	5.93E-03	4.14E-03	1.76E-02	1.011E+00	1.696E+02	0.962
α_6	2.51E-05	3.32E-03	1.69E-03	1.21E-02	5.709E-01	1.716E+02	0.953
α_7	2.29E-10	9.99E-04	7.83E-05	5.28E-03	1.809E-01	1.809E+02	0.906
α_8	1.67E-107	1.15E-04	3.50E-27	8.67E-05	1.245E-02	1.078E+02	1.521

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.63E-01	9.49E-01	9.40E-01	9.45E-01	9.49E-01	9.54E-01	9.58E-01
α_2	3.73E-02	3.69E-02	3.80E-02	2.89E-02	1.84E-02	1.35E-02	1.05E-02
α_3		1.38E-02	1.38E-02	1.84E-02	1.89E-02	1.53E-02	1.17E-02
α_4			8.37E-03	6.66E-03	8.86E-03	9.90E-03	9.53E-03
α_5				9.42E-04	3.15E-03	5.32E-03	5.93E-03
α_6					1.25E-03	1.79E-03	3.32E-03
α_7						1.88E-04	9.99E-04
α_8							1.15E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.63E-01	9.49E-01	9.40E-01	9.45E-01	9.49E-01	9.54E-01	9.58E-01
Beta	3.73E-02	5.07E-02	6.02E-02	5.49E-02	5.05E-02	4.60E-02	4.21E-02
Gamma		2.72E-01	3.68E-01	4.73E-01	6.36E-01	7.06E-01	7.50E-01
Delta			3.77E-01	2.92E-01	4.12E-01	5.30E-01	6.30E-01
Epsilon				1.24E-01	3.32E-01	4.24E-01	5.21E-01
Mu					2.84E-01	2.71E-01	4.28E-01
Omega						9.50E-02	2.52E-01
Sigma							1.04E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 5.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.338

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9548330	0.9884368	0.9949460	0.9999667	4.023E+01	4.706E-01	--
α_2	3.33E-05	1.16E-02	5.05E-03	4.52E-02	4.706E-01	4.023E+01	0.729

CCCG = 3, Gamma = 0.338

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9611639	0.9864924	0.9902094	0.9991157	8.052E+01	1.103E+00	--
α_2	2.98E-04	1.03E-02	6.57E-03	3.32E-02	8.104E-01	7.763E+01	0.860
α_3	2.67E-07	3.18E-03	7.46E-04	1.46E-02	2.921E-01	9.169E+01	0.733

CCCG = 4, Gamma = 0.338

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9654088	0.9854332	0.9877701	0.9974648	1.321E+02	1.953E+00	--
α_2	9.25E-04	9.91E-03	7.57E-03	2.69E-02	1.312E+00	1.311E+02	0.903
α_3	5.31E-06	3.16E-03	1.25E-03	1.28E-02	4.307E-01	1.360E+02	0.877
α_4	2.99E-09	1.50E-03	1.77E-04	7.65E-03	2.099E-01	1.395E+02	0.856

CCCG = 5, Gamma = 0.338

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9717890	0.9863514	0.9877488	0.9961377	2.245E+02	3.107E+00	--
α_2	1.07E-03	7.56E-03	6.15E-03	1.89E-02	1.684E+00	2.211E+02	0.971
α_3	1.77E-04	3.99E-03	2.71E-03	1.22E-02	9.426E-01	2.351E+02	0.917
α_4	1.22E-06	1.63E-03	5.59E-04	6.86E-03	3.816E-01	2.343E+02	0.922
α_5	1.88E-16	4.70E-04	2.58E-06	2.73E-03	9.865E-02	2.098E+02	1.031

CCCG = 6, Gamma = 0.338

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9743726	0.9868779	0.9879755	0.9956334	2.875E+02	3.822E+00	--
α_2	8.94E-04	6.17E-03	5.03E-03	1.53E-02	1.714E+00	2.761E+02	1.026
α_3	2.35E-04	3.58E-03	2.58E-03	1.03E-02	1.108E+00	3.086E+02	0.920
α_4	2.77E-05	2.10E-03	1.17E-03	7.32E-03	6.509E-01	3.097E+02	0.918
α_5	1.68E-08	8.46E-04	1.52E-04	4.08E-03	2.536E-01	2.995E+02	0.951
α_6	6.98E-17	4.30E-04	1.95E-06	2.51E-03	9.572E-02	2.224E+02	1.281

CCCG = 7, Gamma = 0.338

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9774196	0.9875003	0.9882738	0.9949394	4.104E+02	5.195E+00	--
α_2	1.03E-03	5.44E-03	4.61E-03	1.27E-02	2.105E+00	3.849E+02	1.073
α_3	2.82E-04	3.00E-03	2.29E-03	8.16E-03	1.320E+00	4.381E+02	0.945
α_4	1.16E-04	2.27E-03	1.58E-03	6.81E-03	9.967E-01	4.375E+02	0.947
α_5	6.06E-06	1.20E-03	5.70E-04	4.52E-03	5.249E-01	4.373E+02	0.949
α_6	3.31E-10	4.46E-04	4.36E-05	2.31E-03	1.956E-01	4.388E+02	0.946
α_7	3.98E-28	1.39E-04	3.16E-09	7.56E-04	5.291E-02	3.795E+02	1.094

CCCG = 8, Gamma = 0.338

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9786662	0.9878615	0.9885319	0.9947673	4.746E+02	5.832E+00	--
α_2	1.01E-03	5.00E-03	4.28E-03	1.14E-02	2.229E+00	4.435E+02	1.092
α_3	2.15E-04	2.50E-03	1.88E-03	6.90E-03	1.260E+00	5.025E+02	0.966
α_4	1.14E-04	2.00E-03	1.41E-03	5.90E-03	1.042E+00	5.200E+02	0.934
α_5	3.54E-05	1.51E-03	9.22E-04	4.97E-03	7.626E-01	5.055E+02	0.962
α_6	1.46E-07	6.40E-04	1.79E-04	2.85E-03	3.271E-01	5.108E+02	0.953
α_7	2.42E-13	2.50E-04	6.70E-06	1.40E-03	1.344E-01	5.373E+02	0.906
α_8	2.16E-20	2.40E-04	2.25E-07	1.39E-03	7.682E-02	3.200E+02	1.521

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.86E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01	9.88E-01
α_2	1.16E-02	1.03E-02	9.91E-03	7.56E-03	6.17E-03	5.44E-03	5.00E-03
α_3		3.18E-03	3.16E-03	3.99E-03	3.58E-03	3.00E-03	2.50E-03
α_4			1.50E-03	1.63E-03	2.10E-03	2.27E-03	2.00E-03
α_5				4.70E-04	8.46E-04	1.20E-03	1.51E-03
α_6					4.30E-04	4.46E-04	6.40E-04
α_7						1.39E-04	2.50E-04
α_8							2.40E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.86E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01	9.88E-01
Beta	1.16E-02	1.35E-02	1.46E-02	1.36E-02	1.31E-02	1.25E-02	1.21E-02
Gamma		2.35E-01	3.20E-01	4.46E-01	5.30E-01	5.65E-01	5.88E-01
Delta			3.22E-01	3.44E-01	4.85E-01	5.75E-01	6.50E-01
Epsilon				2.24E-01	3.78E-01	4.40E-01	5.69E-01
Mu					3.37E-01	3.28E-01	4.29E-01
Omega						2.38E-01	4.34E-01
Sigma							4.90E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.10	5.10	5.10	5.10	5.10	5.10	5.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 5.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.331

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9878441	0.9968468	0.9985772	0.9999884	1.559E+02	4.932E-01	--
α_2	1.16E-05	3.15E-03	1.42E-03	1.22E-02	4.932E-01	1.559E+02	0.729

CCCG = 3, Gamma = 0.331

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9899511	0.9965707	0.9975645	0.9997970	3.079E+02	1.059E+00	--
α_2	4.54E-05	2.43E-03	1.43E-03	8.19E-03	7.137E-01	2.934E+02	0.860
α_3	3.60E-07	1.00E-03	3.03E-04	4.38E-03	3.458E-01	3.446E+02	0.733

CCCG = 4, Gamma = 0.331

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9910243	0.9961426	0.9967267	0.9992643	5.461E+02	2.115E+00	--
α_2	3.54E-04	2.86E-03	2.27E-03	7.35E-03	1.549E+00	5.406E+02	0.903
α_3	1.48E-08	4.74E-04	9.27E-05	2.25E-03	2.646E-01	5.581E+02	0.877
α_4	5.81E-08	5.26E-04	1.29E-04	2.40E-03	3.010E-01	5.716E+02	0.856

CCCG = 5, Gamma = 0.331

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9934965	0.9963883	0.9966102	0.9985226	1.469E+03	5.325E+00	--
α_2	7.99E-04	2.51E-03	2.28E-03	4.98E-03	3.632E+00	1.446E+03	0.971
α_3	8.66E-05	8.81E-04	6.77E-04	2.38E-03	1.354E+00	1.535E+03	0.917
α_4	1.84E-08	1.94E-04	4.63E-05	8.91E-04	2.961E-01	1.527E+03	0.922
α_5	9.25E-35	3.11E-05	3.42E-11	1.54E-04	4.243E-02	1.366E+03	1.031

CCCG = 6, Gamma = 0.331

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9929306	0.9961461	0.9964012	0.9984906	1.276E+03	4.936E+00	--
α_2	6.25E-04	2.35E-03	2.09E-03	4.97E-03	2.915E+00	1.238E+03	1.026
α_3	7.75E-05	9.09E-04	6.83E-04	2.51E-03	1.257E+00	1.382E+03	0.920
α_4	1.48E-06	3.63E-04	1.66E-04	1.39E-03	5.031E-01	1.386E+03	0.918
α_5	2.50E-15	8.63E-05	1.14E-06	4.95E-04	1.155E-01	1.339E+03	0.951
α_6	6.83E-13	1.46E-04	5.35E-06	8.09E-04	1.451E-01	9.935E+02	1.281

CCCG = 7, Gamma = 0.331

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9943696	0.9964366	0.9965580	0.9980893	2.700E+03	9.654E+00	--
α_2	7.37E-04	1.90E-03	1.77E-03	3.51E-03	4.851E+00	2.546E+03	1.073
α_3	2.48E-04	9.67E-04	8.55E-04	2.07E-03	2.800E+00	2.893E+03	0.945
α_4	4.89E-05	4.79E-04	3.70E-04	1.28E-03	1.384E+00	2.888E+03	0.947
α_5	6.01E-07	1.70E-04	7.60E-05	6.57E-04	4.902E-01	2.884E+03	0.949
α_6	9.42E-16	3.96E-05	5.02E-07	2.27E-04	1.146E-01	2.893E+03	0.946
α_7	3.08E-93	5.85E-06	6.23E-25	6.95E-06	1.464E-02	2.501E+03	1.094

CCCG = 8, Gamma = 0.331

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9939991	0.9964330	0.9965968	0.9983078	1.997E+03	7.148E+00	--
α_2	4.26E-04	1.57E-03	1.40E-03	3.30E-03	2.980E+00	1.895E+03	1.092
α_3	1.58E-04	9.14E-04	7.64E-04	2.18E-03	1.960E+00	2.143E+03	0.966
α_4	3.84E-05	5.26E-04	3.85E-04	1.49E-03	1.166E+00	2.218E+03	0.934
α_5	1.42E-06	2.49E-04	1.21E-04	9.33E-04	5.375E-01	2.155E+03	0.962
α_6	1.83E-11	8.29E-05	6.43E-06	4.38E-04	1.805E-01	2.176E+03	0.953
α_7	9.35E-36	1.81E-05	1.35E-11	8.84E-05	4.139E-02	2.289E+03	0.906
α_8	1.27E-08	2.07E-04	4.57E-05	9.67E-04	2.827E-01	1.363E+03	1.521

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	3.15E-03	2.43E-03	2.86E-03	2.51E-03	2.35E-03	1.90E-03	1.57E-03
α_3		1.00E-03	4.74E-04	8.81E-04	9.09E-04	9.67E-04	9.14E-04
α_4			5.26E-04	1.94E-04	3.63E-04	4.79E-04	5.26E-04
α_5				3.11E-05	8.63E-05	1.70E-04	2.49E-04
α_6					1.46E-04	3.96E-05	8.29E-05
α_7						5.85E-06	1.81E-05
α_8							2.07E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	3.15E-03	3.43E-03	3.86E-03	3.61E-03	3.85E-03	3.56E-03	3.57E-03
Gamma		2.92E-01	2.59E-01	3.06E-01	3.90E-01	4.66E-01	5.60E-01
Delta			5.26E-01	2.03E-01	3.96E-01	4.18E-01	5.42E-01
Epsilon				1.38E-01	3.90E-01	3.10E-01	5.15E-01
Mu					6.29E-01	2.11E-01	5.53E-01
Omega						1.29E-01	7.31E-01
Sigma							9.20E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.00	5.00	5.00	5.00	5.00	5.00	5.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.3.3 CLN-MDP-FHRH: Clean Systems Motor-Driven Pumps Fail to Run Less Than or Greater Than One Hour

Generic CCF Parameters

System Group: Clean Water
System: Auxiliary Feedwater, Chemical and Volume Control, Component Cooling Water, Condensate System, Condensate Transfer System, Containment Spray Recirculation, Generic water system for relief valves, High Pressure Coolant Injection, High Pressure Core Spray, High Pressure Injection, Isolation Condenser, Low Pressure Core Spray, Main Feedwater, Reactor Coolant, Reactor Core Isolation, Residual Heat Removal (LCI in BWRs; LPI in PWRs), Standby Liquid Control
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run < 1H, Fail to Run > 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 47.1

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9606818	0.9882512	0.9929659	0.9997714	0.9934302	6.072E+01	7.219E-01
α_2	2.31E-04	1.17E-02	7.04E-03	3.93E-02	6.57E-03	7.219E-01	6.072E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9647198	0.9859627	0.9886261	0.9980850	0.9911435	1.151E+02	1.638E+00
α_2	8.82E-04	1.06E-02	7.96E-03	2.93E-02	6.69E-03	1.236E+00	1.155E+02
α_3	3.70E-06	3.44E-03	1.26E-03	1.43E-02	2.17E-03	4.018E-01	1.163E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9665674	0.9846251	0.9864945	0.9963049	0.9907701	1.665E+02	2.600E+00
α_2	1.35E-03	9.78E-03	7.92E-03	2.45E-02	5.14E-03	1.653E+00	1.675E+02
α_3	5.18E-05	3.86E-03	2.16E-03	1.35E-02	3.27E-03	6.529E-01	1.685E+02
α_4	1.55E-07	1.74E-03	4.11E-04	8.00E-03	8.17E-04	2.940E-01	1.688E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9720308	0.9852452	0.9863453	0.9946945	0.9911710	2.855E+02	4.275E+00
α_2	1.62E-03	7.82E-03	6.72E-03	1.78E-02	3.58E-03	2.266E+00	2.875E+02
α_3	4.69E-04	4.70E-03	3.62E-03	1.26E-02	3.29E-03	1.363E+00	2.884E+02
α_4	1.07E-05	1.86E-03	9.03E-04	6.95E-03	1.64E-03	5.385E-01	2.892E+02
α_5	1.89E-15	3.73E-04	3.45E-06	2.15E-03	3.27E-04	1.080E-01	2.896E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9743878	0.9861123	0.9870480	0.9946463	0.9918291	3.387E+02	4.769E+00
α_2	1.01E-03	5.76E-03	4.83E-03	1.37E-02	2.41E-03	1.977E+00	3.415E+02
α_3	5.34E-04	4.43E-03	3.52E-03	1.15E-02	2.76E-03	1.522E+00	3.419E+02
α_4	7.45E-05	2.42E-03	1.55E-03	7.73E-03	2.05E-03	8.304E-01	3.426E+02
α_5	1.51E-07	9.17E-04	2.42E-04	4.13E-03	8.20E-04	3.148E-01	3.431E+02
α_6	7.62E-14	3.65E-04	7.19E-06	2.07E-03	1.37E-04	1.254E-01	3.433E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9775575	0.9867973	0.9874257	0.9938839	0.9925201	5.041E+02	6.744E+00
α_2	1.09E-03	4.82E-03	4.19E-03	1.07E-02	1.64E-03	2.462E+00	5.084E+02
α_3	6.26E-04	3.73E-03	3.11E-03	8.98E-03	2.09E-03	1.908E+00	5.089E+02
α_4	2.62E-04	2.66E-03	2.04E-03	7.15E-03	2.05E-03	1.357E+00	5.095E+02
α_5	2.88E-05	1.43E-03	8.52E-04	4.79E-03	1.23E-03	7.294E-01	5.101E+02
α_6	6.88E-09	4.82E-04	8.18E-05	2.34E-03	4.10E-04	2.463E-01	5.106E+02
α_7	3.35E-34	8.34E-05	9.82E-11	4.14E-04	5.86E-05	4.261E-02	5.108E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9790181	0.9876496	0.9882406	0.9942730	0.9931566	5.411E+02	6.767E+00
α_2	7.99E-04	4.01E-03	3.42E-03	9.22E-03	1.17E-03	2.196E+00	5.457E+02
α_3	3.91E-04	2.95E-03	2.37E-03	7.49E-03	1.48E-03	1.616E+00	5.463E+02
α_4	2.34E-04	2.44E-03	1.87E-03	6.60E-03	1.80E-03	1.336E+00	5.466E+02
α_5	6.98E-05	1.68E-03	1.13E-03	5.18E-03	1.44E-03	9.214E-01	5.470E+02
α_6	2.06E-06	8.38E-04	3.52E-04	3.32E-03	7.19E-04	4.591E-01	5.475E+02
α_7	5.06E-13	2.54E-04	7.85E-06	1.42E-03	2.05E-04	1.391E-01	5.478E+02
α_8	7.06E-17	1.80E-04	9.81E-07	1.05E-03	2.57E-05	9.860E-02	5.478E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.86E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.17E-02	1.06E-02	9.78E-03	7.82E-03	5.76E-03	4.82E-03	4.01E-03
α_3		3.44E-03	3.86E-03	4.70E-03	4.43E-03	3.73E-03	2.95E-03
α_4			1.74E-03	1.86E-03	2.42E-03	2.66E-03	2.44E-03
α_5				3.73E-04	9.17E-04	1.43E-03	1.68E-03
α_6					3.65E-04	4.82E-04	8.38E-04
α_7						8.34E-05	2.54E-04
α_8							1.80E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.86E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.17E-02	1.40E-02	1.54E-02	1.48E-02	1.39E-02	1.32E-02	1.24E-02
Gamma		2.45E-01	3.64E-01	4.70E-01	5.86E-01	6.35E-01	6.75E-01

Delta			3.10E-01	3.22E-01	4.55E-01	5.55E-01	6.46E-01
Epsilon				1.67E-01	3.46E-01	4.29E-01	5.48E-01
Mu					2.85E-01	2.84E-01	4.31E-01
Omega						1.48E-01	3.41E-01
Sigma							4.15E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	37.68	56.52	75.36	94.20	113.04	131.88	150.72
N₁	0.6267	0.5550	0.4780	0.4270	0.4024	0.3968	0.4027
N₂	0.2533	0.3850	0.3935	0.3415	0.2754	0.2185	0.1782
N₃		0.1250	0.2505	0.3139	0.3153	0.2781	0.2259
N₄			0.0625	0.1563	0.2345	0.2737	0.2739
N₅				0.0313	0.0938	0.1641	0.2188
N₆					0.0156	0.0547	0.1094
N₇						0.0078	0.0313
N₈							0.0039

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 9.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.189

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9708769	0.9924855	0.9966512	0.9999751	6.385E+01	4.834E-01	--
α_2	2.49E-05	7.51E-03	3.35E-03	2.91E-02	4.834E-01	6.385E+01	0.802

CCCG = 3, Gamma = 0.190

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9782469	0.9921735	0.9941452	0.9993614	1.554E+02	1.226E+00	--
α_2	3.06E-04	6.29E-03	4.34E-03	1.89E-02	9.769E-01	1.544E+02	0.913
α_3	2.46E-08	1.54E-03	2.67E-04	7.46E-03	2.487E-01	1.613E+02	0.878

CCCG = 4, Gamma = 0.190

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9776781	0.9904659	0.9919337	0.9982349	2.137E+02	2.057E+00	--
α_2	7.11E-04	6.45E-03	5.05E-03	1.70E-02	1.442E+00	2.222E+02	0.888
α_3	2.70E-06	2.15E-03	8.09E-04	8.85E-03	4.114E-01	1.907E+02	1.039
α_4	1.23E-09	9.34E-04	1.02E-04	4.79E-03	2.036E-01	2.177E+02	0.911

CCCG = 5, Gamma = 0.191

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9807666	0.9902611	0.9911113	0.9968509	3.745E+02	3.683E+00	--
α_2	1.17E-03	5.73E-03	4.91E-03	1.31E-02	2.243E+00	3.894E+02	0.951
α_3	1.37E-04	2.73E-03	1.89E-03	8.18E-03	9.912E-01	3.627E+02	1.024
α_4	7.40E-07	1.09E-03	3.67E-04	4.60E-03	3.765E-01	3.466E+02	1.074
α_5	1.74E-21	2.01E-04	1.15E-07	1.16E-03	7.237E-02	3.598E+02	1.035

CCCG = 6, Gamma = 0.191

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9818095	0.9905002	0.9912400	0.9966638	4.316E+02	4.139E+00	--
α_2	8.84E-04	4.60E-03	3.91E-03	1.07E-02	2.128E+00	4.608E+02	0.921
α_3	1.86E-04	2.70E-03	1.96E-03	7.72E-03	1.134E+00	4.192E+02	1.014
α_4	8.95E-06	1.37E-03	6.80E-04	5.07E-03	5.533E-01	4.032E+02	1.056
α_5	2.15E-09	5.54E-04	7.39E-05	2.78E-03	2.210E-01	3.990E+02	1.068
α_6	3.58E-16	2.81E-04	1.96E-06	1.63E-03	1.027E-01	3.648E+02	1.168

CCCG = 7, Gamma = 0.191

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9844511	0.9909591	0.9914150	0.9959103	7.050E+02	6.432E+00	--
α_2	9.70E-04	3.73E-03	3.31E-03	7.94E-03	2.840E+00	7.585E+02	0.937
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.857E+02	1.037
α_4	1.01E-04	1.62E-03	1.16E-03	4.70E-03	1.084E+00	6.696E+02	1.063
α_5	4.66E-06	8.20E-04	3.97E-04	3.07E-03	5.376E-01	6.550E+02	1.088
α_6	2.62E-10	2.98E-04	3.01E-05	1.54E-03	1.979E-01	6.635E+02	1.074
α_7	8.22E-53	3.67E-05	3.68E-15	1.25E-04	2.656E-02	7.237E+02	0.985

CCCG = 8, Gamma = 0.191

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9853814	0.9916002	0.9920464	0.9962959	7.216E+02	6.112E+00	--
α_2	6.39E-04	2.96E-03	2.55E-03	6.65E-03	2.364E+00	7.975E+02	0.896
α_3	2.52E-04	2.12E-03	1.68E-03	5.50E-03	1.512E+00	7.117E+02	1.004
α_4	9.11E-05	1.55E-03	1.10E-03	4.56E-03	1.056E+00	6.786E+02	1.054
α_5	1.52E-05	1.00E-03	5.70E-04	3.45E-03	6.745E-01	6.736E+02	1.062
α_6	6.35E-08	4.72E-04	1.20E-04	2.14E-03	3.076E-01	6.510E+02	1.100
α_7	1.11E-15	1.59E-04	1.57E-06	9.15E-04	1.093E-01	6.885E+02	1.040
α_8	2.15E-18	1.39E-04	3.87E-07	8.13E-04	8.885E-02	6.373E+02	1.124

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.92E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01	9.92E-01
α_2	7.51E-03	6.29E-03	6.45E-03	5.73E-03	4.60E-03	3.73E-03	2.96E-03
α_3		1.54E-03	2.15E-03	2.73E-03	2.70E-03	2.54E-03	2.12E-03
α_4			9.34E-04	1.09E-03	1.37E-03	1.62E-03	1.55E-03
α_5				2.01E-04	5.54E-04	8.20E-04	1.00E-03
α_6					2.81E-04	2.98E-04	4.72E-04
α_7						3.67E-05	1.59E-04
α_8							1.39E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.92E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01	9.92E-01
Beta	7.51E-03	7.83E-03	9.53E-03	9.74E-03	9.50E-03	9.04E-03	8.40E-03
Gamma		1.97E-01	3.24E-01	4.12E-01	5.16E-01	5.87E-01	6.48E-01
Delta			3.03E-01	3.21E-01	4.50E-01	5.22E-01	6.11E-01
Epsilon				1.56E-01	3.79E-01	4.17E-01	5.33E-01
Mu					3.37E-01	2.90E-01	4.35E-01
Omega						1.10E-01	3.87E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.28	10.92	14.56	18.20	21.84	25.48	29.12
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 5.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9006375	0.9703606	0.9822678	0.9994665	2.291E+01	6.998E-01	--
α_2	5.34E-04	2.96E-02	1.77E-02	9.94E-02	6.998E-01	2.291E+01	0.802

CCCG = 3, Gamma = 0.121

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9122634	0.9644538	0.9708034	0.9948974	4.554E+01	1.678E+00	--
α_2	2.67E-03	2.81E-02	2.16E-02	7.54E-02	1.314E+00	4.551E+01	0.913
α_3	4.09E-06	7.49E-03	2.46E-03	3.20E-02	3.646E-01	4.833E+01	0.878

CCCG = 4, Gamma = 0.119

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9155757	0.9608564	0.9654238	0.9905055	6.348E+01	2.586E+00	--
α_2	3.37E-03	2.40E-02	1.96E-02	5.99E-02	1.660E+00	6.739E+01	0.888
α_3	1.38E-04	1.09E-02	6.07E-03	3.80E-02	6.427E-01	5.836E+01	1.039
α_4	2.64E-07	4.21E-03	9.40E-04	1.96E-02	2.832E-01	6.698E+01	0.911

CCCG = 5, Gamma = 0.117

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9331867	0.9644066	0.9669323	0.9869932	1.170E+02	4.318E+00	--
α_2	3.87E-03	1.82E-02	1.57E-02	4.10E-02	2.305E+00	1.242E+02	0.951
α_3	1.23E-03	1.18E-02	9.21E-03	3.15E-02	1.391E+00	1.160E+02	1.024
α_4	2.24E-05	4.64E-03	2.19E-03	1.75E-02	5.195E-01	1.115E+02	1.074
α_5	1.51E-15	8.93E-04	6.60E-06	5.18E-03	1.037E-01	1.161E+02	1.035

CCCG = 6, Gamma = 0.116

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9393851	0.9663872	0.9684225	0.9864346	1.463E+02	5.090E+00	--
α_2	2.66E-03	1.34E-02	1.15E-02	3.08E-02	2.175E+00	1.602E+02	0.921
α_3	1.53E-03	1.12E-02	9.03E-03	2.80E-02	1.645E+00	1.458E+02	1.014
α_4	2.01E-04	6.02E-03	3.91E-03	1.90E-02	8.525E-01	1.408E+02	1.056
α_5	5.05E-07	2.32E-03	6.44E-04	1.03E-02	3.251E-01	1.397E+02	1.068
α_6	4.03E-17	7.22E-04	2.63E-06	4.22E-03	9.247E-02	1.279E+02	1.168

CCCG = 7, Gamma = 0.115

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9476269	0.9686176	0.9699784	0.9849611	2.210E+02	7.160E+00	--
α_2	2.97E-03	1.15E-02	1.02E-02	2.44E-02	2.818E+00	2.430E+02	0.937
α_3	1.46E-03	8.64E-03	7.22E-03	2.07E-02	1.918E+00	2.200E+02	1.037
α_4	6.62E-04	6.41E-03	4.97E-03	1.71E-02	1.388E+00	2.152E+02	1.063
α_5	8.71E-05	3.63E-03	2.23E-03	1.19E-02	7.675E-01	2.109E+02	1.088
α_6	8.00E-09	1.09E-03	1.63E-04	5.37E-03	2.327E-01	2.140E+02	1.074
α_7	2.42E-40	1.50E-04	6.77E-12	6.65E-04	3.515E-02	2.336E+02	0.985

CCCG = 8, Gamma = 0.114

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9503514	0.9702184	0.9715050	0.9856914	2.349E+02	7.211E+00	--
α_2	2.35E-03	9.76E-03	8.57E-03	2.12E-02	2.613E+00	2.651E+02	0.896
α_3	9.29E-04	6.86E-03	5.54E-03	1.73E-02	1.638E+00	2.371E+02	1.004
α_4	5.23E-04	5.72E-03	4.35E-03	1.56E-02	1.300E+00	2.262E+02	1.054
α_5	1.92E-04	4.22E-03	2.88E-03	1.28E-02	9.525E-01	2.247E+02	1.062
α_6	9.85E-06	2.33E-03	1.07E-03	8.88E-03	5.069E-01	2.175E+02	1.100
α_7	2.56E-15	4.70E-04	4.41E-06	2.71E-03	1.083E-01	2.304E+02	1.040
α_8	1.65E-17	4.28E-04	1.44E-06	2.50E-03	9.140E-02	2.132E+02	1.124

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.70E-01	9.64E-01	9.61E-01	9.64E-01	9.66E-01	9.69E-01	9.70E-01
α_2	2.96E-02	2.81E-02	2.40E-02	1.82E-02	1.34E-02	1.15E-02	9.76E-03
α_3		7.49E-03	1.09E-02	1.18E-02	1.12E-02	8.64E-03	6.86E-03
α_4			4.21E-03	4.64E-03	6.02E-03	6.41E-03	5.72E-03
α_5				8.93E-04	2.32E-03	3.63E-03	4.22E-03
α_6					7.22E-04	1.09E-03	2.33E-03
α_7						1.50E-04	4.70E-04
α_8							4.28E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.70E-01	9.64E-01	9.61E-01	9.64E-01	9.66E-01	9.69E-01	9.70E-01
Beta	2.96E-02	3.55E-02	3.91E-02	3.56E-02	3.36E-02	3.14E-02	2.98E-02
Gamma		2.11E-01	3.86E-01	4.88E-01	6.01E-01	6.35E-01	6.72E-01
Delta			2.79E-01	3.18E-01	4.48E-01	5.66E-01	6.57E-01
Epsilon				1.61E-01	3.36E-01	4.31E-01	5.66E-01
Mu					2.37E-01	2.54E-01	4.33E-01
Omega						1.22E-01	2.79E-01
Sigma							4.77E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.08	6.12	8.16	10.20	12.24	14.28	16.32
N_1	0.5000	0.3750	0.2500	0.1563	0.0938	0.0547	0.0313
N_2	0.2500	0.3750	0.3750	0.3125	0.2344	0.1641	0.1094
N_3		0.1250	0.2500	0.3125	0.3125	0.2734	0.2188

N₄			0.0625	0.1563	0.2344	0.2734	0.2734
N₅				0.0313	0.0938	0.1641	0.2188
N₆					0.0156	0.0547	0.1094
N₇						0.0078	0.0313
N₈							0.0039

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 2.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.044

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215230	0.9570801	0.9842491	0.9999661	8.476E+00	3.801E-01	--
α_2	3.39E-05	4.29E-02	1.58E-02	1.78E-01	3.801E-01	8.476E+00	0.802

CCCG = 3, Gamma = 0.044

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8409411	0.9461357	0.9618869	0.9973688	1.686E+01	9.600E-01	--
α_2	5.77E-04	3.79E-02	2.22E-02	1.29E-01	6.673E-01	1.695E+01	0.913
α_3	1.41E-06	1.60E-02	3.87E-03	7.35E-02	2.927E-01	1.802E+01	0.878

CCCG = 4, Gamma = 0.044

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8550276	0.9406787	0.9508648	0.9913993	2.647E+01	1.669E+00	--
α_2	2.06E-03	3.54E-02	2.55E-02	1.03E-01	1.039E+00	2.832E+01	0.888
α_3	1.36E-05	1.55E-02	5.57E-03	6.47E-02	3.887E-01	2.470E+01	1.039
α_4	9.78E-08	8.44E-03	1.40E-03	4.13E-02	2.414E-01	2.836E+01	0.911

CCCG = 5, Gamma = 0.044

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8905180	0.9444387	0.9491128	0.9823656	5.927E+01	3.487E+00	--
α_2	4.28E-03	2.73E-02	2.27E-02	6.63E-02	1.791E+00	6.373E+01	0.951
α_3	1.59E-03	1.98E-02	1.49E-02	5.51E-02	1.207E+00	5.963E+01	1.024
α_4	1.33E-05	7.48E-03	3.00E-03	3.01E-02	4.340E-01	5.761E+01	1.074
α_5	2.03E-26	9.12E-04	3.25E-08	5.03E-03	5.493E-02	6.015E+01	1.035

CCCG = 6, Gamma = 0.044

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9039604	0.9498866	0.9536995	0.9827717	7.401E+01	3.905E+00	--
α_2	1.53E-03	1.58E-02	1.22E-02	4.26E-02	1.335E+00	8.296E+01	0.921
α_3	2.46E-03	2.00E-02	1.60E-02	5.13E-02	1.531E+00	7.500E+01	1.014
α_4	1.89E-04	9.78E-03	5.84E-03	3.28E-02	7.191E-01	7.280E+01	1.056
α_5	4.98E-08	3.39E-03	5.82E-04	1.65E-02	2.467E-01	7.243E+01	1.068
α_6	1.21E-20	1.10E-03	6.61E-07	6.36E-03	7.279E-02	6.637E+01	1.168

CCCG = 7, Gamma = 0.044

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9189712	0.9535280	0.9559475	0.9798166	1.184E+02	5.770E+00	--
α_2	1.42E-03	1.14E-02	9.12E-03	2.93E-02	1.549E+00	1.341E+02	0.937
α_3	2.90E-03	1.62E-02	1.37E-02	3.83E-02	1.989E+00	1.205E+02	1.037
α_4	9.70E-04	1.08E-02	8.19E-03	2.94E-02	1.287E+00	1.182E+02	1.063
α_5	9.89E-05	5.92E-03	3.44E-03	2.02E-02	6.913E-01	1.161E+02	1.088
α_6	1.45E-08	1.97E-03	2.97E-04	9.73E-03	2.327E-01	1.180E+02	1.074
α_7	1.11E-64	1.64E-04	2.48E-17	4.13E-04	2.112E-02	1.289E+02	0.985

CCCG = 8, Gamma = 0.044

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9298897	0.9580495	0.9598653	0.9800069	1.602E+02	7.016E+00	--
α_2	1.08E-03	8.40E-03	6.74E-03	2.14E-02	1.583E+00	1.868E+02	0.896
α_3	2.10E-03	1.18E-02	9.95E-03	2.80E-02	1.986E+00	1.660E+02	1.004
α_4	1.46E-03	1.04E-02	8.49E-03	2.61E-02	1.672E+00	1.584E+02	1.054
α_5	3.38E-04	6.37E-03	4.45E-03	1.89E-02	1.011E+00	1.578E+02	1.062
α_6	2.82E-05	3.72E-03	1.90E-03	1.36E-02	5.709E-01	1.529E+02	1.100
α_7	2.56E-10	1.12E-03	8.74E-05	5.90E-03	1.809E-01	1.620E+02	1.040
α_8	1.20E-107	8.29E-05	2.51E-27	6.21E-05	1.245E-02	1.501E+02	1.124

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.57E-01	9.46E-01	9.41E-01	9.44E-01	9.50E-01	9.54E-01	9.58E-01
α_2	4.29E-02	3.79E-02	3.54E-02	2.73E-02	1.58E-02	1.14E-02	8.40E-03
α_3		1.60E-02	1.55E-02	1.98E-02	2.00E-02	1.62E-02	1.18E-02
α_4			8.44E-03	7.48E-03	9.78E-03	1.08E-02	1.04E-02
α_5				9.12E-04	3.39E-03	5.92E-03	6.37E-03
α_6					1.10E-03	1.97E-03	3.72E-03
α_7						1.64E-04	1.12E-03
α_8							8.29E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.57E-01	9.46E-01	9.41E-01	9.44E-01	9.50E-01	9.54E-01	9.58E-01
Beta	4.29E-02	5.39E-02	5.93E-02	5.56E-02	5.01E-02	4.65E-02	4.20E-02
Gamma		2.97E-01	4.03E-01	5.08E-01	6.84E-01	7.54E-01	8.00E-01
Delta			3.53E-01	2.97E-01	4.16E-01	5.37E-01	6.48E-01
Epsilon				1.09E-01	3.15E-01	4.28E-01	5.19E-01
Mu					2.44E-01	2.65E-01	4.36E-01
Omega						7.68E-02	2.44E-01
Sigma							6.92E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.68	2.52	3.36	4.20	5.04	5.88	6.72
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 21.8

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.456

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9648022	0.9909762	0.9960434	0.9999731	5.205E+01	4.739E-01	--
α_2	2.69E-05	9.02E-03	3.96E-03	3.52E-02	4.739E-01	5.205E+01	0.802

CCCG = 3, Gamma = 0.458

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9674828	0.9886670	0.9917705	0.9992445	9.705E+01	1.113E+00	--
α_2	2.52E-04	8.44E-03	5.39E-03	2.70E-02	8.204E-01	9.635E+01	0.913
α_3	2.43E-07	2.89E-03	6.78E-04	1.33E-02	2.921E-01	1.008E+02	0.878

CCCG = 4, Gamma = 0.459

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9711826	0.9878405	0.9897814	0.9978609	1.602E+02	1.972E+00	--
α_2	7.55E-04	7.89E-03	6.05E-03	2.13E-02	1.331E+00	1.673E+02	0.888
α_3	5.06E-06	2.99E-03	1.18E-03	1.21E-02	4.312E-01	1.437E+02	1.039
α_4	2.54E-09	1.28E-03	1.51E-04	6.50E-03	2.099E-01	1.641E+02	0.911

CCCG = 5, Gamma = 0.460

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9748844	0.9878224	0.9890608	0.9965280	2.545E+02	3.137E+00	--
α_2	9.24E-04	6.38E-03	5.21E-03	1.59E-02	1.713E+00	2.666E+02	0.951
α_3	1.68E-04	3.79E-03	2.57E-03	1.16E-02	9.440E-01	2.482E+02	1.024
α_4	1.21E-06	1.61E-03	5.52E-04	6.78E-03	3.816E-01	2.373E+02	1.074
α_5	1.60E-16	4.00E-04	2.19E-06	2.33E-03	9.865E-02	2.465E+02	1.035

CCCG = 6, Gamma = 0.461

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9776683	0.9885373	0.9894883	0.9961572	3.334E+02	3.866E+00	--
α_2	7.27E-04	4.86E-03	3.98E-03	1.20E-02	1.755E+00	3.594E+02	0.921
α_3	2.23E-04	3.39E-03	2.45E-03	9.76E-03	1.111E+00	3.269E+02	1.014
α_4	2.73E-05	2.07E-03	1.15E-03	7.21E-03	6.510E-01	3.144E+02	1.056
α_5	1.61E-08	8.14E-04	1.47E-04	3.92E-03	2.536E-01	3.112E+02	1.068
α_6	5.45E-17	3.36E-04	1.53E-06	1.96E-03	9.572E-02	2.846E+02	1.168

CCCG = 7, Gamma = 0.461

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9797890	0.9887856	0.9894735	0.9954328	4.633E+02	5.254E+00	--
α_2	8.39E-04	4.29E-03	3.65E-03	9.91E-03	2.159E+00	5.015E+02	0.937
α_3	2.75E-04	2.91E-03	2.22E-03	7.90E-03	1.325E+00	4.534E+02	1.037
α_4	1.15E-04	2.25E-03	1.56E-03	6.73E-03	9.969E-01	4.427E+02	1.063
α_5	6.12E-06	1.21E-03	5.75E-04	4.57E-03	5.249E-01	4.331E+02	1.088
α_6	3.31E-10	4.46E-04	4.36E-05	2.31E-03	1.956E-01	4.388E+02	1.074
α_7	3.15E-28	1.11E-04	2.50E-09	6.00E-04	5.291E-02	4.787E+02	0.985

CCCG = 8, Gamma = 0.461

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9814986	0.9894459	0.9900232	0.9954222	5.539E+02	5.908E+00	--
α_2	7.82E-04	3.73E-03	3.21E-03	8.46E-03	2.298E+00	6.140E+02	0.896
α_3	2.00E-04	2.31E-03	1.74E-03	6.35E-03	1.267E+00	5.483E+02	1.004
α_4	1.13E-04	1.99E-03	1.40E-03	5.87E-03	1.042E+00	5.227E+02	1.054
α_5	3.45E-05	1.47E-03	8.98E-04	4.84E-03	7.626E-01	5.188E+02	1.062
α_6	1.49E-07	6.52E-04	1.82E-04	2.90E-03	3.271E-01	5.015E+02	1.100
α_7	2.45E-13	2.53E-04	6.79E-06	1.42E-03	1.344E-01	5.304E+02	1.040
α_8	1.41E-20	1.56E-04	1.47E-07	9.08E-04	7.682E-02	4.910E+02	1.124

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.89E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01	9.89E-01
α_2	9.02E-03	8.44E-03	7.89E-03	6.38E-03	4.86E-03	4.29E-03	3.73E-03
α_3		2.89E-03	2.99E-03	3.79E-03	3.39E-03	2.91E-03	2.31E-03
α_4			1.28E-03	1.61E-03	2.07E-03	2.25E-03	1.99E-03
α_5				4.00E-04	8.14E-04	1.21E-03	1.47E-03
α_6					3.36E-04	4.46E-04	6.52E-04
α_7						1.11E-04	2.53E-04
α_8							1.56E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.89E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01	9.89E-01
Beta	9.02E-03	1.13E-02	1.22E-02	1.22E-02	1.15E-02	1.12E-02	1.06E-02
Gamma		2.55E-01	3.51E-01	4.76E-01	5.76E-01	6.18E-01	6.47E-01
Delta			2.99E-01	3.46E-01	4.87E-01	5.79E-01	6.62E-01
Epsilon				2.00E-01	3.58E-01	4.40E-01	5.60E-01
Mu					2.92E-01	3.15E-01	4.20E-01
Omega						1.99E-01	3.86E-01
Sigma							3.82E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	17.44	26.16	34.88	43.60	52.32	61.04	69.76
N_1	0.1267	0.1800	0.2280	0.2708	0.3087	0.3421	0.3714
N_2	0.0033	0.0100	0.0185	0.0290	0.0411	0.0544	0.0688
N_3		0.0000	0.0005	0.0014	0.0028	0.0047	0.0072

N₄			0.0000	0.0000	0.0001	0.0002	0.0005
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 9.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.187

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9868749	0.9965950	0.9984631	0.9999875	1.444E+02	4.932E-01	--
α_2	1.25E-05	3.40E-03	1.54E-03	1.31E-02	4.932E-01	1.444E+02	0.802

CCCG = 3, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9891853	0.9963089	0.9973781	0.9997815	2.860E+02	1.060E+00	--
α_2	4.71E-05	2.52E-03	1.49E-03	8.50E-03	7.137E-01	2.827E+02	0.913
α_3	4.22E-07	1.17E-03	3.55E-04	5.12E-03	3.458E-01	2.944E+02	0.878

CCCG = 4, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9910325	0.9961461	0.9967297	0.9992650	5.466E+02	2.115E+00	--
α_2	3.41E-04	2.75E-03	2.19E-03	7.09E-03	1.549E+00	5.609E+02	0.888
α_3	1.72E-08	5.51E-04	1.08E-04	2.62E-03	2.646E-01	4.804E+02	1.039
α_4	6.07E-08	5.49E-04	1.35E-04	2.51E-03	3.010E-01	5.476E+02	0.911

CCCG = 5, Gamma = 0.189

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9934085	0.9963394	0.9965643	0.9985025	1.449E+03	5.325E+00	--
α_2	7.75E-04	2.43E-03	2.21E-03	4.83E-03	3.632E+00	1.491E+03	0.951
α_3	9.59E-05	9.76E-04	7.49E-04	2.63E-03	1.354E+00	1.386E+03	1.024
α_4	2.12E-08	2.24E-04	5.34E-05	1.03E-03	2.961E-01	1.324E+03	1.074
α_5	9.20E-35	3.09E-05	3.40E-11	1.53E-04	4.243E-02	1.373E+03	1.035

CCCG = 6, Gamma = 0.189

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931962	0.9962910	0.9965366	0.9985475	1.326E+03	4.936E+00	--
α_2	5.54E-04	2.08E-03	1.85E-03	4.40E-03	2.915E+00	1.398E+03	0.921
α_3	8.43E-05	9.89E-04	7.43E-04	2.73E-03	1.257E+00	1.270E+03	1.014
α_4	1.67E-06	4.12E-04	1.89E-04	1.58E-03	5.031E-01	1.221E+03	1.056
α_5	2.77E-15	9.56E-05	1.26E-06	5.48E-04	1.155E-01	1.207E+03	1.068
α_6	6.15E-13	1.31E-04	4.81E-06	7.28E-04	1.451E-01	1.104E+03	1.168

CCCG = 7, Gamma = 0.189

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9945041	0.9965218	0.9966403	0.9981350	2.766E+03	9.654E+00	--
α_2	6.38E-04	1.65E-03	1.54E-03	3.04E-03	4.851E+00	2.939E+03	0.937
α_3	2.70E-04	1.05E-03	9.31E-04	2.25E-03	2.800E+00	2.655E+03	1.037
α_4	5.45E-05	5.34E-04	4.12E-04	1.43E-03	1.384E+00	2.592E+03	1.063
α_5	6.84E-07	1.93E-04	8.65E-05	7.48E-04	4.902E-01	2.534E+03	1.088
α_6	1.06E-15	4.47E-05	5.66E-07	2.56E-04	1.146E-01	2.566E+03	1.074
α_7	2.75E-93	5.23E-06	5.57E-25	6.22E-06	1.464E-02	2.798E+03	0.985

CCCG = 8, Gamma = 0.189

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9943866	0.9966635	0.9968167	0.9984173	2.135E+03	7.148E+00	--
α_2	3.45E-04	1.27E-03	1.13E-03	2.67E-03	2.980E+00	2.339E+03	0.896
α_3	1.63E-04	9.39E-04	7.85E-04	2.24E-03	1.960E+00	2.086E+03	1.004
α_4	4.29E-05	5.86E-04	4.30E-04	1.66E-03	1.166E+00	1.989E+03	1.054
α_5	1.55E-06	2.72E-04	1.32E-04	1.02E-03	5.375E-01	1.973E+03	1.062
α_6	2.09E-11	9.47E-05	7.34E-06	5.00E-04	1.805E-01	1.907E+03	1.100
α_7	1.06E-35	2.05E-05	1.54E-11	1.00E-04	4.139E-02	2.016E+03	1.040
α_8	9.24E-09	1.52E-04	3.34E-05	7.06E-04	2.827E-01	1.865E+03	1.124

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
α_2	3.40E-03	2.52E-03	2.75E-03	2.43E-03	2.08E-03	1.65E-03	1.27E-03
α_3		1.17E-03	5.51E-04	9.76E-04	9.89E-04	1.05E-03	9.39E-04
α_4			5.49E-04	2.24E-04	4.12E-04	5.34E-04	5.86E-04
α_5				3.09E-05	9.56E-05	1.93E-04	2.72E-04
α_6					1.31E-04	4.47E-05	9.47E-05
α_7						5.23E-06	2.05E-05
α_8							1.52E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
Beta	3.40E-03	3.69E-03	3.85E-03	3.66E-03	3.71E-03	3.48E-03	3.34E-03
Gamma		3.18E-01	2.85E-01	3.36E-01	4.39E-01	5.26E-01	6.19E-01
Delta			4.99E-01	2.07E-01	3.93E-01	4.24E-01	5.45E-01
Epsilon				1.21E-01	3.55E-01	3.13E-01	4.79E-01
Mu					5.79E-01	2.05E-01	4.95E-01
Omega						1.05E-01	6.45E-01
Sigma							8.81E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.20	10.80	14.40	18.00	21.60	25.20	28.80
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.3.4 CLN-MDP-RH: Clean Systems Motor-Driven Pumps Fail to Run Greater Than One Hour

Generic CCF Parameters

System Group: Clean Water
System: Auxiliary Feedwater, Chemical and Volume Control, Component Cooling Water, Condensate System, Condensate Transfer System, Containment Spray Recirculation, Generic water system for relief valves, High Pressure Coolant Injection, High Pressure Core Spray, High Pressure Injection, Isolation Condenser, Low Pressure Core Spray, Main Feedwater, Reactor Coolant, Reactor Core Isolation, Residual Heat Removal (LCI in BWRs; LPI in PWRs), Standby Liquid Control
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run > 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 32.0

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9511372	0.9853760	0.9912164	0.9997095	0.9904330	4.864E+01	7.219E-01
α_2	2.89E-04	1.46E-02	8.78E-03	4.89E-02	9.57E-03	7.219E-01	4.864E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9582863	0.9833823	0.9865265	0.9977336	0.9870772	9.693E+01	1.638E+00
α_2	1.05E-03	1.25E-02	9.43E-03	3.47E-02	9.76E-03	1.236E+00	9.734E+01
α_3	4.39E-06	4.08E-03	1.50E-03	1.69E-02	3.17E-03	4.018E-01	9.817E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9610361	0.9820625	0.9842332	0.9956824	0.9865132	1.424E+02	2.600E+00
α_2	1.57E-03	1.14E-02	9.25E-03	2.86E-02	7.51E-03	1.653E+00	1.433E+02
α_3	6.04E-05	4.50E-03	2.52E-03	1.57E-02	4.78E-03	6.529E-01	1.443E+02
α_4	1.81E-07	2.03E-03	4.80E-04	9.34E-03	1.19E-03	2.940E-01	1.447E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9687992	0.9835284	0.9847524	0.9940728	0.9870859	2.553E+02	4.275E+00
α_2	1.81E-03	8.73E-03	7.50E-03	1.98E-02	5.23E-03	2.266E+00	2.573E+02
α_3	5.24E-04	5.25E-03	4.05E-03	1.41E-02	4.81E-03	1.363E+00	2.582E+02
α_4	1.19E-05	2.07E-03	1.01E-03	7.75E-03	2.39E-03	5.385E-01	2.590E+02
α_5	2.12E-15	4.16E-04	3.85E-06	2.40E-03	4.79E-04	1.080E-01	2.594E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9713856	0.9844739	0.9855112	0.9940166	0.9880394	3.024E+02	4.769E+00
α_2	1.13E-03	6.43E-03	5.40E-03	1.53E-02	3.53E-03	1.977E+00	3.052E+02
α_3	5.98E-04	4.96E-03	3.93E-03	1.28E-02	4.03E-03	1.522E+00	3.057E+02
α_4	8.33E-05	2.70E-03	1.73E-03	8.64E-03	3.00E-03	8.304E-01	3.064E+02
α_5	1.69E-07	1.02E-03	2.70E-04	4.61E-03	1.20E-03	3.148E-01	3.069E+02
α_6	8.52E-14	4.08E-04	8.04E-06	2.32E-03	2.00E-04	1.254E-01	3.071E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9755423	0.9856059	0.9862892	0.9933307	0.9890446	4.618E+02	6.744E+00
α_2	1.19E-03	5.25E-03	4.57E-03	1.17E-02	2.40E-03	2.462E+00	4.661E+02
α_3	6.83E-04	4.07E-03	3.39E-03	9.79E-03	3.06E-03	1.908E+00	4.666E+02
α_4	2.86E-04	2.90E-03	2.23E-03	7.79E-03	3.01E-03	1.357E+00	4.672E+02
α_5	3.14E-05	1.56E-03	9.29E-04	5.22E-03	1.80E-03	7.294E-01	4.678E+02
α_6	7.50E-09	5.26E-04	8.92E-05	2.56E-03	6.01E-04	2.463E-01	4.683E+02
α_7	3.66E-34	9.09E-05	1.07E-10	4.52E-04	8.59E-05	4.261E-02	4.685E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9769967	0.9864551	0.9870972	0.9937158	0.9899723	4.928E+02	6.767E+00
α_2	8.77E-04	4.40E-03	3.75E-03	1.01E-02	1.72E-03	2.196E+00	4.974E+02
α_3	4.29E-04	3.24E-03	2.60E-03	8.21E-03	2.18E-03	1.616E+00	4.980E+02
α_4	2.57E-04	2.67E-03	2.05E-03	7.23E-03	2.64E-03	1.336E+00	4.983E+02
α_5	7.66E-05	1.84E-03	1.24E-03	5.68E-03	2.11E-03	9.214E-01	4.987E+02
α_6	2.26E-06	9.19E-04	3.87E-04	3.64E-03	1.05E-03	4.591E-01	4.991E+02
α_7	5.55E-13	2.78E-04	8.61E-06	1.55E-03	3.01E-04	1.391E-01	4.995E+02
α_8	7.75E-17	1.97E-04	1.08E-06	1.15E-03	3.76E-05	9.860E-02	4.995E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.83E-01	9.82E-01	9.84E-01	9.84E-01	9.86E-01	9.86E-01
α_2	1.46E-02	1.25E-02	1.14E-02	8.73E-03	6.43E-03	5.25E-03	4.40E-03
α_3		4.08E-03	4.50E-03	5.25E-03	4.96E-03	4.07E-03	3.24E-03
α_4			2.03E-03	2.07E-03	2.70E-03	2.90E-03	2.67E-03
α_5				4.16E-04	1.02E-03	1.56E-03	1.84E-03
α_6					4.08E-04	5.26E-04	9.19E-04
α_7						9.09E-05	2.78E-04
α_8							1.97E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.83E-01	9.82E-01	9.84E-01	9.84E-01	9.86E-01	9.86E-01
Beta	1.46E-02	1.66E-02	1.79E-02	1.65E-02	1.55E-02	1.44E-02	1.35E-02
Gamma		2.45E-01	3.64E-01	4.70E-01	5.86E-01	6.35E-01	6.75E-01

Delta			3.10E-01	3.22E-01	4.55E-01	5.55E-01	6.46E-01
Epsilon				1.67E-01	3.46E-01	4.29E-01	5.48E-01
Mu					2.85E-01	2.84E-01	4.31E-01
Omega						1.48E-01	3.41E-01
Sigma							4.15E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	25.60	38.40	51.20	64.00	76.80	89.60	102.40
N₁	0.6267	0.5550	0.4780	0.4270	0.4024	0.3968	0.4027
N₂	0.2533	0.3850	0.3935	0.3415	0.2754	0.2185	0.1782
N₃		0.1250	0.2505	0.3139	0.3153	0.2781	0.2259
N₄			0.0625	0.1563	0.2345	0.2737	0.2739
N₅				0.0313	0.0938	0.1641	0.2188
N₆					0.0156	0.0547	0.1094
N₇						0.0078	0.0313
N₈							0.0039

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 7.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.215

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9635754	0.9905938	0.9957977	0.9999687	5.091E+01	4.834E-01	--
α_2	3.13E-05	9.41E-03	4.20E-03	3.64E-02	4.834E-01	5.091E+01	0.973

CCCG = 3, Gamma = 0.216

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9737846	0.9905605	0.9929324	0.9992287	1.286E+02	1.226E+00	--
α_2	3.65E-04	7.48E-03	5.16E-03	2.25E-02	9.769E-01	1.296E+02	1.068
α_3	3.13E-08	1.96E-03	3.40E-04	9.48E-03	2.487E-01	1.269E+02	1.096

CCCG = 4, Gamma = 0.217

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9731951	0.9885415	0.9902996	0.9978759	1.775E+02	2.057E+00	--
α_2	8.49E-04	7.69E-03	6.03E-03	2.02E-02	1.442E+00	1.860E+02	1.042
α_3	3.23E-06	2.58E-03	9.68E-04	1.06E-02	4.114E-01	1.593E+02	1.223
α_4	1.56E-09	1.19E-03	1.30E-04	6.11E-03	2.036E-01	1.708E+02	1.142

CCCG = 5, Gamma = 0.218

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9777968	0.9887513	0.9897305	0.9963601	3.237E+02	3.683E+00	--
α_2	1.35E-03	6.58E-03	5.64E-03	1.50E-02	2.243E+00	3.389E+02	1.080
α_3	1.61E-04	3.21E-03	2.22E-03	9.62E-03	9.912E-01	3.083E+02	1.192
α_4	8.54E-07	1.25E-03	4.24E-04	5.31E-03	3.765E-01	3.001E+02	1.226
α_5	1.86E-21	2.15E-04	1.22E-07	1.24E-03	7.237E-02	3.368E+02	1.094

CCCG = 6, Gamma = 0.218

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9790837	0.9890713	0.9899200	0.9961595	3.746E+02	4.139E+00	--
α_2	9.88E-04	5.14E-03	4.37E-03	1.19E-02	2.128E+00	4.119E+02	1.018
α_3	2.24E-04	3.24E-03	2.36E-03	9.27E-03	1.134E+00	3.488E+02	1.204
α_4	1.05E-05	1.60E-03	7.93E-04	5.92E-03	5.533E-01	3.455E+02	1.218
α_5	2.46E-09	6.31E-04	8.42E-05	3.17E-03	2.210E-01	3.500E+02	1.204
α_6	4.06E-16	3.19E-04	2.22E-06	1.85E-03	1.027E-01	3.219E+02	1.309

CCCG = 7, Gamma = 0.218

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9825679	0.9898609	0.9903711	0.9954117	6.279E+02	6.432E+00	--
α_2	1.04E-03	3.99E-03	3.54E-03	8.50E-03	2.840E+00	7.081E+02	0.995
α_3	4.42E-04	2.98E-03	2.44E-03	7.37E-03	1.746E+00	5.843E+02	1.207
α_4	1.15E-04	1.85E-03	1.32E-03	5.39E-03	1.084E+00	5.844E+02	1.208
α_5	5.33E-06	9.37E-04	4.54E-04	3.51E-03	5.376E-01	5.734E+02	1.233
α_6	2.98E-10	3.39E-04	3.42E-05	1.75E-03	1.979E-01	5.840E+02	1.211
α_7	8.45E-53	3.77E-05	3.78E-15	1.29E-04	2.656E-02	7.042E+02	1.004

CCCG = 8, Gamma = 0.219

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9835676	0.9905552	0.9910558	0.9958335	6.410E+02	6.112E+00	--
α_2	6.79E-04	3.14E-03	2.71E-03	7.06E-03	2.364E+00	7.507E+02	0.943
α_3	2.94E-04	2.47E-03	1.95E-03	6.41E-03	1.512E+00	6.104E+02	1.160
α_4	1.07E-04	1.82E-03	1.29E-03	5.35E-03	1.056E+00	5.786E+02	1.225
α_5	1.72E-05	1.13E-03	6.46E-04	3.91E-03	6.745E-01	5.941E+02	1.194
α_6	7.39E-08	5.50E-04	1.40E-04	2.49E-03	3.076E-01	5.594E+02	1.268
α_7	1.29E-15	1.85E-04	1.82E-06	1.07E-03	1.093E-01	5.915E+02	1.200
α_8	2.23E-18	1.44E-04	4.00E-07	8.40E-04	8.885E-02	6.162E+02	1.152

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.91E-01	9.89E-01	9.89E-01	9.89E-01	9.90E-01	9.91E-01
α_2	9.41E-03	7.48E-03	7.69E-03	6.58E-03	5.14E-03	3.99E-03	3.14E-03
α_3		1.96E-03	2.58E-03	3.21E-03	3.24E-03	2.98E-03	2.47E-03
α_4			1.19E-03	1.25E-03	1.60E-03	1.85E-03	1.82E-03
α_5				2.15E-04	6.31E-04	9.37E-04	1.13E-03
α_6					3.19E-04	3.39E-04	5.50E-04
α_7						3.77E-05	1.85E-04
α_8							1.44E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.91E-01	9.89E-01	9.89E-01	9.89E-01	9.90E-01	9.91E-01
Beta	9.41E-03	9.44E-03	1.15E-02	1.12E-02	1.09E-02	1.01E-02	9.44E-03
Gamma		2.07E-01	3.29E-01	4.15E-01	5.30E-01	6.06E-01	6.68E-01
Delta			3.16E-01	3.14E-01	4.40E-01	5.15E-01	6.08E-01
Epsilon				1.46E-01	3.73E-01	4.15E-01	5.25E-01
Mu					3.36E-01	2.87E-01	4.37E-01
Omega						1.00E-01	3.74E-01
Sigma							4.38E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.68	8.52	11.36	14.20	17.04	19.88	22.72
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 4.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.152

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8747145	0.9624640	0.9773749	0.9993176	1.794E+01	6.998E-01	--
α_2	6.82E-04	3.75E-02	2.26E-02	1.25E-01	6.998E-01	1.794E+01	0.973

CCCG = 3, Gamma = 0.147

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8932748	0.9565953	0.9642370	0.9937325	3.699E+01	1.678E+00	--
α_2	3.23E-03	3.38E-02	2.61E-02	9.05E-02	1.314E+00	3.757E+01	1.068
α_3	5.27E-06	9.62E-03	3.17E-03	4.12E-02	3.646E-01	3.753E+01	1.096

CCCG = 4, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8977793	0.9524360	0.9578943	0.9884053	5.178E+01	2.586E+00	--
α_2	4.07E-03	2.90E-02	2.37E-02	7.20E-02	1.660E+00	5.562E+01	1.042
α_3	1.68E-04	1.32E-02	7.36E-03	4.59E-02	6.427E-01	4.817E+01	1.223
α_4	3.40E-07	5.42E-03	1.21E-03	2.52E-02	2.832E-01	5.198E+01	1.142

CCCG = 5, Gamma = 0.140

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9224396	0.9585983	0.9615016	0.9848314	9.998E+01	4.318E+00	--
α_2	4.48E-03	2.10E-02	1.82E-02	4.73E-02	2.305E+00	1.072E+02	1.080
α_3	1.46E-03	1.40E-02	1.09E-02	3.72E-02	1.391E+00	9.787E+01	1.192
α_4	2.60E-05	5.39E-03	2.55E-03	2.04E-02	5.195E-01	9.593E+01	1.226
α_5	1.62E-15	9.59E-04	7.10E-06	5.57E-03	1.037E-01	1.080E+02	1.094

CCCG = 6, Gamma = 0.139

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9296996	0.9609478	0.9632863	0.9842044	1.252E+02	5.090E+00	--
α_2	2.99E-03	1.51E-02	1.29E-02	3.45E-02	2.175E+00	1.424E+02	1.018
α_3	1.84E-03	1.35E-02	1.09E-02	3.38E-02	1.645E+00	1.205E+02	1.204
α_4	2.36E-04	7.06E-03	4.59E-03	2.23E-02	8.525E-01	1.199E+02	1.218
α_5	5.79E-07	2.66E-03	7.38E-04	1.18E-02	3.251E-01	1.219E+02	1.204
α_6	4.59E-17	8.23E-04	3.00E-06	4.80E-03	9.247E-02	1.123E+02	1.309

CCCG = 7, Gamma = 0.137

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9409081	0.9645516	0.9660758	0.9829891	1.948E+02	7.160E+00	--
α_2	3.20E-03	1.23E-02	1.09E-02	2.62E-02	2.818E+00	2.257E+02	0.995
α_3	1.73E-03	1.02E-02	8.51E-03	2.44E-02	1.918E+00	1.865E+02	1.207
α_4	7.62E-04	7.38E-03	5.72E-03	1.97E-02	1.388E+00	1.868E+02	1.208
α_5	1.00E-04	4.16E-03	2.56E-03	1.37E-02	7.675E-01	1.837E+02	1.233
α_6	9.14E-09	1.24E-03	1.86E-04	6.13E-03	2.327E-01	1.876E+02	1.211
α_7	2.49E-40	1.55E-04	6.99E-12	6.87E-04	3.515E-02	2.263E+02	1.004

CCCG = 8, Gamma = 0.136

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9438825	0.9663014	0.9677456	0.9837881	2.068E+02	7.211E+00	--
α_2	2.51E-03	1.04E-02	9.15E-03	2.27E-02	2.613E+00	2.483E+02	0.943
α_3	1.09E-03	8.03E-03	6.49E-03	2.02E-02	1.638E+00	2.022E+02	1.160
α_4	6.16E-04	6.73E-03	5.12E-03	1.83E-02	1.300E+00	1.919E+02	1.225
α_5	2.19E-04	4.81E-03	3.28E-03	1.46E-02	9.525E-01	1.972E+02	1.194
α_6	1.15E-05	2.72E-03	1.26E-03	1.04E-02	5.069E-01	1.860E+02	1.268
α_7	3.00E-15	5.49E-04	5.16E-06	3.17E-03	1.083E-01	1.970E+02	1.200
α_8	1.71E-17	4.45E-04	1.50E-06	2.60E-03	9.140E-02	2.053E+02	1.152

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.62E-01	9.57E-01	9.52E-01	9.59E-01	9.61E-01	9.65E-01	9.66E-01
α_2	3.75E-02	3.38E-02	2.90E-02	2.10E-02	1.51E-02	1.23E-02	1.04E-02
α_3		9.62E-03	1.32E-02	1.40E-02	1.35E-02	1.02E-02	8.03E-03
α_4			5.42E-03	5.39E-03	7.06E-03	7.38E-03	6.73E-03
α_5				9.59E-04	2.66E-03	4.16E-03	4.81E-03
α_6					8.23E-04	1.24E-03	2.72E-03
α_7						1.55E-04	5.49E-04
α_8							4.45E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.62E-01	9.57E-01	9.52E-01	9.59E-01	9.61E-01	9.65E-01	9.66E-01
Beta	3.75E-02	4.34E-02	4.76E-02	4.14E-02	3.91E-02	3.54E-02	3.37E-02
Gamma		2.22E-01	3.91E-01	4.92E-01	6.15E-01	6.52E-01	6.91E-01
Delta			2.92E-01	3.12E-01	4.39E-01	5.59E-01	6.55E-01
Epsilon				1.51E-01	3.30E-01	4.30E-01	5.59E-01
Mu					2.36E-01	2.51E-01	4.36E-01
Omega						1.11E-01	2.68E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.28	4.92	6.56	8.20	9.84	11.48	13.12
N_1	0.5000	0.3750	0.2500	0.1563	0.0938	0.0547	0.0313
N_2	0.2500	0.3750	0.3750	0.3125	0.2344	0.1641	0.1094
N_3		0.1250	0.2500	0.3125	0.3125	0.2734	0.2188

N₄			0.0625	0.1563	0.2344	0.2734	0.2734
N₅				0.0313	0.0938	0.1641	0.2188
N₆					0.0156	0.0547	0.1094
N₇						0.0078	0.0313
N₈							0.0039

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.003

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7242688	0.9328079	0.9742607	0.9999443	5.277E+00	3.801E-01	--
α_2	5.57E-05	6.72E-02	2.57E-02	2.76E-01	3.801E-01	5.277E+00	0.973

CCCG = 3, Gamma = 0.003

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7796829	0.9244305	0.9457048	0.9962221	1.174E+01	9.600E-01	--
α_2	8.09E-04	5.21E-02	3.10E-02	1.75E-01	6.673E-01	1.214E+01	1.068
α_3	2.11E-06	2.35E-02	5.77E-03	1.08E-01	2.927E-01	1.218E+01	1.096

CCCG = 4, Gamma = 0.003

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8060535	0.9197892	0.9329992	0.9881811	1.914E+01	1.669E+00	--
α_2	2.79E-03	4.74E-02	3.43E-02	1.37E-01	1.039E+00	2.090E+01	1.042
α_3	1.84E-05	2.08E-02	7.54E-03	8.66E-02	3.887E-01	1.831E+01	1.223
α_4	1.41E-07	1.21E-02	2.02E-03	5.90E-02	2.414E-01	1.977E+01	1.142

CCCG = 5, Gamma = 0.003

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8666582	0.9320055	0.9375765	0.9782822	4.780E+01	3.487E+00	--
α_2	5.21E-03	3.32E-02	2.76E-02	8.03E-02	1.791E+00	5.219E+01	1.080
α_3	1.98E-03	2.47E-02	1.85E-02	6.83E-02	1.207E+00	4.774E+01	1.192
α_4	1.62E-05	9.13E-03	3.67E-03	3.67E-02	4.340E-01	4.712E+01	1.226
α_5	2.29E-26	1.03E-03	3.68E-08	5.69E-03	5.493E-02	5.326E+01	1.094

CCCG = 6, Gamma = 0.003

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8828139	0.9385995	0.9431614	0.9787773	5.969E+01	3.905E+00	--
α_2	1.81E-03	1.87E-02	1.44E-02	5.01E-02	1.335E+00	7.020E+01	1.018
α_3	3.13E-03	2.53E-02	2.03E-02	6.47E-02	1.531E+00	5.893E+01	1.204
α_4	2.34E-04	1.20E-02	7.19E-03	4.03E-02	7.191E-01	5.906E+01	1.218
α_5	5.99E-08	4.08E-03	7.00E-04	1.98E-02	2.467E-01	6.025E+01	1.204
α_6	1.44E-20	1.31E-03	7.90E-07	7.60E-03	7.279E-02	5.555E+01	1.309

CCCG = 7, Gamma = 0.003

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9047369	0.9452236	0.9480256	0.9761337	9.957E+01	5.770E+00	--
α_2	1.58E-03	1.27E-02	1.01E-02	3.25E-02	1.549E+00	1.205E+02	0.995
α_3	3.53E-03	1.98E-02	1.67E-02	4.66E-02	1.989E+00	9.862E+01	1.207
α_4	1.16E-03	1.28E-02	9.75E-03	3.49E-02	1.287E+00	9.923E+01	1.208
α_5	1.17E-04	7.02E-03	4.08E-03	2.39E-02	6.913E-01	9.784E+01	1.233
α_6	1.72E-08	2.32E-03	3.50E-04	1.15E-02	2.327E-01	1.001E+02	1.211
α_7	1.19E-64	1.75E-04	2.65E-17	4.40E-04	2.112E-02	1.209E+02	1.004

CCCG = 8, Gamma = 0.003

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9177414	0.9506776	0.9527793	0.9764336	1.352E+02	7.016E+00	--
α_2	1.18E-03	9.19E-03	7.37E-03	2.34E-02	1.583E+00	1.706E+02	0.943
α_3	2.52E-03	1.42E-02	1.20E-02	3.35E-02	1.986E+00	1.379E+02	1.160
α_4	1.77E-03	1.26E-02	1.03E-02	3.15E-02	1.672E+00	1.309E+02	1.225
α_5	3.95E-04	7.43E-03	5.20E-03	2.21E-02	1.011E+00	1.350E+02	1.194
α_6	3.39E-05	4.46E-03	2.27E-03	1.63E-02	5.709E-01	1.274E+02	1.268
α_7	3.07E-10	1.34E-03	1.05E-04	7.07E-03	1.809E-01	1.351E+02	1.200
α_8	1.28E-107	8.84E-05	2.67E-27	6.62E-05	1.245E-02	1.409E+02	1.152

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.33E-01	9.24E-01	9.20E-01	9.32E-01	9.39E-01	9.45E-01	9.51E-01
α_2	6.72E-02	5.21E-02	4.74E-02	3.32E-02	1.87E-02	1.27E-02	9.19E-03
α_3		2.35E-02	2.08E-02	2.47E-02	2.53E-02	1.98E-02	1.42E-02
α_4			1.21E-02	9.13E-03	1.20E-02	1.28E-02	1.26E-02
α_5				1.03E-03	4.08E-03	7.02E-03	7.43E-03
α_6					1.31E-03	2.32E-03	4.46E-03
α_7						1.75E-04	1.34E-03
α_8							8.84E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.33E-01	9.24E-01	9.20E-01	9.32E-01	9.39E-01	9.45E-01	9.51E-01
Beta	6.72E-02	7.56E-02	8.02E-02	6.80E-02	6.14E-02	5.48E-02	4.93E-02
Gamma		3.10E-01	4.10E-01	5.12E-01	6.96E-01	7.68E-01	8.14E-01
Delta			3.67E-01	2.92E-01	4.08E-01	5.30E-01	6.46E-01
Epsilon				1.01E-01	3.09E-01	4.26E-01	5.14E-01
Mu					2.43E-01	2.62E-01	4.42E-01
Omega						7.00E-02	2.42E-01
Sigma							6.20E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.08	0.12	0.16	0.20	0.24	0.28	0.32
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 16.7

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.509

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9527933	0.9878811	0.9946640	0.9999637	3.863E+01	4.739E-01	--
α_2	3.63E-05	1.21E-02	5.34E-03	4.72E-02	4.739E-01	3.863E+01	0.973

CCCG = 3, Gamma = 0.513

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9584937	0.9855109	0.9894590	0.9990313	7.567E+01	1.113E+00	--
α_2	3.18E-04	1.06E-02	6.79E-03	3.39E-02	8.204E-01	7.649E+01	1.068
α_3	3.27E-07	3.88E-03	9.12E-04	1.79E-02	2.921E-01	7.504E+01	1.096

CCCG = 4, Gamma = 0.515

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9639895	0.9847847	0.9872002	0.9973178	1.276E+02	1.972E+00	--
α_2	9.39E-04	9.80E-03	7.52E-03	2.64E-02	1.331E+00	1.345E+02	1.042
α_3	6.31E-06	3.73E-03	1.48E-03	1.51E-02	4.312E-01	1.153E+02	1.223
α_4	3.37E-09	1.69E-03	2.00E-04	8.62E-03	2.099E-01	1.237E+02	1.142

CCCG = 5, Gamma = 0.516

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9701334	0.9855060	0.9869736	0.9958626	2.133E+02	3.137E+00	--
α_2	1.09E-03	7.55E-03	6.16E-03	1.88E-02	1.713E+00	2.251E+02	1.080
α_3	2.04E-04	4.59E-03	3.12E-03	1.40E-02	9.440E-01	2.047E+02	1.192
α_4	1.44E-06	1.91E-03	6.57E-04	8.06E-03	3.816E-01	1.994E+02	1.226
α_5	1.76E-16	4.40E-04	2.41E-06	2.56E-03	9.865E-02	2.239E+02	1.094

CCCG = 6, Gamma = 0.517

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9735793	0.9864284	0.9875498	0.9954457	2.810E+02	3.866E+00	--
α_2	8.35E-04	5.58E-03	4.57E-03	1.38E-02	1.755E+00	3.130E+02	1.018
α_3	2.76E-04	4.18E-03	3.02E-03	1.20E-02	1.111E+00	2.649E+02	1.204
α_4	3.27E-05	2.48E-03	1.38E-03	8.64E-03	6.510E-01	2.623E+02	1.218
α_5	1.89E-08	9.53E-04	1.72E-04	4.59E-03	2.536E-01	2.659E+02	1.204
α_6	6.34E-17	3.91E-04	1.78E-06	2.28E-03	9.572E-02	2.446E+02	1.309

CCCG = 7, Gamma = 0.518

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9768040	0.9871226	0.9879100	0.9947521	4.028E+02	5.254E+00	--
α_2	9.19E-04	4.70E-03	4.00E-03	1.09E-02	2.159E+00	4.574E+02	0.995
α_3	3.31E-04	3.50E-03	2.67E-03	9.48E-03	1.325E+00	3.776E+02	1.207
α_4	1.34E-04	2.63E-03	1.83E-03	7.89E-03	9.969E-01	3.775E+02	1.208
α_5	7.16E-06	1.41E-03	6.72E-04	5.34E-03	5.249E-01	3.705E+02	1.233
α_6	3.85E-10	5.18E-04	5.07E-05	2.68E-03	1.956E-01	3.775E+02	1.211
α_7	3.31E-28	1.16E-04	2.63E-09	6.30E-04	5.291E-02	4.553E+02	1.004

CCCG = 8, Gamma = 0.519

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787746	0.9878864	0.9885469	0.9947427	4.818E+02	5.908E+00	--
α_2	8.49E-04	4.04E-03	3.48E-03	9.17E-03	2.298E+00	5.658E+02	0.943
α_3	2.38E-04	2.75E-03	2.07E-03	7.56E-03	1.267E+00	4.604E+02	1.160
α_4	1.36E-04	2.38E-03	1.68E-03	7.03E-03	1.042E+00	4.363E+02	1.225
α_5	3.99E-05	1.70E-03	1.04E-03	5.60E-03	7.626E-01	4.480E+02	1.194
α_6	1.77E-07	7.75E-04	2.16E-04	3.44E-03	3.271E-01	4.219E+02	1.268
α_7	2.92E-13	3.01E-04	8.07E-06	1.69E-03	1.344E-01	4.462E+02	1.200
α_8	1.49E-20	1.65E-04	1.55E-07	9.59E-04	7.682E-02	4.649E+02	1.152

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.86E-01	9.85E-01	9.86E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.21E-02	1.06E-02	9.80E-03	7.55E-03	5.58E-03	4.70E-03	4.04E-03
α_3		3.88E-03	3.73E-03	4.59E-03	4.18E-03	3.50E-03	2.75E-03
α_4			1.69E-03	1.91E-03	2.48E-03	2.63E-03	2.38E-03
α_5				4.40E-04	9.53E-04	1.41E-03	1.70E-03
α_6					3.91E-04	5.18E-04	7.75E-04
α_7						1.16E-04	3.01E-04
α_8							1.65E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.86E-01	9.85E-01	9.86E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.21E-02	1.45E-02	1.52E-02	1.45E-02	1.36E-02	1.29E-02	1.21E-02
Gamma		2.68E-01	3.56E-01	4.79E-01	5.89E-01	6.35E-01	6.66E-01
Delta			3.13E-01	3.39E-01	4.78E-01	5.73E-01	6.60E-01
Epsilon				1.87E-01	3.52E-01	4.38E-01	5.52E-01
Mu					2.91E-01	3.09E-01	4.22E-01
Omega						1.83E-01	3.76E-01
Sigma							3.54E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	13.36	20.04	26.72	33.40	40.08	46.76	53.44
N_1	0.1267	0.1800	0.2280	0.2708	0.3087	0.3421	0.3714
N_2	0.0033	0.0100	0.0185	0.0290	0.0411	0.0544	0.0688
N_3		0.0000	0.0005	0.0014	0.0028	0.0047	0.0072

N₄			0.0000	0.0000	0.0001	0.0002	0.0005
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.121

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9835187	0.9957228	0.9980672	0.9999843	1.148E+02	4.932E-01	--
α_2	1.57E-05	4.28E-03	1.93E-03	1.65E-02	4.932E-01	1.148E+02	0.973

CCCG = 3, Gamma = 0.122

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9867725	0.9954835	0.9967902	0.9997324	2.335E+02	1.059E+00	--
α_2	5.64E-05	3.02E-03	1.78E-03	1.02E-02	7.137E-01	2.359E+02	1.068
α_3	5.40E-07	1.50E-03	4.54E-04	6.55E-03	3.458E-01	2.302E+02	1.096

CCCG = 4, Gamma = 0.122

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9891972	0.9953558	0.9960581	0.9991138	4.532E+02	2.115E+00	--
α_2	4.07E-04	3.29E-03	2.62E-03	8.45E-03	1.549E+00	4.699E+02	1.042
α_3	2.06E-08	6.59E-04	1.29E-04	3.13E-03	2.646E-01	4.015E+02	1.223
α_4	7.73E-08	7.00E-04	1.72E-04	3.20E-03	3.010E-01	4.298E+02	1.142

CCCG = 5, Gamma = 0.123

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9924145	0.9957867	0.9960452	0.9982760	1.258E+03	5.325E+00	--
α_2	8.87E-04	2.78E-03	2.53E-03	5.52E-03	3.632E+00	1.303E+03	1.080
α_3	1.12E-04	1.14E-03	8.78E-04	3.08E-03	1.354E+00	1.183E+03	1.192
α_4	2.44E-08	2.57E-04	6.14E-05	1.18E-03	2.961E-01	1.151E+03	1.226
α_5	9.79E-35	3.29E-05	3.62E-11	1.63E-04	4.243E-02	1.290E+03	1.094

CCCG = 6, Gamma = 0.123

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9922146	0.9957552	0.9960359	0.9983373	1.158E+03	4.936E+00	--
α_2	6.18E-04	2.32E-03	2.06E-03	4.91E-03	2.915E+00	1.252E+03	1.018
α_3	1.01E-04	1.18E-03	8.90E-04	3.28E-03	1.257E+00	1.060E+03	1.204
α_4	1.95E-06	4.80E-04	2.20E-04	1.84E-03	5.031E-01	1.048E+03	1.218
α_5	3.15E-15	1.09E-04	1.44E-06	6.24E-04	1.155E-01	1.061E+03	1.204
α_6	6.95E-13	1.49E-04	5.45E-06	8.24E-04	1.451E-01	9.757E+02	1.309

CCCG = 7, Gamma = 0.123

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9938727	0.9961219	0.9962539	0.9979204	2.480E+03	9.654E+00	--
α_2	6.82E-04	1.76E-03	1.64E-03	3.24E-03	4.851E+00	2.752E+03	0.995
α_3	3.16E-04	1.23E-03	1.09E-03	2.64E-03	2.800E+00	2.269E+03	1.207
α_4	6.23E-05	6.10E-04	4.71E-04	1.63E-03	1.384E+00	2.269E+03	1.208
α_5	7.80E-07	2.20E-04	9.85E-05	8.52E-04	4.902E-01	2.225E+03	1.233
α_6	1.20E-15	5.06E-05	6.41E-07	2.90E-04	1.146E-01	2.265E+03	1.211
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.731E+03	1.004

CCCG = 8, Gamma = 0.123

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9937288	0.9962721	0.9964432	0.9982314	1.910E+03	7.148E+00	--
α_2	3.66E-04	1.35E-03	1.20E-03	2.84E-03	2.980E+00	2.204E+03	0.943
α_3	1.89E-04	1.09E-03	9.14E-04	2.61E-03	1.960E+00	1.792E+03	1.160
α_4	5.02E-05	6.86E-04	5.03E-04	1.95E-03	1.166E+00	1.698E+03	1.225
α_5	1.75E-06	3.08E-04	1.49E-04	1.15E-03	5.375E-01	1.743E+03	1.194
α_6	2.43E-11	1.10E-04	8.54E-06	5.82E-04	1.805E-01	1.640E+03	1.268
α_7	1.23E-35	2.39E-05	1.79E-11	1.17E-04	4.139E-02	1.734E+03	1.200
α_8	9.55E-09	1.57E-04	3.45E-05	7.30E-04	2.827E-01	1.806E+03	1.152

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	4.28E-03	3.02E-03	3.29E-03	2.78E-03	2.32E-03	1.76E-03	1.35E-03
α_3		1.50E-03	6.59E-04	1.14E-03	1.18E-03	1.23E-03	1.09E-03
α_4			7.00E-04	2.57E-04	4.80E-04	6.10E-04	6.86E-04
α_5				3.29E-05	1.09E-04	2.20E-04	3.08E-04
α_6					1.49E-04	5.06E-05	1.10E-04
α_7						5.36E-06	2.39E-05
α_8							1.57E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	4.28E-03	4.52E-03	4.64E-03	4.21E-03	4.24E-03	3.88E-03	3.73E-03
Gamma		3.32E-01	2.92E-01	3.40E-01	4.53E-01	5.46E-01	6.38E-01
Delta			5.15E-01	2.02E-01	3.84E-01	4.18E-01	5.40E-01
Epsilon				1.13E-01	3.49E-01	3.12E-01	4.66E-01
Mu					5.77E-01	2.03E-01	4.85E-01
Omega						9.58E-02	6.21E-01
Sigma							8.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.20	4.80	6.40	8.00	9.60	11.20	12.80
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.3.5 CLN-MDP-FR-NR: Normally Running Clean Systems Motor-Driven Pumps Fail to Run

Generic CCF Parameters

System Group: Clean Water
System: Chemical and Volume Control, Component Cooling Water, Condensate System, Condensate Transfer System, Generic water system for relief valves, Main Feedwater, Reactor Coolant
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 59.8

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9594920	0.9874214	0.9920297	0.9996461	0.9918434	6.295E+01	8.019E-01
α_2	3.52E-04	1.26E-02	7.97E-03	4.05E-02	8.16E-03	8.019E-01	6.295E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9590316	0.9822526	0.9848609	0.9965620	0.9835526	1.178E+02	2.128E+00
α_2	2.51E-03	1.54E-02	1.28E-02	3.73E-02	1.64E-02	1.851E+00	1.181E+02
α_3	1.15E-07	2.31E-03	4.93E-04	1.08E-02	0.00E+00	2.768E-01	1.196E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9648261	0.9833031	0.9851283	0.9955562	0.9876135	1.704E+02	2.894E+00
α_2	1.53E-03	1.02E-02	8.34E-03	2.50E-02	6.19E-03	1.760E+00	1.715E+02
α_3	2.05E-04	5.21E-03	3.47E-03	1.61E-02	6.19E-03	9.024E-01	1.724E+02
α_4	9.25E-09	1.34E-03	1.99E-04	6.61E-03	0.00E+00	2.315E-01	1.731E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9717784	0.9849725	0.9860531	0.9944632	0.9900662	2.905E+02	4.432E+00
α_2	1.46E-03	7.37E-03	6.29E-03	1.70E-02	2.48E-03	2.174E+00	2.928E+02
α_3	6.52E-04	5.25E-03	4.18E-03	1.35E-02	4.97E-03	1.549E+00	2.934E+02
α_4	2.52E-05	2.14E-03	1.17E-03	7.56E-03	2.48E-03	6.322E-01	2.943E+02
α_5	2.26E-20	2.60E-04	2.42E-07	1.51E-03	0.00E+00	7.674E-02	2.949E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
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α_1	0.9745841	0.9861723	0.9870917	0.9946257	0.9917081	3.448E+02	4.835E+00
α_2	8.27E-04	5.22E-03	4.31E-03	1.27E-02	1.04E-03	1.826E+00	3.478E+02
α_3	5.80E-04	4.52E-03	3.62E-03	1.16E-02	3.11E-03	1.582E+00	3.481E+02
α_4	1.33E-04	2.78E-03	1.91E-03	8.39E-03	3.11E-03	9.710E-01	3.487E+02
α_5	3.58E-07	9.90E-04	3.00E-04	4.32E-03	1.04E-03	3.461E-01	3.493E+02
α_6	2.47E-15	3.14E-04	3.18E-06	1.81E-03	0.00E+00	1.098E-01	3.495E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9778680	0.9869762	0.9876010	0.9939619	0.9928842	5.113E+02	6.747E+00
α_2	9.38E-04	4.45E-03	3.83E-03	1.01E-02	4.45E-04	2.306E+00	5.158E+02
α_3	5.96E-04	3.63E-03	3.01E-03	8.76E-03	1.78E-03	1.880E+00	5.162E+02
α_4	3.15E-04	2.81E-03	2.21E-03	7.39E-03	2.67E-03	1.458E+00	5.166E+02
α_5	4.58E-05	1.57E-03	9.97E-04	5.07E-03	1.78E-03	8.154E-01	5.173E+02
α_6	9.91E-09	4.90E-04	8.86E-05	2.36E-03	4.45E-04	2.541E-01	5.178E+02
α_7	4.60E-41	6.72E-05	2.50E-12	2.95E-04	0.00E+00	3.480E-02	5.180E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9794268	0.9879083	0.9884905	0.9944045	0.9937682	5.495E+02	6.726E+00
α_2	6.76E-04	3.68E-03	3.11E-03	8.66E-03	1.95E-04	2.049E+00	5.542E+02
α_3	3.44E-04	2.78E-03	2.21E-03	7.16E-03	9.74E-04	1.547E+00	5.547E+02
α_4	2.50E-04	2.47E-03	1.91E-03	6.62E-03	1.95E-03	1.375E+00	5.548E+02
α_5	9.73E-05	1.83E-03	1.27E-03	5.43E-03	1.95E-03	1.015E+00	5.552E+02
α_6	3.81E-06	9.10E-04	4.19E-04	3.48E-03	9.74E-04	5.060E-01	5.557E+02
α_7	4.98E-13	2.50E-04	7.74E-06	1.40E-03	1.95E-04	1.391E-01	5.561E+02
α_8	1.98E-17	1.70E-04	7.21E-07	9.91E-04	0.00E+00	9.469E-02	5.561E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.26E-02	1.54E-02	1.02E-02	7.37E-03	5.22E-03	4.45E-03	3.68E-03
α_3		2.31E-03	5.21E-03	5.25E-03	4.52E-03	3.63E-03	2.78E-03
α_4			1.34E-03	2.14E-03	2.78E-03	2.81E-03	2.47E-03
α_5				2.60E-04	9.90E-04	1.57E-03	1.83E-03
α_6					3.14E-04	4.90E-04	9.10E-04
α_7						6.72E-05	2.50E-04
α_8							1.70E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.26E-02	1.77E-02	1.67E-02	1.50E-02	1.38E-02	1.30E-02	1.21E-02
Gamma		1.30E-01	3.92E-01	5.09E-01	6.22E-01	6.58E-01	6.95E-01
Delta			2.04E-01	3.14E-01	4.74E-01	5.77E-01	6.69E-01
Epsilon				1.08E-01	3.19E-01	4.31E-01	5.61E-01
Mu					2.41E-01	2.62E-01	4.22E-01

Omega						1.20E-01	3.16E-01
Sigma							4.05E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	39.87	59.80	79.73	99.67	119.60	139.53	159.47
N₁	0.6667	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.3333	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313
N₃		0.0000	0.5000	0.5000	0.3750	0.2500	0.1563
N₄			0.0000	0.2500	0.3750	0.3750	0.3125
N₅				0.0000	0.1250	0.2500	0.3125
N₆					0.0000	0.0625	0.1563
N₇						0.0000	0.0313
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 21.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.344

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9745379	0.9934328	0.9970770	0.9999782	7.312E+01	4.834E-01	--
α_2	2.18E-05	6.57E-03	2.92E-03	2.55E-02	4.834E-01	7.312E+01	0.793

CCCG = 3, Gamma = 0.347

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9776303	0.9919508	0.9939778	0.9993431	1.510E+02	1.226E+00	--
α_2	3.40E-04	6.98E-03	4.82E-03	2.10E-02	9.769E-01	1.389E+02	1.087
α_3	1.70E-08	1.07E-03	1.85E-04	5.17E-03	2.487E-01	2.332E+02	0.651

CCCG = 4, Gamma = 0.348

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9793341	0.9911760	0.9925362	0.9983671	2.311E+02	2.057E+00	--
α_2	6.48E-04	5.87E-03	4.60E-03	1.55E-02	1.442E+00	2.441E+02	0.864
α_3	2.83E-06	2.25E-03	8.47E-04	9.27E-03	4.114E-01	1.820E+02	1.162
α_4	9.13E-10	6.96E-04	7.58E-05	3.57E-03	2.036E-01	2.923E+02	0.725

CCCG = 5, Gamma = 0.349

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825326	0.9911582	0.9919314	0.9971422	4.129E+02	3.683E+00	--
α_2	1.01E-03	4.95E-03	4.25E-03	1.13E-02	2.243E+00	4.506E+02	0.860
α_3	1.34E-04	2.66E-03	1.84E-03	7.97E-03	9.912E-01	3.721E+02	1.044
α_4	7.38E-07	1.08E-03	3.66E-04	4.59E-03	3.765E-01	3.475E+02	1.119
α_5	1.30E-21	1.50E-04	8.54E-08	8.66E-04	7.237E-02	4.829E+02	0.806

CCCG = 6, Gamma = 0.350

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9838153	0.9915507	0.9922100	0.9970341	4.857E+02	4.139E+00	--
α_2	7.41E-04	3.86E-03	3.28E-03	8.96E-03	2.128E+00	5.494E+02	0.810
α_3	1.69E-04	2.46E-03	1.79E-03	7.03E-03	1.134E+00	4.607E+02	0.967
α_4	8.96E-06	1.37E-03	6.80E-04	5.08E-03	5.533E-01	4.031E+02	1.107
α_5	2.07E-09	5.31E-04	7.08E-05	2.66E-03	2.210E-01	4.161E+02	1.073
α_6	2.98E-16	2.34E-04	1.63E-06	1.36E-03	1.027E-01	4.383E+02	1.019

CCCG = 7, Gamma = 0.350

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9859553	0.9918357	0.9922482	0.9963080	7.814E+02	6.432E+00	--
α_2	8.42E-04	3.24E-03	2.87E-03	6.90E-03	2.840E+00	8.742E+02	0.840
α_3	3.35E-04	2.26E-03	1.85E-03	5.59E-03	1.746E+00	7.709E+02	0.954
α_4	9.65E-05	1.55E-03	1.11E-03	4.50E-03	1.084E+00	6.991E+02	1.052
α_5	4.58E-06	8.05E-04	3.90E-04	3.01E-03	5.376E-01	6.673E+02	1.103
α_6	2.46E-10	2.80E-04	2.83E-05	1.45E-03	1.979E-01	7.056E+02	1.044
α_7	7.31E-53	3.27E-05	3.27E-15	1.12E-04	2.656E-02	8.132E+02	0.906

CCCG = 8, Gamma = 0.351

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9868813	0.9924640	0.9928649	0.9966779	8.050E+02	6.112E+00	--
α_2	5.56E-04	2.57E-03	2.22E-03	5.79E-03	2.364E+00	9.168E+02	0.809
α_3	2.18E-04	1.84E-03	1.45E-03	4.77E-03	1.512E+00	8.220E+02	0.903
α_4	8.39E-05	1.43E-03	1.01E-03	4.20E-03	1.056E+00	7.369E+02	1.007
α_5	1.47E-05	9.73E-04	5.54E-04	3.35E-03	6.745E-01	6.928E+02	1.072
α_6	6.05E-08	4.50E-04	1.14E-04	2.04E-03	3.076E-01	6.833E+02	1.088
α_7	1.04E-15	1.48E-04	1.46E-06	8.54E-04	1.093E-01	7.380E+02	1.007
α_8	1.95E-18	1.26E-04	3.51E-07	7.36E-04	8.885E-02	7.033E+02	1.057

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.92E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01	9.92E-01
α_2	6.57E-03	6.98E-03	5.87E-03	4.95E-03	3.86E-03	3.24E-03	2.57E-03
α_3		1.07E-03	2.25E-03	2.66E-03	2.46E-03	2.26E-03	1.84E-03
α_4			6.96E-04	1.08E-03	1.37E-03	1.55E-03	1.43E-03
α_5				1.50E-04	5.31E-04	8.05E-04	9.73E-04
α_6					2.34E-04	2.80E-04	4.50E-04
α_7						3.27E-05	1.48E-04
α_8							1.26E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.92E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01	9.92E-01
Beta	6.57E-03	8.05E-03	8.82E-03	8.84E-03	8.45E-03	8.16E-03	7.54E-03
Gamma		1.32E-01	3.34E-01	4.40E-01	5.43E-01	6.03E-01	6.59E-01
Delta			2.36E-01	3.17E-01	4.65E-01	5.41E-01	6.30E-01
Epsilon				1.22E-01	3.58E-01	4.19E-01	5.43E-01
Mu					3.06E-01	2.80E-01	4.27E-01
Omega						1.04E-01	3.79E-01
Sigma							4.60E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	14.07	21.10	28.13	35.17	42.20	49.23	56.27
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 8.2

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.158

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9028518	0.9698090	0.9808086	0.9992010	2.516E+01	7.831E-01	--
α_2	7.99E-04	3.02E-02	1.92E-02	9.71E-02	7.831E-01	2.516E+01	0.793

CCCG = 3, Gamma = 0.151

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8862732	0.9496517	0.9564466	0.9897539	4.109E+01	2.178E+00	--
α_2	8.27E-03	4.69E-02	3.97E-02	1.10E-01	1.939E+00	3.942E+01	1.087
α_3	3.64E-08	3.47E-03	5.60E-04	1.70E-02	2.396E-01	6.878E+01	0.651

CCCG = 4, Gamma = 0.148

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9109598	0.9572738	0.9617004	0.9884398	6.494E+01	2.898E+00	--
α_2	3.74E-03	2.40E-02	1.99E-02	5.85E-02	1.785E+00	7.245E+01	0.864
α_3	6.25E-04	1.62E-02	1.08E-02	5.01E-02	8.927E-01	5.427E+01	1.162
α_4	9.60E-09	2.50E-03	3.34E-04	1.25E-02	2.207E-01	8.820E+01	0.725

CCCG = 5, Gamma = 0.146

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9351642	0.9650956	0.9674738	0.9868985	1.246E+02	4.506E+00	--
α_2	3.20E-03	1.56E-02	1.34E-02	3.54E-02	2.242E+00	1.417E+02	0.860
α_3	1.71E-03	1.33E-02	1.07E-02	3.39E-02	1.578E+00	1.170E+02	1.044
α_4	5.77E-05	5.55E-03	2.98E-03	1.97E-02	6.132E-01	1.100E+02	1.119
α_5	4.36E-21	4.72E-04	2.73E-07	2.73E-03	7.248E-02	1.534E+02	0.806

CCCG = 6, Gamma = 0.144

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9429664	0.9682293	0.9701200	0.9870321	1.584E+02	5.199E+00	--
α_2	2.03E-03	1.09E-02	9.22E-03	2.54E-02	2.066E+00	1.877E+02	0.810
α_3	1.55E-03	1.07E-02	8.77E-03	2.67E-02	1.707E+00	1.572E+02	0.967
α_4	3.63E-04	7.15E-03	4.97E-03	2.14E-02	9.931E-01	1.379E+02	1.107
α_5	1.13E-06	2.49E-03	7.85E-04	1.07E-02	3.563E-01	1.429E+02	1.073
α_6	4.65E-20	5.09E-04	4.80E-07	2.96E-03	7.684E-02	1.508E+02	1.019

CCCG = 7, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9512562	0.9707548	0.9720175	0.9859411	2.397E+02	7.223E+00	--
α_2	2.43E-03	9.71E-03	8.57E-03	2.09E-02	2.717E+00	2.771E+02	0.840
α_3	1.28E-03	7.69E-03	6.40E-03	1.85E-02	1.895E+00	2.446E+02	0.954
α_4	7.78E-04	6.67E-03	5.27E-03	1.74E-02	1.490E+00	2.219E+02	1.052
α_5	1.34E-04	4.01E-03	2.60E-03	1.27E-02	8.534E-01	2.122E+02	1.103
α_6	1.16E-08	1.07E-03	1.73E-04	5.23E-03	2.405E-01	2.250E+02	1.044
α_7	5.74E-51	1.05E-04	2.16E-14	3.72E-04	2.734E-02	2.594E+02	0.906

CCCG = 8, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9541624	0.9724928	0.9736809	0.9867657	2.562E+02	7.246E+00	--
α_2	1.95E-03	8.36E-03	7.31E-03	1.84E-02	2.535E+00	3.008E+02	0.809
α_3	7.39E-04	5.80E-03	4.64E-03	1.48E-02	1.575E+00	2.701E+02	0.903
α_4	5.32E-04	5.50E-03	4.22E-03	1.48E-02	1.340E+00	2.422E+02	1.007
α_5	2.63E-04	4.57E-03	3.23E-03	1.35E-02	1.046E+00	2.278E+02	1.072
α_6	1.61E-05	2.46E-03	1.22E-03	9.08E-03	5.538E-01	2.250E+02	1.088
α_7	2.43E-15	4.45E-04	4.18E-06	2.57E-03	1.083E-01	2.434E+02	1.007
α_8	3.50E-18	3.77E-04	9.42E-07	2.20E-03	8.749E-02	2.320E+02	1.057

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.70E-01	9.50E-01	9.57E-01	9.65E-01	9.68E-01	9.71E-01	9.72E-01
α_2	3.02E-02	4.69E-02	2.40E-02	1.56E-02	1.09E-02	9.71E-03	8.36E-03
α_3		3.47E-03	1.62E-02	1.33E-02	1.07E-02	7.69E-03	5.80E-03
α_4			2.50E-03	5.55E-03	7.15E-03	6.67E-03	5.50E-03
α_5				4.72E-04	2.49E-03	4.01E-03	4.57E-03
α_6					5.09E-04	1.07E-03	2.46E-03
α_7						1.05E-04	4.45E-04
α_8							3.77E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.70E-01	9.50E-01	9.57E-01	9.65E-01	9.68E-01	9.71E-01	9.72E-01
Beta	3.02E-02	5.03E-02	4.27E-02	3.49E-02	3.18E-02	2.92E-02	2.75E-02
Gamma		6.90E-02	4.37E-01	5.54E-01	6.57E-01	6.68E-01	6.96E-01
Delta			1.34E-01	3.11E-01	4.86E-01	6.07E-01	6.97E-01
Epsilon				7.85E-02	2.95E-01	4.37E-01	5.88E-01
Mu					1.70E-01	2.27E-01	4.17E-01
Omega						8.98E-02	2.51E-01
Sigma							4.59E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.47	8.20	10.93	13.67	16.40	19.13	21.87
N_1	0.6667	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.3333	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313
N_3		0.0000	0.5000	0.5000	0.3750	0.2500	0.1563

N₄			0.0000	0.2500	0.3750	0.3750	0.3125
N₅				0.0000	0.1250	0.2500	0.3125
N₆					0.0000	0.0625	0.1563
N₇						0.0000	0.0313
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8309284	0.9593869	0.9851553	0.9999681	8.979E+00	3.801E-01	--
α_2	3.19E-05	4.06E-02	1.48E-02	1.69E-01	3.801E-01	8.979E+00	0.793

CCCG = 3, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8368194	0.9446942	0.9608274	0.9972943	1.640E+01	9.600E-01	--
α_2	6.72E-04	4.38E-02	2.58E-02	1.48E-01	6.673E-01	1.457E+01	1.087
α_3	1.01E-06	1.15E-02	2.76E-03	5.30E-02	2.927E-01	2.513E+01	0.651

CCCG = 4, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8603114	0.9429044	0.9527507	0.9917361	2.756E+01	1.669E+00	--
α_2	1.96E-03	3.36E-02	2.42E-02	9.76E-02	1.039E+00	2.987E+01	0.864
α_3	1.49E-05	1.69E-02	6.10E-03	7.06E-02	3.887E-01	2.258E+01	1.162
α_4	7.56E-08	6.56E-03	1.08E-03	3.21E-02	2.414E-01	3.658E+01	0.725

CCCG = 5, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8959184	0.9472358	0.9517005	0.9832771	6.260E+01	3.487E+00	--
α_2	3.81E-03	2.44E-02	2.02E-02	5.93E-02	1.791E+00	7.160E+01	0.860
α_3	1.60E-03	2.00E-02	1.50E-02	5.54E-02	1.207E+00	5.925E+01	1.044
α_4	1.37E-05	7.70E-03	3.09E-03	3.10E-02	4.340E-01	5.595E+01	1.119
α_5	1.56E-26	7.02E-04	2.50E-08	3.87E-03	5.493E-02	7.822E+01	0.806

CCCG = 6, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9097509	0.9529607	0.9565626	0.9838521	7.910E+01	3.905E+00	--
α_2	1.33E-03	1.38E-02	1.06E-02	3.70E-02	1.335E+00	9.570E+01	0.810
α_3	2.32E-03	1.88E-02	1.51E-02	4.83E-02	1.531E+00	7.972E+01	0.967
α_4	1.96E-04	1.01E-02	6.04E-03	3.40E-02	7.191E-01	7.029E+01	1.107
α_5	4.94E-08	3.37E-03	5.77E-04	1.64E-02	2.467E-01	7.300E+01	1.073
α_6	1.04E-20	9.44E-04	5.68E-07	5.47E-03	7.279E-02	7.705E+01	1.019

CCCG = 7, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9240638	0.9564885	0.9587680	0.9811238	1.268E+02	5.770E+00	--
α_2	1.26E-03	1.02E-02	8.11E-03	2.60E-02	1.549E+00	1.510E+02	0.840
α_3	2.64E-03	1.48E-02	1.25E-02	3.49E-02	1.989E+00	1.324E+02	0.954
α_4	9.51E-04	1.06E-02	8.03E-03	2.88E-02	1.287E+00	1.205E+02	1.052
α_5	9.95E-05	5.95E-03	3.46E-03	2.03E-02	6.913E-01	1.155E+02	1.103
α_6	1.40E-08	1.90E-03	2.86E-04	9.37E-03	2.327E-01	1.226E+02	1.044
α_7	1.01E-64	1.49E-04	2.26E-17	3.76E-04	2.112E-02	1.414E+02	0.906

CCCG = 8, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9344979	0.9608377	0.9625427	0.9813536	1.721E+02	7.016E+00	--
α_2	9.69E-04	7.53E-03	6.04E-03	1.92E-02	1.583E+00	2.086E+02	0.809
α_3	1.87E-03	1.05E-02	8.87E-03	2.50E-02	1.986E+00	1.863E+02	0.903
α_4	1.39E-03	9.91E-03	8.05E-03	2.48E-02	1.672E+00	1.671E+02	1.007
α_5	3.38E-04	6.38E-03	4.46E-03	1.90E-02	1.011E+00	1.576E+02	1.072
α_6	2.77E-05	3.65E-03	1.86E-03	1.34E-02	5.709E-01	1.557E+02	1.088
α_7	2.46E-10	1.07E-03	8.40E-05	5.67E-03	1.809E-01	1.686E+02	1.007
α_8	1.12E-107	7.74E-05	2.34E-27	5.80E-05	1.245E-02	1.608E+02	1.057

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.59E-01	9.45E-01	9.43E-01	9.47E-01	9.53E-01	9.56E-01	9.61E-01
α_2	4.06E-02	4.38E-02	3.36E-02	2.44E-02	1.38E-02	1.02E-02	7.53E-03
α_3		1.15E-02	1.69E-02	2.00E-02	1.88E-02	1.48E-02	1.05E-02
α_4			6.56E-03	7.70E-03	1.01E-02	1.06E-02	9.91E-03
α_5				7.02E-04	3.37E-03	5.95E-03	6.38E-03
α_6					9.44E-04	1.90E-03	3.65E-03
α_7						1.49E-04	1.07E-03
α_8							7.74E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.59E-01	9.45E-01	9.43E-01	9.47E-01	9.53E-01	9.56E-01	9.61E-01
Beta	4.06E-02	5.53E-02	5.71E-02	5.28E-02	4.70E-02	4.35E-02	3.92E-02
Gamma		2.08E-01	4.11E-01	5.38E-01	7.08E-01	7.67E-01	8.08E-01
Delta			2.79E-01	2.96E-01	4.34E-01	5.56E-01	6.67E-01
Epsilon				8.35E-02	2.99E-01	4.31E-01	5.30E-01
Mu					2.19E-01	2.56E-01	4.30E-01
Omega						7.30E-02	2.39E-01
Sigma							6.74E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	3.00	4.00	5.00	6.00	7.00	8.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 18.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.302

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9604519	0.9898817	0.9955862	0.9999710	4.604E+01	4.706E-01	--
α_2	2.90E-05	1.01E-02	4.41E-03	3.95E-02	4.706E-01	4.604E+01	0.793

CCCG = 3, Gamma = 0.304

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9619147	0.9867553	0.9904015	0.9991332	8.214E+01	1.103E+00	--
α_2	3.14E-04	1.09E-02	6.93E-03	3.50E-02	8.104E-01	7.359E+01	1.087
α_3	1.97E-07	2.35E-03	5.51E-04	1.09E-02	2.921E-01	1.239E+02	0.651

CCCG = 4, Gamma = 0.306

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9695091	0.9871699	0.9892345	0.9977696	1.502E+02	1.953E+00	--
α_2	7.59E-04	8.14E-03	6.22E-03	2.21E-02	1.312E+00	1.599E+02	0.864
α_3	6.05E-06	3.60E-03	1.42E-03	1.45E-02	4.307E-01	1.193E+02	1.162
α_4	2.17E-09	1.09E-03	1.29E-04	5.56E-03	2.099E-01	1.918E+02	0.725

CCCG = 5, Gamma = 0.306

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9748986	0.9878629	0.9891091	0.9965681	2.529E+02	3.107E+00	--
α_2	8.44E-04	5.98E-03	4.86E-03	1.50E-02	1.684E+00	2.799E+02	0.860
α_3	1.80E-04	4.06E-03	2.76E-03	1.24E-02	9.426E-01	2.310E+02	1.044
α_4	1.33E-06	1.76E-03	6.07E-04	7.45E-03	3.816E-01	2.159E+02	1.119
α_5	1.31E-16	3.28E-04	1.80E-06	1.91E-03	9.865E-02	3.002E+02	0.806

CCCG = 6, Gamma = 0.307

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9781132	0.9888009	0.9897410	0.9962767	3.375E+02	3.822E+00	--
α_2	6.34E-04	4.38E-03	3.57E-03	1.09E-02	1.714E+00	3.897E+02	0.810
α_3	2.22E-04	3.38E-03	2.44E-03	9.75E-03	1.108E+00	3.266E+02	0.967
α_4	3.00E-05	2.27E-03	1.27E-03	7.93E-03	6.509E-01	2.858E+02	1.107
α_5	1.70E-08	8.58E-04	1.55E-04	4.14E-03	2.536E-01	2.952E+02	1.073
α_6	4.99E-17	3.08E-04	1.40E-06	1.79E-03	9.572E-02	3.110E+02	1.019

CCCG = 7, Gamma = 0.307

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9804369	0.9891763	0.9898482	0.9956209	4.748E+02	5.195E+00	--
α_2	7.40E-04	3.90E-03	3.31E-03	9.09E-03	2.105E+00	5.376E+02	0.840
α_3	2.61E-04	2.78E-03	2.12E-03	7.54E-03	1.320E+00	4.741E+02	0.954
α_4	1.18E-04	2.31E-03	1.60E-03	6.93E-03	9.967E-01	4.298E+02	1.052
α_5	6.46E-06	1.28E-03	6.07E-04	4.82E-03	5.249E-01	4.104E+02	1.103
α_6	3.35E-10	4.50E-04	4.41E-05	2.33E-03	1.956E-01	4.341E+02	1.044
α_7	3.02E-28	1.06E-04	2.40E-09	5.74E-04	5.291E-02	5.004E+02	0.906

CCCG = 8, Gamma = 0.307

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9821837	0.9898689	0.9904307	0.9956359	5.698E+02	5.832E+00	--
α_2	6.88E-04	3.39E-03	2.91E-03	7.77E-03	2.229E+00	6.543E+02	0.809
α_3	1.84E-04	2.14E-03	1.61E-03	5.91E-03	1.260E+00	5.869E+02	0.903
α_4	1.12E-04	1.98E-03	1.39E-03	5.83E-03	1.042E+00	5.261E+02	1.007
α_5	3.61E-05	1.54E-03	9.42E-04	5.08E-03	7.626E-01	4.946E+02	1.072
α_6	1.53E-07	6.70E-04	1.87E-04	2.98E-03	3.271E-01	4.880E+02	1.088
α_7	2.47E-13	2.55E-04	6.83E-06	1.43E-03	1.344E-01	5.271E+02	1.007
α_8	1.38E-20	1.53E-04	1.43E-07	8.88E-04	7.682E-02	5.023E+02	1.057

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01
α_2	1.01E-02	1.09E-02	8.14E-03	5.98E-03	4.38E-03	3.90E-03	3.39E-03
α_3		2.35E-03	3.60E-03	4.06E-03	3.38E-03	2.78E-03	2.14E-03
α_4			1.09E-03	1.76E-03	2.27E-03	2.31E-03	1.98E-03
α_5				3.28E-04	8.58E-04	1.28E-03	1.54E-03
α_6					3.08E-04	4.50E-04	6.70E-04
α_7						1.06E-04	2.55E-04
α_8							1.53E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01
Beta	1.01E-02	1.32E-02	1.28E-02	1.21E-02	1.12E-02	1.08E-02	1.01E-02
Gamma		1.78E-01	3.66E-01	5.07E-01	6.09E-01	6.40E-01	6.65E-01
Delta			2.33E-01	3.40E-01	5.04E-01	5.99E-01	6.82E-01
Epsilon				1.57E-01	3.39E-01	4.42E-01	5.70E-01
Mu					2.64E-01	3.03E-01	4.12E-01
Omega						1.90E-01	3.78E-01
Sigma							3.75E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	12.33	18.50	24.67	30.83	37.00	43.17	49.33
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 9.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.147

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9868854	0.9965978	0.9984643	0.9999875	1.445E+02	4.932E-01	--
α_2	1.25E-05	3.40E-03	1.54E-03	1.31E-02	4.932E-01	1.445E+02	0.793

CCCG = 3, Gamma = 0.148

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9885889	0.9961049	0.9972329	0.9997694	2.710E+02	1.059E+00	--
α_2	5.65E-05	3.02E-03	1.78E-03	1.02E-02	7.137E-01	2.357E+02	1.087
α_3	3.15E-07	8.76E-04	2.65E-04	3.83E-03	3.458E-01	3.942E+02	0.651

CCCG = 4, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9912699	0.9962483	0.9968165	0.9992845	5.615E+02	2.115E+00	--
α_2	3.34E-04	2.69E-03	2.14E-03	6.93E-03	1.549E+00	5.736E+02	0.864
α_3	1.93E-08	6.19E-04	1.21E-04	2.95E-03	2.646E-01	4.271E+02	1.162
α_4	4.85E-08	4.39E-04	1.08E-04	2.01E-03	3.010E-01	6.848E+02	0.725

CCCG = 5, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9937755	0.9965435	0.9967559	0.9985861	1.535E+03	5.325E+00	--
α_2	7.02E-04	2.20E-03	2.00E-03	4.38E-03	3.632E+00	1.646E+03	0.860
α_3	9.79E-05	9.97E-04	7.65E-04	2.69E-03	1.354E+00	1.357E+03	1.044
α_4	2.22E-08	2.34E-04	5.58E-05	1.07E-03	2.961E-01	1.267E+03	1.119
α_5	7.18E-35	2.41E-05	2.66E-11	1.20E-04	4.243E-02	1.759E+03	0.806

CCCG = 6, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9937163	0.9965749	0.9968017	0.9986588	1.436E+03	4.936E+00	--
α_2	4.88E-04	1.84E-03	1.63E-03	3.88E-03	2.915E+00	1.585E+03	0.810
α_3	8.06E-05	9.45E-04	7.10E-04	2.61E-03	1.257E+00	1.329E+03	0.967
α_4	1.76E-06	4.33E-04	1.98E-04	1.66E-03	5.031E-01	1.162E+03	1.107
α_5	2.79E-15	9.63E-05	1.27E-06	5.52E-04	1.155E-01	1.199E+03	1.073
α_6	5.38E-13	1.15E-04	4.21E-06	6.37E-04	1.451E-01	1.262E+03	1.019

CCCG = 7, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9949050	0.9967757	0.9968857	0.9982713	2.985E+03	9.654E+00	--
α_2	5.73E-04	1.48E-03	1.38E-03	2.73E-03	4.851E+00	3.272E+03	0.840
α_3	2.48E-04	9.70E-04	8.57E-04	2.08E-03	2.800E+00	2.884E+03	0.954
α_4	5.41E-05	5.29E-04	4.09E-04	1.42E-03	1.384E+00	2.614E+03	1.052
α_5	6.95E-07	1.96E-04	8.78E-05	7.60E-04	4.902E-01	2.495E+03	1.103
α_6	1.03E-15	4.35E-05	5.51E-07	2.49E-04	1.146E-01	2.637E+03	1.044
α_7	2.53E-93	4.82E-06	5.13E-25	5.72E-06	1.464E-02	3.038E+03	0.906

CCCG = 8, Gamma = 0.150

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9947985	0.9969085	0.9970506	0.9985337	2.305E+03	7.148E+00	--
α_2	3.12E-04	1.15E-03	1.03E-03	2.42E-03	2.980E+00	2.584E+03	0.809
α_3	1.47E-04	8.46E-04	7.07E-04	2.02E-03	1.960E+00	2.315E+03	0.903
α_4	4.11E-05	5.61E-04	4.12E-04	1.59E-03	1.166E+00	2.075E+03	1.007
α_5	1.56E-06	2.75E-04	1.33E-04	1.03E-03	5.375E-01	1.951E+03	1.072
α_6	2.07E-11	9.38E-05	7.28E-06	4.96E-04	1.805E-01	1.923E+03	1.088
α_7	1.03E-35	1.99E-05	1.49E-11	9.75E-05	4.139E-02	2.077E+03	1.007
α_8	8.71E-09	1.43E-04	3.15E-05	6.66E-04	2.827E-01	1.979E+03	1.057

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	3.40E-03	3.02E-03	2.69E-03	2.20E-03	1.84E-03	1.48E-03	1.15E-03
α_3		8.76E-04	6.19E-04	9.97E-04	9.45E-04	9.70E-04	8.46E-04
α_4			4.39E-04	2.34E-04	4.33E-04	5.29E-04	5.61E-04
α_5				2.41E-05	9.63E-05	1.96E-04	2.75E-04
α_6					1.15E-04	4.35E-05	9.38E-05
α_7						4.82E-06	1.99E-05
α_8							1.43E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	3.40E-03	3.90E-03	3.75E-03	3.46E-03	3.43E-03	3.22E-03	3.09E-03
Gamma		2.25E-01	2.82E-01	3.63E-01	4.64E-01	5.41E-01	6.27E-01
Delta			4.15E-01	2.06E-01	4.05E-01	4.44E-01	5.64E-01
Epsilon				9.36E-02	3.28E-01	3.16E-01	4.87E-01
Mu					5.44E-01	1.97E-01	4.82E-01
Omega						9.98E-02	6.34E-01
Sigma							8.78E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.00	9.00	12.00	15.00	18.00	21.00	24.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.3.6 CLN-MDP-FS-NR: Normally Running Clean Systems Motor-Driven Pumps Fail to Start

Generic CCF Parameters

System Group: Clean Water
System: Chemical and Volume Control, Component Cooling Water, Condensate System, Condensate Transfer System, Generic water system for relief valves, Main Feedwater, Reactor Coolant
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Start
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 53.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9757865	0.9938255	0.9973353	0.9999811	1.0000000	7.541E+01	4.685E-01
α_2	1.72E-05	6.17E-03	2.67E-03	2.42E-02	0.00E+00	4.685E-01	7.541E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9712525	0.9899378	0.9926611	0.9993063	1.0000000	1.110E+02	1.128E+00
α_2	2.53E-04	7.59E-03	4.94E-03	2.40E-02	0.00E+00	8.512E-01	1.113E+02
α_3	1.23E-07	2.47E-03	5.27E-04	1.16E-02	0.00E+00	2.768E-01	1.118E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9687875	0.9869917	0.9891444	0.9978285	1.0000000	1.437E+02	1.894E+00
α_2	7.46E-04	8.65E-03	6.53E-03	2.38E-02	0.00E+00	1.260E+00	1.443E+02
α_3	3.00E-06	2.76E-03	1.01E-03	1.15E-02	0.00E+00	4.024E-01	1.452E+02
α_4	1.10E-08	1.59E-03	2.37E-04	7.87E-03	0.00E+00	2.315E-01	1.453E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9721001	0.9861198	0.9874109	0.9957402	1.0000000	2.438E+02	3.432E+00
α_2	1.32E-03	7.78E-03	6.50E-03	1.86E-02	0.00E+00	1.924E+00	2.453E+02
α_3	2.45E-04	4.24E-03	3.00E-03	1.25E-02	0.00E+00	1.049E+00	2.462E+02
α_4	1.17E-06	1.55E-03	5.33E-04	6.52E-03	0.00E+00	3.822E-01	2.469E+02
α_5	2.69E-20	3.10E-04	2.89E-07	1.80E-03	0.00E+00	7.674E-02	2.472E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
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α_1	0.9734772	0.9864036	0.9875387	0.9954610	1.0000000	2.782E+02	3.835E+00
α_2	8.64E-04	6.03E-03	4.91E-03	1.50E-02	0.00E+00	1.701E+00	2.804E+02
α_3	3.37E-04	4.28E-03	3.18E-03	1.20E-02	0.00E+00	1.207E+00	2.808E+02
α_4	1.94E-05	2.11E-03	1.11E-03	7.61E-03	0.00E+00	5.960E-01	2.815E+02
α_5	3.07E-09	7.84E-04	1.05E-04	3.93E-03	0.00E+00	2.211E-01	2.818E+02
α_6	3.06E-15	3.89E-04	3.94E-06	2.24E-03	0.00E+00	1.098E-01	2.819E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9764700	0.9866510	0.9874005	0.9942902	1.0000000	4.248E+02	5.747E+00
α_2	1.07E-03	5.21E-03	4.47E-03	1.19E-02	0.00E+00	2.243E+00	4.283E+02
α_3	5.08E-04	3.78E-03	3.05E-03	9.57E-03	0.00E+00	1.630E+00	4.289E+02
α_4	1.56E-04	2.52E-03	1.80E-03	7.32E-03	0.00E+00	1.083E+00	4.295E+02
α_5	9.49E-06	1.31E-03	6.62E-04	4.82E-03	0.00E+00	5.654E-01	4.300E+02
α_6	2.44E-10	4.45E-04	4.11E-05	2.32E-03	0.00E+00	1.916E-01	4.304E+02
α_7	5.54E-41	8.08E-05	3.01E-12	3.54E-04	0.00E+00	3.480E-02	4.305E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9774856	0.9872410	0.9879605	0.9945491	1.0000000	4.430E+02	5.726E+00
α_2	8.11E-04	4.50E-03	3.79E-03	1.06E-02	0.00E+00	2.018E+00	4.467E+02
α_3	3.20E-04	3.10E-03	2.40E-03	8.27E-03	0.00E+00	1.391E+00	4.474E+02
α_4	1.41E-04	2.37E-03	1.68E-03	6.93E-03	0.00E+00	1.062E+00	4.477E+02
α_5	2.76E-05	1.57E-03	9.15E-04	5.32E-03	0.00E+00	7.026E-01	4.480E+02
α_6	3.06E-07	7.79E-04	2.39E-04	3.39E-03	0.00E+00	3.497E-01	4.484E+02
α_7	1.18E-15	2.40E-04	2.21E-06	1.39E-03	0.00E+00	1.078E-01	4.486E+02
α_8	2.46E-17	2.11E-04	8.94E-07	1.23E-03	0.00E+00	9.469E-02	4.487E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.90E-01	9.87E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01
α_2	6.17E-03	7.59E-03	8.65E-03	7.78E-03	6.03E-03	5.21E-03	4.50E-03
α_3		2.47E-03	2.76E-03	4.24E-03	4.28E-03	3.78E-03	3.10E-03
α_4			1.59E-03	1.55E-03	2.11E-03	2.52E-03	2.37E-03
α_5				3.10E-04	7.84E-04	1.31E-03	1.57E-03
α_6					3.89E-04	4.45E-04	7.79E-04
α_7						8.08E-05	2.40E-04
α_8							2.11E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.90E-01	9.87E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01
Beta	6.17E-03	1.01E-02	1.30E-02	1.39E-02	1.36E-02	1.33E-02	1.28E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01

Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	53.00	53.00	53.00	53.00	53.00	53.00	53.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 25.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.472

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9832163	0.9956753	0.9980808	0.9999857	1.113E+02	4.834E-01	--
α_2	1.43E-05	4.32E-03	1.92E-03	1.68E-02	4.834E-01	1.113E+02	0.620

CCCG = 3, Gamma = 0.472

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9814893	0.9933439	0.9950239	0.9994574	1.829E+02	1.226E+00	--
α_2	2.53E-04	5.21E-03	3.59E-03	1.57E-02	9.769E-01	1.867E+02	0.831
α_3	2.32E-08	1.45E-03	2.52E-04	7.03E-03	2.487E-01	1.712E+02	0.909

CCCG = 4, Gamma = 0.472

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9780476	0.9906243	0.9920682	0.9982644	2.173E+02	2.057E+00	--
α_2	7.05E-04	6.39E-03	5.00E-03	1.68E-02	1.442E+00	2.242E+02	0.926
α_3	2.43E-06	1.94E-03	7.28E-04	7.97E-03	4.114E-01	2.117E+02	0.985
α_4	1.37E-09	1.05E-03	1.14E-04	5.37E-03	2.036E-01	1.943E+02	1.074

CCCG = 5, Gamma = 0.472

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9793842	0.9895586	0.9904689	0.9966226	3.491E+02	3.683E+00	--
α_2	1.26E-03	6.17E-03	5.29E-03	1.41E-02	2.243E+00	3.610E+02	1.044
α_3	1.49E-04	2.96E-03	2.05E-03	8.88E-03	9.912E-01	3.340E+02	1.132
α_4	7.57E-07	1.11E-03	3.75E-04	4.71E-03	3.765E-01	3.388E+02	1.118
α_5	1.72E-21	1.98E-04	1.13E-07	1.14E-03	7.237E-02	3.656E+02	1.037

CCCG = 6, Gamma = 0.472

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9800561	0.9895812	0.9903911	0.9963395	3.931E+02	4.139E+00	--
α_2	9.53E-04	4.96E-03	4.21E-03	1.15E-02	2.128E+00	4.273E+02	1.000
α_3	2.14E-04	3.10E-03	2.25E-03	8.86E-03	1.134E+00	3.650E+02	1.173
α_4	9.63E-06	1.47E-03	7.31E-04	5.46E-03	5.533E-01	3.748E+02	1.144
α_5	2.21E-09	5.69E-04	7.59E-05	2.85E-03	2.210E-01	3.885E+02	1.105
α_6	4.11E-16	3.23E-04	2.25E-06	1.87E-03	1.027E-01	3.181E+02	1.350

CCCG = 7, Gamma = 0.472

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9825044	0.9898239	0.9903359	0.9953949	6.256E+02	6.432E+00	--
α_2	1.07E-03	4.10E-03	3.64E-03	8.73E-03	2.840E+00	6.893E+02	1.029
α_3	4.40E-04	2.96E-03	2.42E-03	7.33E-03	1.746E+00	5.874E+02	1.209
α_4	1.13E-04	1.82E-03	1.30E-03	5.30E-03	1.084E+00	5.944E+02	1.197
α_5	5.20E-06	9.13E-04	4.42E-04	3.42E-03	5.376E-01	5.880E+02	1.211
α_6	2.92E-10	3.32E-04	3.35E-05	1.72E-03	1.979E-01	5.953E+02	1.197
α_7	9.69E-53	4.32E-05	4.33E-15	1.48E-04	2.656E-02	6.142E+02	1.160

CCCG = 8, Gamma = 0.472

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9832197	0.9903546	0.9908657	0.9957447	6.276E+02	6.112E+00	--
α_2	7.28E-04	3.36E-03	2.90E-03	7.56E-03	2.364E+00	7.007E+02	1.013
α_3	2.96E-04	2.49E-03	1.97E-03	6.46E-03	1.512E+00	6.060E+02	1.172
α_4	1.06E-04	1.80E-03	1.28E-03	5.29E-03	1.056E+00	5.851E+02	1.215
α_5	1.69E-05	1.11E-03	6.34E-04	3.84E-03	6.745E-01	6.056E+02	1.175
α_6	7.20E-08	5.35E-04	1.36E-04	2.43E-03	3.076E-01	5.743E+02	1.240
α_7	1.32E-15	1.89E-04	1.86E-06	1.09E-03	1.093E-01	5.795E+02	1.229
α_8	2.41E-18	1.56E-04	4.34E-07	9.11E-04	8.885E-02	5.683E+02	1.253

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.93E-01	9.91E-01	9.90E-01	9.90E-01	9.90E-01	9.90E-01
α_2	4.32E-03	5.21E-03	6.39E-03	6.17E-03	4.96E-03	4.10E-03	3.36E-03
α_3		1.45E-03	1.94E-03	2.96E-03	3.10E-03	2.96E-03	2.49E-03
α_4			1.05E-03	1.11E-03	1.47E-03	1.82E-03	1.80E-03
α_5				1.98E-04	5.69E-04	9.13E-04	1.11E-03
α_6					3.23E-04	3.32E-04	5.35E-04
α_7						4.32E-05	1.89E-04
α_8							1.56E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.93E-01	9.91E-01	9.90E-01	9.90E-01	9.90E-01	9.90E-01
Beta	4.32E-03	6.66E-03	9.38E-03	1.04E-02	1.04E-02	1.02E-02	9.65E-03
Gamma		2.18E-01	3.18E-01	4.09E-01	5.24E-01	5.97E-01	6.51E-01
Delta			3.51E-01	3.07E-01	4.33E-01	5.12E-01	6.04E-01
Epsilon				1.51E-01	3.77E-01	4.15E-01	5.25E-01
Mu					3.62E-01	2.91E-01	4.42E-01
Omega						1.15E-01	3.92E-01
Sigma							4.53E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	25.00	25.00	25.00	25.00	25.00	25.00	25.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 7.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9475770	0.9867850	0.9944572	0.9999706	3.359E+01	4.498E-01	--
α_2	2.94E-05	1.32E-02	5.54E-03	5.24E-02	4.498E-01	3.359E+01	0.620

CCCG = 3, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9347489	0.9766579	0.9826049	0.9982189	4.930E+01	1.178E+00	--
α_2	8.10E-04	1.82E-02	1.25E-02	5.54E-02	9.387E-01	5.051E+01	0.831
α_3	5.37E-08	5.10E-03	8.25E-04	2.50E-02	2.396E-01	4.677E+01	0.909

CCCG = 4, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9271185	0.9693573	0.9742634	0.9948005	6.005E+01	1.898E+00	--
α_2	1.82E-03	2.01E-02	1.54E-02	5.46E-02	1.285E+00	6.264E+01	0.926
α_3	6.05E-06	6.53E-03	2.34E-03	2.73E-02	3.927E-01	5.970E+01	0.985
α_4	1.55E-08	4.01E-03	5.38E-04	2.01E-02	2.207E-01	5.487E+01	1.074

CCCG = 5, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9353523	0.9674286	0.9702846	0.9897391	1.041E+02	3.506E+00	--
α_2	3.20E-03	1.79E-02	1.51E-02	4.22E-02	1.992E+00	1.092E+02	1.044
α_3	6.52E-04	1.05E-02	7.55E-03	3.05E-02	1.078E+00	1.015E+02	1.132
α_4	1.84E-06	3.50E-03	1.13E-03	1.50E-02	3.632E-01	1.035E+02	1.118
α_5	5.99E-21	6.47E-04	3.75E-07	3.75E-03	7.248E-02	1.119E+02	1.037

CCCG = 6, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9396288	0.9681081	0.9704518	0.9885764	1.275E+02	4.199E+00	--
α_2	2.34E-03	1.35E-02	1.14E-02	3.22E-02	1.941E+00	1.413E+02	1.000
α_3	1.05E-03	1.09E-02	8.37E-03	2.94E-02	1.332E+00	1.208E+02	1.173
α_4	5.30E-05	4.93E-03	2.67E-03	1.75E-02	6.181E-01	1.246E+02	1.144
α_5	1.22E-08	1.78E-03	2.65E-04	8.83E-03	2.313E-01	1.295E+02	1.105
α_6	6.61E-20	7.24E-04	6.83E-07	4.21E-03	7.684E-02	1.061E+02	1.350

CCCG = 7, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9454611	0.9683176	0.9698957	0.9857833	1.902E+02	6.223E+00	--
α_2	3.02E-03	1.23E-02	1.08E-02	2.66E-02	2.654E+00	2.129E+02	1.029
α_3	1.22E-03	8.97E-03	7.25E-03	2.26E-02	1.645E+00	1.818E+02	1.209
α_4	4.01E-04	6.01E-03	4.36E-03	1.73E-02	1.115E+00	1.843E+02	1.197
α_5	3.19E-05	3.29E-03	1.75E-03	1.18E-02	6.034E-01	1.827E+02	1.211
α_6	1.71E-10	9.60E-04	7.16E-05	5.09E-03	1.780E-01	1.853E+02	1.197
α_7	7.79E-51	1.43E-04	2.94E-14	5.05E-04	2.734E-02	1.913E+02	1.160

CCCG = 8, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9474581	0.9694625	0.9709815	0.9862778	1.983E+02	6.246E+00	--
α_2	2.55E-03	1.11E-02	9.65E-03	2.44E-02	2.504E+00	2.240E+02	1.013
α_3	7.78E-04	7.25E-03	5.66E-03	1.92E-02	1.419E+00	1.943E+02	1.172
α_4	2.99E-04	5.44E-03	3.82E-03	1.61E-02	1.027E+00	1.878E+02	1.215
α_5	7.75E-05	3.76E-03	2.25E-03	1.25E-02	7.337E-01	1.946E+02	1.175
α_6	2.14E-06	2.15E-03	7.76E-04	8.94E-03	3.975E-01	1.847E+02	1.240
α_7	4.13E-20	4.13E-04	3.96E-07	2.40E-03	7.703E-02	1.866E+02	1.229
α_8	4.44E-18	4.78E-04	1.19E-06	2.79E-03	8.749E-02	1.830E+02	1.253

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.77E-01	9.69E-01	9.67E-01	9.68E-01	9.68E-01	9.69E-01
α_2	1.32E-02	1.82E-02	2.01E-02	1.79E-02	1.35E-02	1.23E-02	1.11E-02
α_3		5.10E-03	6.53E-03	1.05E-02	1.09E-02	8.97E-03	7.25E-03
α_4			4.01E-03	3.50E-03	4.93E-03	6.01E-03	5.44E-03
α_5				6.47E-04	1.78E-03	3.29E-03	3.76E-03
α_6					7.24E-04	9.60E-04	2.15E-03
α_7						1.43E-04	4.13E-04
α_8							4.78E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.77E-01	9.69E-01	9.67E-01	9.68E-01	9.68E-01	9.69E-01
Beta	1.32E-02	2.33E-02	3.06E-02	3.26E-02	3.19E-02	3.17E-02	3.05E-02
Gamma		2.18E-01	3.44E-01	4.50E-01	5.75E-01	6.11E-01	6.38E-01
Delta			3.80E-01	2.83E-01	4.06E-01	5.37E-01	6.28E-01
Epsilon				1.56E-01	3.37E-01	4.22E-01	5.55E-01
Mu					2.89E-01	2.51E-01	4.47E-01
Omega						1.30E-01	2.93E-01
Sigma							5.37E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.00	7.00	7.00	7.00	7.00	7.00	7.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 15.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.283

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9711301	0.9926223	0.9967937	0.9999789	6.332E+01	4.706E-01	--
α_2	2.11E-05	7.38E-03	3.21E-03	2.89E-02	4.706E-01	6.332E+01	0.620

CCCG = 3, Gamma = 0.283

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9650794	0.9878627	0.9912098	0.9992064	8.973E+01	1.103E+00	--
α_2	2.51E-04	8.70E-03	5.53E-03	2.80E-02	8.104E-01	9.230E+01	0.831
α_3	2.89E-07	3.43E-03	8.07E-04	1.58E-02	2.921E-01	8.478E+01	0.909

CCCG = 4, Gamma = 0.283

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9658213	0.9856080	0.9879176	0.9974955	1.337E+02	1.953E+00	--
α_2	8.75E-04	9.38E-03	7.16E-03	2.54E-02	1.312E+00	1.386E+02	0.926
α_3	5.51E-06	3.27E-03	1.30E-03	1.32E-02	4.307E-01	1.311E+02	0.985
α_4	3.47E-09	1.74E-03	2.06E-04	8.86E-03	2.099E-01	1.204E+02	1.074

CCCG = 5, Gamma = 0.283

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9693752	0.9851770	0.9866913	0.9958027	2.065E+02	3.107E+00	--
α_2	1.10E-03	7.77E-03	6.32E-03	1.94E-02	1.684E+00	2.151E+02	1.044
α_3	2.09E-04	4.72E-03	3.20E-03	1.44E-02	9.426E-01	1.989E+02	1.132
α_4	1.42E-06	1.89E-03	6.49E-04	7.96E-03	3.816E-01	2.020E+02	1.118
α_5	1.81E-16	4.52E-04	2.48E-06	2.63E-03	9.865E-02	2.181E+02	1.037

CCCG = 6, Gamma = 0.283

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9724093	0.9858676	0.9870474	0.9952950	2.666E+02	3.822E+00	--
α_2	8.42E-04	5.81E-03	4.74E-03	1.44E-02	1.714E+00	2.932E+02	1.000
α_3	2.89E-04	4.41E-03	3.18E-03	1.27E-02	1.108E+00	2.503E+02	1.173
α_4	3.34E-05	2.53E-03	1.41E-03	8.81E-03	6.509E-01	2.571E+02	1.144
α_5	1.88E-08	9.50E-04	1.71E-04	4.58E-03	2.536E-01	2.667E+02	1.105
α_6	7.11E-17	4.38E-04	1.99E-06	2.55E-03	9.572E-02	2.184E+02	1.350

CCCG = 7, Gamma = 0.283

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9749992	0.9861547	0.9870092	0.9943916	3.700E+02	5.195E+00	--
α_2	9.67E-04	5.10E-03	4.32E-03	1.19E-02	2.105E+00	4.109E+02	1.029
α_3	3.53E-04	3.75E-03	2.87E-03	1.02E-02	1.320E+00	3.502E+02	1.209
α_4	1.43E-04	2.81E-03	1.95E-03	8.40E-03	9.967E-01	3.543E+02	1.197
α_5	7.56E-06	1.49E-03	7.10E-04	5.64E-03	5.249E-01	3.507E+02	1.211
α_6	4.09E-10	5.50E-04	5.39E-05	2.85E-03	1.956E-01	3.551E+02	1.197
α_7	4.12E-28	1.44E-04	3.27E-09	7.83E-04	5.291E-02	3.665E+02	1.160

CCCG = 8, Gamma = 0.283

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9767836	0.9867861	0.9875144	0.9943014	4.355E+02	5.832E+00	--
α_2	9.22E-04	4.55E-03	3.89E-03	1.04E-02	2.229E+00	4.882E+02	1.013
α_3	2.55E-04	2.97E-03	2.24E-03	8.21E-03	1.260E+00	4.224E+02	1.172
α_4	1.45E-04	2.55E-03	1.80E-03	7.52E-03	1.042E+00	4.078E+02	1.215
α_5	4.23E-05	1.80E-03	1.10E-03	5.95E-03	7.626E-01	4.221E+02	1.175
α_6	1.87E-07	8.16E-04	2.28E-04	3.63E-03	3.271E-01	4.004E+02	1.240
α_7	3.22E-13	3.32E-04	8.91E-06	1.87E-03	1.344E-01	4.041E+02	1.229
α_8	1.75E-20	1.94E-04	1.82E-07	1.13E-03	7.682E-02	3.964E+02	1.253

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.88E-01	9.86E-01	9.85E-01	9.86E-01	9.86E-01	9.87E-01
α_2	7.38E-03	8.70E-03	9.38E-03	7.77E-03	5.81E-03	5.10E-03	4.55E-03
α_3		3.43E-03	3.27E-03	4.72E-03	4.41E-03	3.75E-03	2.97E-03
α_4			1.74E-03	1.89E-03	2.53E-03	2.81E-03	2.55E-03
α_5				4.52E-04	9.50E-04	1.49E-03	1.80E-03
α_6					4.38E-04	5.50E-04	8.16E-04
α_7						1.44E-04	3.32E-04
α_8							1.94E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.88E-01	9.86E-01	9.85E-01	9.86E-01	9.86E-01	9.87E-01
Beta	7.38E-03	1.21E-02	1.44E-02	1.48E-02	1.41E-02	1.38E-02	1.32E-02
Gamma		2.83E-01	3.48E-01	4.76E-01	5.89E-01	6.32E-01	6.56E-01
Delta			3.47E-01	3.31E-01	4.70E-01	5.71E-01	6.57E-01
Epsilon				1.93E-01	3.55E-01	4.38E-01	5.52E-01
Mu					3.16E-01	3.17E-01	4.27E-01
Omega						2.08E-01	3.92E-01
Sigma							3.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	15.00	15.00	15.00	15.00	15.00	15.00	15.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 6.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.113

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9897432	0.9973400	0.9988005	0.9999902	1.849E+02	4.932E-01	--
α_2	9.76E-06	2.66E-03	1.20E-03	1.03E-02	4.932E-01	1.849E+02	0.620

CCCG = 3, Gamma = 0.113

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9895300	0.9964268	0.9974621	0.9997885	2.954E+02	1.059E+00	--
α_2	4.36E-05	2.34E-03	1.38E-03	7.88E-03	7.137E-01	3.049E+02	0.831
α_3	4.45E-07	1.24E-03	3.74E-04	5.40E-03	3.458E-01	2.789E+02	0.909

CCCG = 4, Gamma = 0.113

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9904329	0.9958880	0.9965104	0.9992156	5.121E+02	2.115E+00	--
α_2	3.62E-04	2.92E-03	2.33E-03	7.52E-03	1.549E+00	5.285E+02	0.926
α_3	1.66E-08	5.31E-04	1.04E-04	2.53E-03	2.646E-01	4.981E+02	0.985
α_4	7.28E-08	6.59E-04	1.62E-04	3.01E-03	3.010E-01	4.565E+02	1.074

CCCG = 5, Gamma = 0.113

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9927177	0.9959553	0.9962036	0.9983451	1.311E+03	5.325E+00	--
α_2	8.58E-04	2.69E-03	2.45E-03	5.35E-03	3.632E+00	1.346E+03	1.044
α_3	1.07E-04	1.09E-03	8.35E-04	2.93E-03	1.354E+00	1.243E+03	1.132
α_4	2.23E-08	2.35E-04	5.61E-05	1.08E-03	2.961E-01	1.260E+03	1.118
α_5	9.29E-35	3.12E-05	3.44E-11	1.55E-04	4.243E-02	1.359E+03	1.037

CCCG = 6, Gamma = 0.113

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9923852	0.9958484	0.9961230	0.9983738	1.184E+03	4.936E+00	--
α_2	6.09E-04	2.29E-03	2.03E-03	4.84E-03	2.915E+00	1.271E+03	1.000
α_3	9.88E-05	1.16E-03	8.70E-04	3.20E-03	1.257E+00	1.085E+03	1.173
α_4	1.84E-06	4.52E-04	2.07E-04	1.73E-03	5.031E-01	1.113E+03	1.144
α_5	2.90E-15	1.00E-04	1.32E-06	5.74E-04	1.155E-01	1.153E+03	1.105
α_6	7.19E-13	1.54E-04	5.63E-06	8.52E-04	1.451E-01	9.437E+02	1.350

CCCG = 7, Gamma = 0.113

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9937765	0.9960609	0.9961950	0.9978876	2.441E+03	9.654E+00	--
α_2	7.06E-04	1.82E-03	1.70E-03	3.36E-03	4.851E+00	2.655E+03	1.029
α_3	3.17E-04	1.24E-03	1.09E-03	2.65E-03	2.800E+00	2.261E+03	1.209
α_4	6.18E-05	6.05E-04	4.67E-04	1.62E-03	1.384E+00	2.286E+03	1.197
α_5	7.67E-07	2.17E-04	9.69E-05	8.39E-04	4.902E-01	2.261E+03	1.211
α_6	1.19E-15	5.01E-05	6.35E-07	2.87E-04	1.146E-01	2.288E+03	1.197
α_7	3.26E-93	6.20E-06	6.60E-25	7.37E-06	1.464E-02	2.360E+03	1.160

CCCG = 8, Gamma = 0.113

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9935171	0.9961462	0.9963230	0.9981716	1.848E+03	7.148E+00	--
α_2	3.95E-04	1.46E-03	1.30E-03	3.06E-03	2.980E+00	2.045E+03	1.013
α_3	1.92E-04	1.11E-03	9.27E-04	2.64E-03	1.960E+00	1.767E+03	1.172
α_4	5.00E-05	6.83E-04	5.01E-04	1.94E-03	1.166E+00	1.706E+03	1.215
α_5	1.73E-06	3.04E-04	1.47E-04	1.14E-03	5.375E-01	1.765E+03	1.175
α_6	2.38E-11	1.08E-04	8.37E-06	5.70E-04	1.805E-01	1.673E+03	1.240
α_7	1.27E-35	2.45E-05	1.83E-11	1.20E-04	4.139E-02	1.688E+03	1.229
α_8	1.04E-08	1.71E-04	3.77E-05	7.96E-04	2.827E-01	1.655E+03	1.253

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	2.66E-03	2.34E-03	2.92E-03	2.69E-03	2.29E-03	1.82E-03	1.46E-03
α_3		1.24E-03	5.31E-04	1.09E-03	1.16E-03	1.24E-03	1.11E-03
α_4			6.59E-04	2.35E-04	4.52E-04	6.05E-04	6.83E-04
α_5				3.12E-05	1.00E-04	2.17E-04	3.04E-04
α_6					1.54E-04	5.01E-05	1.08E-04
α_7						6.20E-06	2.45E-05
α_8							1.71E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	2.66E-03	3.57E-03	4.11E-03	4.04E-03	4.15E-03	3.94E-03	3.85E-03
Gamma		3.47E-01	2.89E-01	3.35E-01	4.49E-01	5.37E-01	6.22E-01
Delta			5.54E-01	1.97E-01	3.79E-01	4.15E-01	5.38E-01
Epsilon				1.17E-01	3.60E-01	3.11E-01	4.71E-01
Mu					6.05E-01	2.06E-01	4.99E-01
Omega						1.10E-01	6.44E-01
Sigma							8.74E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.00	6.00	6.00	6.00	6.00	6.00	6.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.3.7 CLN-MDP-FS-NS: Standby Clean Systems Motor-Driven Pumps Fail to Start

Generic CCF Parameters

System Group: Clean Water
System: Auxiliary Feedwater, Containment Spray Recirculation, High Pressure Coolant Injection, High Pressure Core Spray, High Pressure Injection, Isolation Condenser, Low Pressure Core Spray, Reactor Core Isolation, Residual Heat Removal (LCI in BWRs; LPI in PWRs), Standby Liquid Control
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Start
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 141.3

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9596907	0.9836912	0.9866408	0.9976131	0.9848472	1.037E+02	1.719E+00
α_2	2.39E-03	1.63E-02	1.34E-02	4.03E-02	1.52E-02	1.719E+00	1.037E+02

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9687039	0.9855679	0.9873074	0.9964966	0.9878038	1.795E+02	2.628E+00
α_2	5.49E-04	6.73E-03	5.04E-03	1.87E-02	3.05E-03	1.226E+00	1.809E+02
α_3	8.09E-04	7.70E-03	5.99E-03	2.04E-02	9.15E-03	1.402E+00	1.807E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9722069	0.9860109	0.9872589	0.9955635	0.9896740	2.524E+02	3.581E+00
α_2	8.62E-04	6.39E-03	5.15E-03	1.61E-02	2.29E-03	1.635E+00	2.544E+02
α_3	3.22E-04	4.50E-03	3.30E-03	1.28E-02	4.59E-03	1.152E+00	2.548E+02
α_4	8.32E-05	3.10E-03	1.94E-03	1.01E-02	3.44E-03	7.940E-01	2.552E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9762575	0.9868257	0.9876351	0.9946335	0.9911076	3.929E+02	5.245E+00
α_2	1.15E-03	5.62E-03	4.81E-03	1.28E-02	1.53E-03	2.237E+00	3.959E+02
α_3	5.34E-04	4.05E-03	3.25E-03	1.03E-02	2.76E-03	1.612E+00	3.965E+02
α_4	1.47E-04	2.61E-03	1.84E-03	7.70E-03	3.22E-03	1.038E+00	3.971E+02
α_5	4.22E-07	8.99E-04	2.85E-04	3.88E-03	1.38E-03	3.580E-01	3.977E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9786432	0.9879021	0.9885846	0.9948371	0.9922583	4.675E+02	5.726E+00
α_2	6.99E-04	4.09E-03	3.42E-03	9.78E-03	9.60E-04	1.935E+00	4.713E+02
α_3	4.73E-04	3.47E-03	2.81E-03	8.77E-03	1.79E-03	1.645E+00	4.716E+02
α_4	2.00E-04	2.55E-03	1.89E-03	7.14E-03	2.50E-03	1.205E+00	4.721E+02
α_5	2.40E-05	1.46E-03	8.42E-04	4.98E-03	1.92E-03	6.898E-01	4.726E+02
α_6	9.10E-09	5.29E-04	9.29E-05	2.56E-03	5.76E-04	2.504E-01	4.730E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9808180	0.9883939	0.9888838	0.9943043	0.9931920	6.545E+02	7.685E+00
α_2	8.02E-04	3.64E-03	3.15E-03	8.13E-03	5.76E-04	2.407E+00	6.597E+02
α_3	5.17E-04	2.97E-03	2.49E-03	7.07E-03	1.18E-03	1.965E+00	6.602E+02
α_4	3.18E-04	2.43E-03	1.95E-03	6.17E-03	1.84E-03	1.606E+00	6.605E+02
α_5	1.08E-04	1.67E-03	1.20E-03	4.82E-03	1.89E-03	1.104E+00	6.610E+02
α_6	2.84E-06	7.50E-04	3.39E-04	2.89E-03	1.07E-03	4.963E-01	6.616E+02
α_7	3.86E-16	1.59E-04	1.26E-06	9.19E-04	2.47E-04	1.051E-01	6.620E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9823671	0.9893295	0.9897746	0.9947627	0.9939537	7.130E+02	7.690E+00
α_2	5.67E-04	2.95E-03	2.51E-03	6.86E-03	3.37E-04	2.127E+00	7.186E+02
α_3	3.08E-04	2.28E-03	1.84E-03	5.75E-03	7.69E-04	1.641E+00	7.191E+02
α_4	2.41E-04	2.07E-03	1.63E-03	5.40E-03	1.32E-03	1.492E+00	7.192E+02
α_5	1.41E-04	1.71E-03	1.28E-03	4.76E-03	1.63E-03	1.234E+00	7.195E+02
α_6	2.61E-05	1.07E-03	6.59E-04	3.52E-03	1.30E-03	7.716E-01	7.199E+02
α_7	3.80E-08	4.10E-04	9.74E-05	1.88E-03	5.77E-04	2.953E-01	7.204E+02
α_8	8.24E-14	1.80E-04	4.15E-06	1.02E-03	1.08E-04	1.298E-01	7.206E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.86E-01	9.86E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01
α_2	1.63E-02	6.73E-03	6.39E-03	5.62E-03	4.09E-03	3.64E-03	2.95E-03
α_3		7.70E-03	4.50E-03	4.05E-03	3.47E-03	2.97E-03	2.28E-03
α_4			3.10E-03	2.61E-03	2.55E-03	2.43E-03	2.07E-03
α_5				8.99E-04	1.46E-03	1.67E-03	1.71E-03
α_6					5.29E-04	7.50E-04	1.07E-03
α_7						1.59E-04	4.10E-04
α_8							1.80E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.86E-01	9.86E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01
Beta	1.63E-02	1.44E-02	1.40E-02	1.32E-02	1.21E-02	1.16E-02	1.07E-02
Gamma		5.33E-01	5.44E-01	5.74E-01	6.62E-01	6.87E-01	7.23E-01
Delta			4.08E-01	4.64E-01	5.66E-01	6.28E-01	7.05E-01

Epsilon				2.56E-01	4.38E-01	5.15E-01	6.20E-01
Mu					2.66E-01	3.53E-01	4.92E-01
Omega						1.75E-01	3.55E-01
Sigma							3.05E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	80.74	121.11	161.49	201.86	242.23	282.60	322.97
N₁	0.5000	0.3750	0.2500	0.1563	0.0938	0.0547	0.0313
N₂	1.2500	0.3750	0.3750	0.3125	0.2344	0.1641	0.1094
N₃		1.1250	0.7500	0.5625	0.4375	0.3359	0.2500
N₄			0.5625	0.6563	0.6094	0.5234	0.4297
N₅				0.2813	0.4688	0.5391	0.5313
N₆					0.1406	0.3047	0.4219
N₇						0.0703	0.1875
N₈							0.0352

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 51.2

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.355

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9758593	0.9937745	0.9972304	0.9999794	7.717E+01	4.834E-01	--
α_2	2.06E-05	6.23E-03	2.77E-03	2.41E-02	4.834E-01	7.717E+01	0.948

CCCG = 3, Gamma = 0.357

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9843713	0.9943831	0.9958031	0.9995426	2.170E+02	1.226E+00	--
α_2	1.84E-04	3.78E-03	2.61E-03	1.14E-02	9.769E-01	2.572E+02	0.677
α_3	2.93E-08	1.83E-03	3.18E-04	8.89E-03	2.487E-01	1.355E+02	1.288

CCCG = 4, Gamma = 0.358

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9838892	0.9931268	0.9941899	0.9987297	2.972E+02	2.057E+00	--
α_2	4.36E-04	3.96E-03	3.10E-03	1.04E-02	1.442E+00	3.627E+02	0.666
α_3	2.33E-06	1.86E-03	6.98E-04	7.64E-03	4.114E-01	2.211E+02	1.095
α_4	1.39E-09	1.06E-03	1.15E-04	5.41E-03	2.036E-01	1.927E+02	1.257

CCCG = 5, Gamma = 0.359

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9855340	0.9926815	0.9933233	0.9976363	4.996E+02	3.683E+00	--
α_2	7.86E-04	3.85E-03	3.30E-03	8.79E-03	2.243E+00	5.807E+02	0.733
α_3	1.06E-04	2.11E-03	1.46E-03	6.32E-03	9.912E-01	4.695E+02	0.908
α_4	7.51E-07	1.10E-03	3.72E-04	4.67E-03	3.765E-01	3.416E+02	1.250
α_5	2.28E-21	2.63E-04	1.50E-07	1.52E-03	7.237E-02	2.747E+02	1.556

CCCG = 6, Gamma = 0.359

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9865794	0.9929972	0.9935451	0.9975434	5.869E+02	4.139E+00	--
α_2	5.71E-04	2.97E-03	2.53E-03	6.91E-03	2.128E+00	7.133E+02	0.688
α_3	1.34E-04	1.94E-03	1.41E-03	5.55E-03	1.134E+00	5.842E+02	0.841
α_4	7.85E-06	1.20E-03	5.96E-04	4.45E-03	5.533E-01	4.600E+02	1.069
α_5	2.35E-09	6.03E-04	8.04E-05	3.02E-03	2.210E-01	3.666E+02	1.342
α_6	3.66E-16	2.87E-04	2.00E-06	1.67E-03	1.027E-01	3.574E+02	1.377

CCCG = 7, Gamma = 0.360

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9879752	0.9930123	0.9933661	0.9968414	9.140E+02	6.432E+00	--
α_2	6.72E-04	2.59E-03	2.29E-03	5.51E-03	2.840E+00	1.096E+03	0.719
α_3	2.82E-04	1.90E-03	1.55E-03	4.70E-03	1.746E+00	9.181E+02	0.859
α_4	8.30E-05	1.33E-03	9.54E-04	3.88E-03	1.084E+00	8.120E+02	0.971
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.869E+02	1.149
α_6	2.98E-10	3.39E-04	3.42E-05	1.75E-03	1.979E-01	5.839E+02	1.352
α_7	1.12E-52	5.01E-05	5.02E-15	1.71E-04	2.656E-02	5.299E+02	1.491

CCCG = 8, Gamma = 0.360

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9888901	0.9936201	0.9939603	0.9971887	9.519E+02	6.112E+00	--
α_2	4.32E-04	2.00E-03	1.73E-03	4.50E-03	2.364E+00	1.181E+03	0.680
α_3	1.81E-04	1.52E-03	1.20E-03	3.95E-03	1.512E+00	9.934E+02	0.808
α_4	7.12E-05	1.21E-03	8.60E-04	3.57E-03	1.056E+00	8.685E+02	0.925
α_5	1.33E-05	8.75E-04	4.99E-04	3.02E-03	6.745E-01	7.698E+02	1.044
α_6	6.26E-08	4.66E-04	1.18E-04	2.11E-03	3.076E-01	6.597E+02	1.219
α_7	1.35E-15	1.93E-04	1.91E-06	1.12E-03	1.093E-01	5.652E+02	1.423
α_8	1.74E-18	1.13E-04	3.14E-07	6.59E-04	8.885E-02	7.859E+02	1.023

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.94E-01	9.93E-01	9.93E-01	9.93E-01	9.93E-01	9.94E-01
α_2	6.23E-03	3.78E-03	3.96E-03	3.85E-03	2.97E-03	2.59E-03	2.00E-03
α_3		1.83E-03	1.86E-03	2.11E-03	1.94E-03	1.90E-03	1.52E-03
α_4			1.06E-03	1.10E-03	1.20E-03	1.33E-03	1.21E-03
α_5				2.63E-04	6.03E-04	7.82E-04	8.75E-04
α_6					2.87E-04	3.39E-04	4.66E-04
α_7						5.01E-05	1.93E-04
α_8							1.13E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.94E-01	9.93E-01	9.93E-01	9.93E-01	9.93E-01	9.94E-01
Beta	6.23E-03	5.62E-03	6.87E-03	7.32E-03	7.00E-03	6.99E-03	6.38E-03
Gamma		3.26E-01	4.24E-01	4.74E-01	5.75E-01	6.30E-01	6.87E-01
Delta			3.62E-01	3.93E-01	5.19E-01	5.69E-01	6.53E-01
Epsilon				1.93E-01	4.26E-01	4.68E-01	5.76E-01
Mu					3.23E-01	3.32E-01	4.69E-01
Omega						1.29E-01	3.97E-01
Sigma							3.69E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	29.26	43.89	58.51	73.14	87.77	102.40	117.03
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 28.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.203

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276455	0.9785114	0.9872424	0.9996171	3.187E+01	6.998E-01	--
α_2	3.83E-04	2.15E-02	1.28E-02	7.24E-02	6.998E-01	3.187E+01	0.948

CCCG = 3, Gamma = 0.202

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9443105	0.9775786	0.9816794	0.9968128	7.317E+01	1.678E+00	--
α_2	1.38E-03	1.47E-02	1.12E-02	3.97E-02	1.314E+00	8.821E+01	0.677
α_3	4.23E-06	7.75E-03	2.54E-03	3.32E-02	3.646E-01	4.670E+01	1.288

CCCG = 4, Gamma = 0.202

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9448318	0.9745672	0.9776140	0.9938806	9.909E+01	2.586E+00	--
α_2	1.80E-03	1.30E-02	1.05E-02	3.25E-02	1.660E+00	1.262E+02	0.666
α_3	1.05E-04	8.27E-03	4.60E-03	2.89E-02	6.427E-01	7.711E+01	1.095
α_4	2.62E-07	4.18E-03	9.33E-04	1.95E-02	2.832E-01	6.746E+01	1.257

CCCG = 5, Gamma = 0.201

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9527573	0.9749231	0.9767403	0.9908789	1.679E+02	4.318E+00	--
α_2	2.38E-03	1.13E-02	9.71E-03	2.54E-02	2.305E+00	2.024E+02	0.733
α_3	8.73E-04	8.42E-03	6.53E-03	2.24E-02	1.391E+00	1.638E+02	0.908
α_4	2.09E-05	4.33E-03	2.05E-03	1.64E-02	5.195E-01	1.196E+02	1.250
α_5	1.82E-15	1.08E-03	7.96E-06	6.24E-03	1.037E-01	9.636E+01	1.556

CCCG = 6, Gamma = 0.201

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9574859	0.9765009	0.9779530	0.9905552	2.115E+02	5.090E+00	--
α_2	1.60E-03	8.08E-03	6.90E-03	1.86E-02	2.175E+00	2.671E+02	0.688
α_3	1.02E-03	7.46E-03	6.04E-03	1.88E-02	1.645E+00	2.187E+02	0.841
α_4	1.64E-04	4.92E-03	3.19E-03	1.56E-02	8.525E-01	1.725E+02	1.069
α_5	5.13E-07	2.35E-03	6.53E-04	1.05E-02	3.251E-01	1.377E+02	1.342
α_6	3.83E-17	6.87E-04	2.50E-06	4.01E-03	9.247E-02	1.345E+02	1.377

CCCG = 7, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9614176	0.9769344	0.9779516	0.9889776	3.033E+02	7.160E+00	--
α_2	1.93E-03	7.45E-03	6.60E-03	1.59E-02	2.818E+00	3.753E+02	0.719
α_3	1.02E-03	6.06E-03	5.06E-03	1.45E-02	1.918E+00	3.147E+02	0.859
α_4	5.12E-04	4.96E-03	3.84E-03	1.32E-02	1.388E+00	2.785E+02	0.971
α_5	7.79E-05	3.24E-03	1.99E-03	1.07E-02	7.675E-01	2.359E+02	1.149
α_6	8.53E-09	1.16E-03	1.74E-04	5.72E-03	2.327E-01	2.008E+02	1.352
α_7	3.10E-40	1.93E-04	8.68E-12	8.53E-04	3.515E-02	1.824E+02	1.491

CCCG = 8, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9641778	0.9785616	0.9795035	0.9897287	3.291E+02	7.211E+00	--
α_2	1.49E-03	6.18E-03	5.42E-03	1.35E-02	2.613E+00	4.203E+02	0.680
α_3	6.23E-04	4.61E-03	3.72E-03	1.16E-02	1.638E+00	3.539E+02	0.808
α_4	3.82E-04	4.18E-03	3.18E-03	1.14E-02	1.300E+00	3.095E+02	0.925
α_5	1.57E-04	3.46E-03	2.36E-03	1.05E-02	9.525E-01	2.744E+02	1.044
α_6	9.10E-06	2.15E-03	9.92E-04	8.21E-03	5.069E-01	2.354E+02	1.219
α_7	2.93E-15	5.36E-04	5.04E-06	3.10E-03	1.083E-01	2.019E+02	1.423
α_8	1.25E-17	3.25E-04	1.09E-06	1.90E-03	9.140E-02	2.808E+02	1.023

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.79E-01	9.78E-01	9.75E-01	9.75E-01	9.77E-01	9.77E-01	9.79E-01
α_2	2.15E-02	1.47E-02	1.30E-02	1.13E-02	8.08E-03	7.45E-03	6.18E-03
α_3		7.75E-03	8.27E-03	8.42E-03	7.46E-03	6.06E-03	4.61E-03
α_4			4.18E-03	4.33E-03	4.92E-03	4.96E-03	4.18E-03
α_5				1.08E-03	2.35E-03	3.24E-03	3.46E-03
α_6					6.87E-04	1.16E-03	2.15E-03
α_7						1.93E-04	5.36E-04
α_8							3.25E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.79E-01	9.78E-01	9.75E-01	9.75E-01	9.77E-01	9.77E-01	9.79E-01
Beta	2.15E-02	2.24E-02	2.54E-02	2.51E-02	2.35E-02	2.31E-02	2.14E-02
Gamma		3.46E-01	4.89E-01	5.51E-01	6.56E-01	6.77E-01	7.12E-01
Delta			3.36E-01	3.91E-01	5.16E-01	6.12E-01	6.98E-01
Epsilon				1.99E-01	3.82E-01	4.81E-01	6.07E-01
Mu					2.26E-01	2.94E-01	4.65E-01
Omega						1.43E-01	2.86E-01
Sigma							3.78E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	16.00	24.00	32.00	40.00	48.00	56.00	64.00
N_1	0.5000	0.3750	0.2500	0.1563	0.0938	0.0547	0.0313
N_2	0.2500	0.3750	0.3750	0.3125	0.2344	0.1641	0.1094
N_3		0.1250	0.2500	0.3125	0.3125	0.2734	0.2188

N₄			0.0625	0.1563	0.2344	0.2734	0.2734
N₅				0.0313	0.0938	0.1641	0.2188
N₆					0.0156	0.0547	0.1094
N₇						0.0078	0.0313
N₈							0.0039

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.021

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7909754	0.9495425	0.9812373	0.9999596	7.153E+00	3.801E-01	--
α_2	4.04E-05	5.05E-02	1.88E-02	2.09E-01	3.801E-01	7.153E+00	0.948

CCCG = 3, Gamma = 0.021

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8480464	0.9486147	0.9637041	0.9974964	1.772E+01	9.600E-01	--
α_2	4.21E-04	2.80E-02	1.63E-02	9.56E-02	6.673E-01	2.315E+01	0.677
α_3	2.10E-06	2.34E-02	5.75E-03	1.07E-01	2.927E-01	1.223E+01	1.288

CCCG = 4, Gamma = 0.021

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8667742	0.9456197	0.9550469	0.9921455	2.902E+01	1.669E+00	--
α_2	1.53E-03	2.65E-02	1.89E-02	7.72E-02	1.039E+00	3.819E+01	0.666
α_3	1.43E-05	1.63E-02	5.86E-03	6.80E-02	3.887E-01	2.348E+01	1.095
α_4	1.36E-07	1.16E-02	1.94E-03	5.68E-02	2.414E-01	2.055E+01	1.257

CCCG = 5, Gamma = 0.021

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9038338	0.9513243	0.9554780	0.9846048	6.815E+01	3.487E+00	--
α_2	3.28E-03	2.10E-02	1.74E-02	5.12E-02	1.791E+00	8.332E+01	0.733
α_3	1.40E-03	1.76E-02	1.32E-02	4.89E-02	1.207E+00	6.749E+01	0.908
α_4	1.55E-05	8.69E-03	3.49E-03	3.50E-02	4.340E-01	4.950E+01	1.250
α_5	3.06E-26	1.37E-03	4.91E-08	7.58E-03	5.493E-02	4.005E+01	1.556

CCCG = 6, Gamma = 0.021

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9158284	0.9561795	0.9595571	0.9849800	8.520E+01	3.905E+00	--
α_2	1.14E-03	1.18E-02	9.09E-03	3.18E-02	1.335E+00	1.116E+02	0.688
α_3	2.03E-03	1.66E-02	1.32E-02	4.25E-02	1.531E+00	9.089E+01	0.841
α_4	1.92E-04	9.89E-03	5.90E-03	3.32E-02	7.191E-01	7.200E+01	1.069
α_5	6.26E-08	4.26E-03	7.32E-04	2.07E-02	2.467E-01	5.767E+01	1.342
α_6	1.42E-20	1.29E-03	7.79E-07	7.49E-03	7.279E-02	5.638E+01	1.377

CCCG = 7, Gamma = 0.021

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9284061	0.9590084	0.9611673	0.9822341	1.350E+02	5.770E+00	--
α_2	1.09E-03	8.76E-03	6.99E-03	2.25E-02	1.549E+00	1.753E+02	0.719
α_3	2.39E-03	1.34E-02	1.13E-02	3.17E-02	1.989E+00	1.461E+02	0.859
α_4	8.85E-04	9.83E-03	7.47E-03	2.68E-02	1.287E+00	1.296E+02	0.971
α_5	1.04E-04	6.25E-03	3.63E-03	2.13E-02	6.913E-01	1.100E+02	1.149
α_6	1.83E-08	2.47E-03	3.74E-04	1.22E-02	2.327E-01	9.380E+01	1.352
α_7	1.68E-64	2.48E-04	3.76E-17	6.25E-04	2.112E-02	8.529E+01	1.491

CCCG = 8, Gamma = 0.021

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9380718	0.9629970	0.9646153	0.9823948	1.826E+02	7.016E+00	--
α_2	8.19E-04	6.37E-03	5.10E-03	1.63E-02	1.583E+00	2.469E+02	0.680
α_3	1.68E-03	9.51E-03	7.99E-03	2.25E-02	1.986E+00	2.069E+02	0.808
α_4	1.28E-03	9.16E-03	7.44E-03	2.29E-02	1.672E+00	1.809E+02	0.925
α_5	3.31E-04	6.25E-03	4.37E-03	1.86E-02	1.011E+00	1.608E+02	1.044
α_6	3.13E-05	4.12E-03	2.10E-03	1.51E-02	5.709E-01	1.380E+02	1.219
α_7	3.50E-10	1.52E-03	1.20E-04	8.06E-03	1.809E-01	1.185E+02	1.423
α_8	1.09E-107	7.54E-05	2.28E-27	5.65E-05	1.245E-02	1.650E+02	1.023

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.50E-01	9.49E-01	9.46E-01	9.51E-01	9.56E-01	9.59E-01	9.63E-01
α_2	5.05E-02	2.80E-02	2.65E-02	2.10E-02	1.18E-02	8.76E-03	6.37E-03
α_3		2.34E-02	1.63E-02	1.76E-02	1.66E-02	1.34E-02	9.51E-03
α_4			1.16E-02	8.69E-03	9.89E-03	9.83E-03	9.16E-03
α_5				1.37E-03	4.26E-03	6.25E-03	6.25E-03
α_6					1.29E-03	2.47E-03	4.12E-03
α_7						2.48E-04	1.52E-03
α_8							7.54E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.50E-01	9.49E-01	9.46E-01	9.51E-01	9.56E-01	9.59E-01	9.63E-01
Beta	5.05E-02	5.14E-02	5.44E-02	4.87E-02	4.38E-02	4.10E-02	3.70E-02
Gamma		4.55E-01	5.13E-01	5.68E-01	7.30E-01	7.86E-01	8.28E-01
Delta			4.16E-01	3.64E-01	4.82E-01	5.83E-01	6.90E-01
Epsilon				1.36E-01	3.59E-01	4.77E-01	5.67E-01
Mu					2.32E-01	3.04E-01	4.78E-01
Omega						9.09E-02	2.80E-01
Sigma							4.72E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.71	2.57	3.43	4.29	5.14	6.00	6.86
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 38.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.276

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9238866	0.9705580	0.9765889	0.9965802	4.848E+01	1.471E+00	--
α_2	3.42E-03	2.94E-02	2.34E-02	7.61E-02	1.471E+00	4.848E+01	0.948

CCCG = 3, Gamma = 0.274

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9467199	0.9769506	0.9803416	0.9955794	8.911E+01	2.103E+00	--
α_2	1.64E-04	5.72E-03	3.62E-03	1.84E-02	8.104E-01	1.410E+02	0.677
α_3	1.58E-03	1.73E-02	1.32E-02	4.71E-02	1.292E+00	7.325E+01	1.288

CCCG = 4, Gamma = 0.273

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9633481	0.9824963	0.9843664	0.9952515	1.657E+02	2.953E+00	--
α_2	5.11E-04	5.49E-03	4.19E-03	1.49E-02	1.312E+00	2.376E+02	0.666
α_3	2.74E-04	6.40E-03	4.33E-03	1.96E-02	9.307E-01	1.444E+02	1.095
α_4	1.03E-04	5.61E-03	3.31E-03	1.89E-02	7.099E-01	1.259E+02	1.257

CCCG = 5, Gamma = 0.272

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9715500	0.9851451	0.9862989	0.9947981	2.724E+02	4.107E+00	--
α_2	6.53E-04	4.63E-03	3.76E-03	1.16E-02	1.684E+00	3.621E+02	0.733
α_3	3.12E-04	4.06E-03	3.01E-03	1.14E-02	1.193E+00	2.924E+02	0.908
α_4	1.52E-04	4.13E-03	2.72E-03	1.29E-02	8.816E-01	2.125E+02	1.250
α_5	7.81E-07	2.03E-03	6.23E-04	8.85E-03	3.487E-01	1.711E+02	1.556

CCCG = 6, Gamma = 0.272

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9763039	0.9871192	0.9879764	0.9950063	3.695E+02	4.822E+00	--
α_2	4.92E-04	3.41E-03	2.77E-03	8.48E-03	1.714E+00	5.015E+02	0.688
α_3	2.46E-04	2.99E-03	2.24E-03	8.33E-03	1.233E+00	4.105E+02	0.841
α_4	1.73E-04	3.17E-03	2.22E-03	9.39E-03	1.026E+00	3.230E+02	1.069
α_5	2.80E-05	2.44E-03	1.33E-03	8.61E-03	6.286E-01	2.574E+02	1.342
α_6	3.36E-09	8.78E-04	1.17E-04	4.40E-03	2.207E-01	2.513E+02	1.377

CCCG = 7, Gamma = 0.271

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9796552	0.9882623	0.9888734	0.9947826	5.216E+02	6.195E+00	--
α_2	5.89E-04	3.11E-03	2.63E-03	7.24E-03	2.105E+00	6.757E+02	0.719
α_3	2.49E-04	2.44E-03	1.88E-03	6.51E-03	1.383E+00	5.661E+02	0.859
α_4	2.09E-04	2.48E-03	1.86E-03	6.88E-03	1.247E+00	5.005E+02	0.971
α_5	8.26E-05	2.12E-03	1.41E-03	6.59E-03	8.999E-01	4.233E+02	1.149
α_6	2.55E-06	1.24E-03	5.05E-04	4.95E-03	4.456E-01	3.599E+02	1.352
α_7	1.00E-14	3.53E-04	4.64E-06	2.02E-03	1.154E-01	3.269E+02	1.491

CCCG = 8, Gamma = 0.271

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9818668	0.9893076	0.9898139	0.9950197	6.321E+02	6.832E+00	--
α_2	5.39E-04	2.66E-03	2.28E-03	6.09E-03	2.229E+00	8.361E+02	0.680
α_3	1.65E-04	1.83E-03	1.39E-03	5.02E-03	1.291E+00	7.036E+02	0.808
α_4	1.51E-04	1.94E-03	1.44E-03	5.46E-03	1.198E+00	6.149E+02	0.925
α_5	1.20E-04	1.97E-03	1.41E-03	5.75E-03	1.075E+00	5.448E+02	1.044
α_6	1.68E-05	1.37E-03	7.53E-04	4.81E-03	6.396E-01	4.670E+02	1.219
α_7	5.79E-08	7.26E-04	1.68E-04	3.35E-03	2.907E-01	4.002E+02	1.423
α_8	1.00E-15	1.94E-04	1.80E-06	1.12E-03	1.081E-01	5.568E+02	1.023

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.71E-01	9.77E-01	9.82E-01	9.85E-01	9.87E-01	9.88E-01	9.89E-01
α_2	2.94E-02	5.72E-03	5.49E-03	4.63E-03	3.41E-03	3.11E-03	2.66E-03
α_3		1.73E-02	6.40E-03	4.06E-03	2.99E-03	2.44E-03	1.83E-03
α_4			5.61E-03	4.13E-03	3.17E-03	2.48E-03	1.94E-03
α_5				2.03E-03	2.44E-03	2.12E-03	1.97E-03
α_6					8.78E-04	1.24E-03	1.37E-03
α_7						3.53E-04	7.26E-04
α_8							1.94E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.71E-01	9.77E-01	9.82E-01	9.85E-01	9.87E-01	9.88E-01	9.89E-01
Beta	2.94E-02	2.30E-02	1.75E-02	1.49E-02	1.29E-02	1.17E-02	1.07E-02
Gamma		7.52E-01	6.86E-01	6.88E-01	7.36E-01	7.35E-01	7.51E-01
Delta			4.67E-01	6.03E-01	6.84E-01	7.18E-01	7.72E-01
Epsilon				3.30E-01	5.11E-01	5.99E-01	6.86E-01
Mu					2.65E-01	4.28E-01	5.37E-01
Omega						2.22E-01	4.02E-01
Sigma							2.11E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	21.77	32.66	43.54	54.43	65.31	76.20	87.09
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		1.0000	0.5000	0.2500	0.1250	0.0625	0.0313

N₄			0.5000	0.5000	0.3750	0.2500	0.1563
N₅				0.2500	0.3750	0.3750	0.3125
N₆					0.1250	0.2500	0.3125
N₇						0.0625	0.1563
N₈							0.0313

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 21.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.145

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9851134	0.9961373	0.9982554	0.9999858	1.272E+02	4.932E-01	--
α_2	1.42E-05	3.86E-03	1.74E-03	1.49E-02	4.932E-01	1.272E+02	0.948

CCCG = 3, Gamma = 0.146

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9897676	0.9965080	0.9975199	0.9997933	3.023E+02	1.060E+00	--
α_2	3.39E-05	1.82E-03	1.07E-03	6.14E-03	7.137E-01	3.920E+02	0.677
α_3	6.03E-07	1.67E-03	5.07E-04	7.31E-03	3.458E-01	2.061E+02	1.288

CCCG = 4, Gamma = 0.147

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9922262	0.9966599	0.9971661	0.9993632	6.310E+02	2.115E+00	--
α_2	2.51E-04	2.03E-03	1.61E-03	5.22E-03	1.549E+00	7.625E+02	0.666
α_3	1.78E-08	5.69E-04	1.11E-04	2.71E-03	2.646E-01	4.645E+02	1.095
α_4	8.22E-08	7.43E-04	1.82E-04	3.40E-03	3.010E-01	4.046E+02	1.257

CCCG = 5, Gamma = 0.147

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9945604	0.9969797	0.9971655	0.9987648	1.758E+03	5.325E+00	--
α_2	5.92E-04	1.86E-03	1.69E-03	3.69E-03	3.632E+00	1.951E+03	0.733
α_3	8.43E-05	8.58E-04	6.59E-04	2.31E-03	1.354E+00	1.576E+03	0.908
α_4	2.45E-08	2.58E-04	6.16E-05	1.19E-03	2.961E-01	1.147E+03	1.250
α_5	1.37E-34	4.61E-05	5.07E-11	2.28E-04	4.243E-02	9.212E+02	1.556

CCCG = 6, Gamma = 0.147

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9944349	0.9969670	0.9971680	0.9988125	1.622E+03	4.936E+00	--
α_2	4.09E-04	1.54E-03	1.37E-03	3.25E-03	2.915E+00	1.892E+03	0.688
α_3	6.91E-05	8.11E-04	6.09E-04	2.24E-03	1.257E+00	1.549E+03	0.841
α_4	1.68E-06	4.12E-04	1.89E-04	1.58E-03	5.031E-01	1.220E+03	1.069
α_5	3.44E-15	1.19E-04	1.57E-06	6.82E-04	1.155E-01	9.715E+02	1.342
α_6	7.17E-13	1.53E-04	5.61E-06	8.49E-04	1.451E-01	9.470E+02	1.377

CCCG = 7, Gamma = 0.148

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9954545	0.9971237	0.9972219	0.9984581	3.347E+03	9.654E+00	--
α_2	4.87E-04	1.26E-03	1.17E-03	2.32E-03	4.851E+00	3.852E+03	0.719
α_3	2.22E-04	8.67E-04	7.66E-04	1.86E-03	2.800E+00	3.227E+03	0.859
α_4	4.95E-05	4.85E-04	3.74E-04	1.30E-03	1.384E+00	2.854E+03	0.971
α_5	7.19E-07	2.03E-04	9.08E-05	7.86E-04	4.902E-01	2.413E+03	1.149
α_6	1.33E-15	5.59E-05	7.08E-07	3.21E-04	1.146E-01	2.051E+03	1.352
α_7	4.14E-93	7.87E-06	8.37E-25	9.35E-06	1.464E-02	1.861E+03	1.491

CCCG = 8, Gamma = 0.148

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9953742	0.9972510	0.9973774	0.9986962	2.593E+03	7.148E+00	--
α_2	2.59E-04	9.57E-04	8.53E-04	2.01E-03	2.980E+00	3.111E+03	0.680
α_3	1.30E-04	7.49E-04	6.26E-04	1.79E-03	1.960E+00	2.616E+03	0.808
α_4	3.73E-05	5.10E-04	3.74E-04	1.45E-03	1.166E+00	2.287E+03	0.925
α_5	1.51E-06	2.65E-04	1.28E-04	9.92E-04	5.375E-01	2.027E+03	1.044
α_6	2.30E-11	1.04E-04	8.06E-06	5.50E-04	1.805E-01	1.736E+03	1.219
α_7	1.44E-35	2.78E-05	2.08E-11	1.36E-04	4.139E-02	1.487E+03	1.423
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	1.023

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	3.86E-03	1.82E-03	2.03E-03	1.86E-03	1.54E-03	1.26E-03	9.57E-04
α_3		1.67E-03	5.69E-04	8.58E-04	8.11E-04	8.67E-04	7.49E-04
α_4			7.43E-04	2.58E-04	4.12E-04	4.85E-04	5.10E-04
α_5				4.61E-05	1.19E-04	2.03E-04	2.65E-04
α_6					1.53E-04	5.59E-05	1.04E-04
α_7						7.87E-06	2.78E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	3.86E-03	3.49E-03	3.34E-03	3.02E-03	3.03E-03	2.88E-03	2.75E-03
Gamma		4.80E-01	3.93E-01	3.85E-01	4.93E-01	5.63E-01	6.52E-01
Delta			5.66E-01	2.62E-01	4.58E-01	4.64E-01	5.82E-01
Epsilon				1.51E-01	3.98E-01	3.55E-01	5.12E-01
Mu					5.63E-01	2.39E-01	5.03E-01
Omega						1.23E-01	6.13E-01
Sigma							8.31E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	12.00	18.00	24.00	30.00	36.00	42.00	48.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.4 Containment Spray Pumps

2.1.4.1 CSS-MDP-FS: CSS Motor-Driven Pumps Fail to Start

Generic CCF Parameters

System Group: Clean Water
System: Containment Spray Recirculation
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Start
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 17.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9540397	0.9882520	0.9948824	0.9999643	1.0000000	3.941E+01	4.685E-01
α_2	3.30E-05	1.17E-02	5.11E-03	4.60E-02	0.00E+00	4.685E-01	3.941E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9577503	0.9851782	0.9891614	0.9989758	1.0000000	7.498E+01	1.128E+00
α_2	3.75E-04	1.12E-02	7.29E-03	3.53E-02	0.00E+00	8.512E-01	7.526E+01
α_3	1.82E-07	3.64E-03	7.79E-04	1.71E-02	0.00E+00	2.768E-01	7.583E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9586083	0.9827177	0.9855617	0.9971069	1.0000000	1.077E+02	1.894E+00
α_2	9.94E-04	1.15E-02	8.69E-03	3.16E-02	0.00E+00	1.260E+00	1.083E+02
α_3	3.99E-06	3.67E-03	1.35E-03	1.52E-02	0.00E+00	4.024E-01	1.092E+02
α_4	1.47E-08	2.11E-03	3.15E-04	1.05E-02	0.00E+00	2.315E-01	1.093E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9673743	0.9837547	0.9852543	0.9950087	1.0000000	2.078E+02	3.432E+00
α_2	1.55E-03	9.11E-03	7.61E-03	2.18E-02	0.00E+00	1.924E+00	2.093E+02
α_3	2.87E-04	4.97E-03	3.52E-03	1.46E-02	0.00E+00	1.049E+00	2.102E+02
α_4	1.38E-06	1.81E-03	6.24E-04	7.63E-03	0.00E+00	3.822E-01	2.109E+02
α_5	3.15E-20	3.63E-04	3.38E-07	2.11E-03	0.00E+00	7.674E-02	2.112E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9696166	0.9844143	0.9857058	0.9947972	1.0000000	2.422E+02	3.835E+00

α_2	9.91E-04	6.91E-03	5.63E-03	1.72E-02	0.00E+00	1.701E+00	2.444E+02
α_3	3.87E-04	4.91E-03	3.65E-03	1.37E-02	0.00E+00	1.207E+00	2.448E+02
α_4	2.22E-05	2.42E-03	1.27E-03	8.73E-03	0.00E+00	5.960E-01	2.455E+02
α_5	3.52E-09	8.99E-04	1.20E-04	4.51E-03	0.00E+00	2.211E-01	2.458E+02
α_6	3.51E-15	4.46E-04	4.52E-06	2.57E-03	0.00E+00	1.098E-01	2.459E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9743308	0.9854330	0.9862434	0.9937654	1.0000000	3.888E+02	5.747E+00
α_2	1.16E-03	5.69E-03	4.87E-03	1.30E-02	0.00E+00	2.243E+00	3.923E+02
α_3	5.54E-04	4.13E-03	3.33E-03	1.04E-02	0.00E+00	1.630E+00	3.929E+02
α_4	1.71E-04	2.74E-03	1.96E-03	7.98E-03	0.00E+00	1.083E+00	3.935E+02
α_5	1.04E-05	1.43E-03	7.23E-04	5.26E-03	0.00E+00	5.654E-01	3.940E+02
α_6	2.67E-10	4.86E-04	4.49E-05	2.53E-03	0.00E+00	1.916E-01	3.944E+02
α_7	6.04E-41	8.82E-05	3.28E-12	3.87E-04	0.00E+00	3.480E-02	3.945E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9755249	0.9861281	0.9869039	0.9940708	1.0000000	4.070E+02	5.726E+00
α_2	8.81E-04	4.89E-03	4.12E-03	1.15E-02	0.00E+00	2.018E+00	4.107E+02
α_3	3.48E-04	3.37E-03	2.61E-03	8.99E-03	0.00E+00	1.391E+00	4.114E+02
α_4	1.53E-04	2.57E-03	1.83E-03	7.54E-03	0.00E+00	1.062E+00	4.117E+02
α_5	3.00E-05	1.70E-03	9.94E-04	5.78E-03	0.00E+00	7.026E-01	4.120E+02
α_6	3.33E-07	8.47E-04	2.60E-04	3.68E-03	0.00E+00	3.497E-01	4.124E+02
α_7	1.28E-15	2.61E-04	2.40E-06	1.51E-03	0.00E+00	1.078E-01	4.126E+02
α_8	2.67E-17	2.29E-04	9.72E-07	1.34E-03	0.00E+00	9.469E-02	4.127E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.85E-01	9.83E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.17E-02	1.12E-02	1.15E-02	9.11E-03	6.91E-03	5.69E-03	4.89E-03
α_3		3.64E-03	3.67E-03	4.97E-03	4.91E-03	4.13E-03	3.37E-03
α_4			2.11E-03	1.81E-03	2.42E-03	2.74E-03	2.57E-03
α_5				3.63E-04	8.99E-04	1.43E-03	1.70E-03
α_6					4.46E-04	4.86E-04	8.47E-04
α_7						8.82E-05	2.61E-04
α_8							2.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.85E-01	9.83E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.17E-02	1.48E-02	1.73E-02	1.62E-02	1.56E-02	1.46E-02	1.39E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	17.00	17.00	17.00	17.00	17.00	17.00	17.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 8.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9701878	0.9923071	0.9965709	0.9999745	6.235E+01	4.834E-01	--
α_2	2.55E-05	7.69E-03	3.43E-03	2.98E-02	4.834E-01	6.235E+01	0.841

CCCG = 3, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9755002	0.9911810	0.9933991	0.9992798	1.377E+02	1.226E+00	--
α_2	3.33E-04	6.83E-03	4.71E-03	2.06E-02	9.769E-01	1.420E+02	0.975
α_3	3.18E-08	1.99E-03	3.45E-04	9.63E-03	2.487E-01	1.249E+02	1.114

CCCG = 4, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738481	0.9888220	0.9905379	0.9979283	1.820E+02	2.057E+00	--
α_2	8.43E-04	7.63E-03	5.98E-03	2.01E-02	1.442E+00	1.875E+02	1.018
α_3	2.89E-06	2.30E-03	8.66E-04	9.47E-03	4.114E-01	1.781E+02	1.078
α_4	1.63E-09	1.24E-03	1.36E-04	6.38E-03	2.036E-01	1.636E+02	1.175

CCCG = 5, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9784898	0.9891038	0.9900529	0.9964747	3.343E+02	3.683E+00	--
α_2	1.32E-03	6.45E-03	5.53E-03	1.47E-02	2.243E+00	3.453E+02	1.044
α_3	1.54E-04	3.07E-03	2.12E-03	9.20E-03	9.912E-01	3.222E+02	1.122
α_4	7.94E-07	1.16E-03	3.94E-04	4.94E-03	3.765E-01	3.229E+02	1.122
α_5	1.84E-21	2.12E-04	1.21E-07	1.22E-03	7.237E-02	3.413E+02	1.063

CCCG = 6, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9795920	0.9893379	0.9901663	0.9962536	3.841E+02	4.139E+00	--
α_2	9.80E-04	5.10E-03	4.33E-03	1.18E-02	2.128E+00	4.154E+02	0.989
α_3	2.16E-04	3.12E-03	2.27E-03	8.94E-03	1.134E+00	3.618E+02	1.138
α_4	9.90E-06	1.51E-03	7.51E-04	5.61E-03	5.533E-01	3.648E+02	1.130
α_5	2.27E-09	5.84E-04	7.79E-05	2.93E-03	2.210E-01	3.783E+02	1.091
α_6	4.37E-16	3.43E-04	2.39E-06	1.99E-03	1.027E-01	2.994E+02	1.379

CCCG = 7, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9830709	0.9901543	0.9906500	0.9955450	6.469E+02	6.432E+00	--
α_2	1.03E-03	3.97E-03	3.52E-03	8.45E-03	2.840E+00	7.123E+02	0.973
α_3	4.25E-04	2.87E-03	2.34E-03	7.09E-03	1.746E+00	6.075E+02	1.142
α_4	1.10E-04	1.76E-03	1.26E-03	5.13E-03	1.084E+00	6.141E+02	1.132
α_5	4.98E-06	8.76E-04	4.24E-04	3.28E-03	5.376E-01	6.133E+02	1.134
α_6	2.86E-10	3.26E-04	3.29E-05	1.68E-03	1.979E-01	6.069E+02	1.147
α_7	1.00E-52	4.47E-05	4.48E-15	1.53E-04	2.656E-02	5.936E+02	1.173

CCCG = 8, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9838133	0.9906968	0.9911900	0.9958962	6.509E+02	6.112E+00	--
α_2	6.99E-04	3.23E-03	2.79E-03	7.26E-03	2.364E+00	7.297E+02	0.950
α_3	2.86E-04	2.40E-03	1.90E-03	6.24E-03	1.512E+00	6.275E+02	1.106
α_4	1.03E-04	1.75E-03	1.24E-03	5.14E-03	1.056E+00	6.026E+02	1.153
α_5	1.63E-05	1.07E-03	6.11E-04	3.70E-03	6.745E-01	6.279E+02	1.107
α_6	6.74E-08	5.02E-04	1.27E-04	2.28E-03	3.076E-01	6.129E+02	1.135
α_7	1.34E-15	1.91E-04	1.88E-06	1.10E-03	1.093E-01	5.724E+02	1.215
α_8	2.39E-18	1.55E-04	4.31E-07	9.05E-04	8.885E-02	5.725E+02	1.215

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.91E-01	9.89E-01	9.89E-01	9.89E-01	9.90E-01	9.91E-01
α_2	7.69E-03	6.83E-03	7.63E-03	6.45E-03	5.10E-03	3.97E-03	3.23E-03
α_3		1.99E-03	2.30E-03	3.07E-03	3.12E-03	2.87E-03	2.40E-03
α_4			1.24E-03	1.16E-03	1.51E-03	1.76E-03	1.75E-03
α_5				2.12E-04	5.84E-04	8.76E-04	1.07E-03
α_6					3.43E-04	3.26E-04	5.02E-04
α_7						4.47E-05	1.91E-04
α_8							1.55E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.91E-01	9.89E-01	9.89E-01	9.89E-01	9.90E-01	9.91E-01
Beta	7.69E-03	8.82E-03	1.12E-02	1.09E-02	1.07E-02	9.85E-03	9.30E-03
Gamma		2.25E-01	3.17E-01	4.08E-01	5.22E-01	5.97E-01	6.53E-01
Delta			3.50E-01	3.10E-01	4.39E-01	5.12E-01	6.04E-01
Epsilon				1.54E-01	3.80E-01	4.14E-01	5.23E-01
Mu					3.70E-01	2.97E-01	4.41E-01
Omega						1.21E-01	4.08E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.50	8.50	8.50	8.50	8.50	8.50	8.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 3.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.206

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9151309	0.9785279	0.9908867	0.9999516	2.050E+01	4.498E-01	--
α_2	4.84E-05	2.15E-02	9.11E-03	8.49E-02	4.498E-01	2.050E+01	0.841

CCCG = 3, Gamma = 0.206

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9160931	0.9698786	0.9774669	0.9976874	3.794E+01	1.178E+00	--
α_2	1.04E-03	2.33E-02	1.60E-02	7.06E-02	9.387E-01	3.931E+01	0.975
α_3	7.19E-08	6.80E-03	1.11E-03	3.33E-02	2.396E-01	3.500E+01	1.114

CCCG = 4, Gamma = 0.206

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9151526	0.9642416	0.9699128	0.9939108	5.119E+01	1.898E+00	--
α_2	2.13E-03	2.35E-02	1.80E-02	6.38E-02	1.285E+00	5.339E+01	1.018
α_3	7.05E-06	7.60E-03	2.73E-03	3.17E-02	3.927E-01	5.127E+01	1.078
α_4	1.80E-08	4.66E-03	6.27E-04	2.34E-02	2.207E-01	4.717E+01	1.175

CCCG = 5, Gamma = 0.206

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9335094	0.9664883	0.9694214	0.9894379	1.011E+02	3.506E+00	--
α_2	3.30E-03	1.85E-02	1.56E-02	4.35E-02	1.992E+00	1.059E+02	1.044
α_3	6.67E-04	1.07E-02	7.71E-03	3.12E-02	1.078E+00	9.925E+01	1.122
α_4	1.90E-06	3.62E-03	1.17E-03	1.55E-02	3.632E-01	9.999E+01	1.122
α_5	6.33E-21	6.84E-04	3.96E-07	3.96E-03	7.248E-02	1.059E+02	1.063

CCCG = 6, Gamma = 0.206

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9391799	0.9678683	0.9702285	0.9884892	1.265E+02	4.199E+00	--
α_2	2.37E-03	1.37E-02	1.15E-02	3.27E-02	1.941E+00	1.394E+02	0.989
α_3	1.04E-03	1.08E-02	8.33E-03	2.92E-02	1.332E+00	1.215E+02	1.138
α_4	5.37E-05	5.00E-03	2.70E-03	1.77E-02	6.181E-01	1.231E+02	1.130
α_5	1.24E-08	1.80E-03	2.68E-04	8.94E-03	2.313E-01	1.279E+02	1.091
α_6	6.93E-20	7.58E-04	7.15E-07	4.41E-03	7.684E-02	1.013E+02	1.379

CCCG = 7, Gamma = 0.206

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9476156	0.9695805	0.9710996	0.9863563	1.983E+02	6.223E+00	--
α_2	2.90E-03	1.18E-02	1.04E-02	2.56E-02	2.654E+00	2.218E+02	0.973
α_3	1.18E-03	8.60E-03	6.96E-03	2.17E-02	1.645E+00	1.895E+02	1.142
α_4	3.85E-04	5.78E-03	4.18E-03	1.66E-02	1.115E+00	1.919E+02	1.132
α_5	3.03E-05	3.13E-03	1.66E-03	1.12E-02	6.034E-01	1.920E+02	1.134
α_6	1.66E-10	9.34E-04	6.97E-05	4.96E-03	1.780E-01	1.903E+02	1.147
α_7	8.00E-51	1.47E-04	3.02E-14	5.19E-04	2.734E-02	1.862E+02	1.173

CCCG = 8, Gamma = 0.206

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9497537	0.9708082	0.9722644	0.9868890	2.077E+02	6.246E+00	--
α_2	2.43E-03	1.05E-02	9.19E-03	2.32E-02	2.504E+00	2.353E+02	0.950
α_3	7.46E-04	6.95E-03	5.42E-03	1.84E-02	1.419E+00	2.029E+02	1.106
α_4	2.88E-04	5.24E-03	3.68E-03	1.55E-02	1.027E+00	1.950E+02	1.153
α_5	7.42E-05	3.59E-03	2.16E-03	1.20E-02	7.337E-01	2.034E+02	1.107
α_6	1.99E-06	2.00E-03	7.21E-04	8.31E-03	3.975E-01	1.988E+02	1.135
α_7	4.15E-20	4.14E-04	3.98E-07	2.41E-03	7.703E-02	1.859E+02	1.215
α_8	4.37E-18	4.70E-04	1.18E-06	2.75E-03	8.749E-02	1.859E+02	1.215

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.79E-01	9.70E-01	9.64E-01	9.66E-01	9.68E-01	9.70E-01	9.71E-01
α_2	2.15E-02	2.33E-02	2.35E-02	1.85E-02	1.37E-02	1.18E-02	1.05E-02
α_3		6.80E-03	7.60E-03	1.07E-02	1.08E-02	8.60E-03	6.95E-03
α_4			4.66E-03	3.62E-03	5.00E-03	5.78E-03	5.24E-03
α_5				6.84E-04	1.80E-03	3.13E-03	3.59E-03
α_6					7.58E-04	9.34E-04	2.00E-03
α_7						1.47E-04	4.14E-04
α_8							4.70E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.79E-01	9.70E-01	9.64E-01	9.66E-01	9.68E-01	9.70E-01	9.71E-01
Beta	2.15E-02	3.01E-02	3.58E-02	3.35E-02	3.21E-02	3.04E-02	2.92E-02
Gamma		2.26E-01	3.43E-01	4.49E-01	5.73E-01	6.11E-01	6.39E-01
Delta			3.80E-01	2.86E-01	4.11E-01	5.37E-01	6.28E-01
Epsilon				1.59E-01	3.39E-01	4.22E-01	5.53E-01
Mu					2.96E-01	2.57E-01	4.45E-01
Omega						1.36E-01	3.07E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.50	3.50	3.50	3.50	3.50	3.50	3.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.235

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9459493	0.9861486	0.9939269	0.9999600	3.350E+01	4.706E-01	--
α_2	4.00E-05	1.39E-02	6.07E-03	5.41E-02	4.706E-01	3.350E+01	0.841

CCCG = 3, Gamma = 0.235

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9517500	0.9831898	0.9877915	0.9988961	6.448E+01	1.103E+00	--
α_2	3.44E-04	1.19E-02	7.58E-03	3.82E-02	8.104E-01	6.724E+01	0.975
α_3	4.14E-07	4.90E-03	1.15E-03	2.26E-02	2.921E-01	5.930E+01	1.114

CCCG = 4, Gamma = 0.235

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9590454	0.9827326	0.9854894	0.9969892	1.111E+02	1.953E+00	--
α_2	1.05E-03	1.13E-02	8.62E-03	3.06E-02	1.312E+00	1.151E+02	1.018
α_3	6.59E-06	3.92E-03	1.55E-03	1.58E-02	4.307E-01	1.096E+02	1.078
α_4	4.15E-09	2.08E-03	2.46E-04	1.06E-02	2.099E-01	1.007E+02	1.175

CCCG = 5, Gamma = 0.235

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9678766	0.9844472	0.9860339	0.9955944	1.967E+02	3.107E+00	--
α_2	1.15E-03	8.16E-03	6.64E-03	2.04E-02	1.684E+00	2.046E+02	1.044
α_3	2.18E-04	4.91E-03	3.34E-03	1.50E-02	9.426E-01	1.909E+02	1.122
α_4	1.49E-06	1.99E-03	6.84E-04	8.39E-03	3.816E-01	1.915E+02	1.122
α_5	1.95E-16	4.87E-04	2.67E-06	2.83E-03	9.865E-02	2.025E+02	1.063

CCCG = 6, Gamma = 0.235

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9718103	0.9855592	0.9867640	0.9951916	2.609E+02	3.822E+00	--
α_2	8.65E-04	5.97E-03	4.87E-03	1.48E-02	1.714E+00	2.854E+02	0.989
α_3	2.91E-04	4.44E-03	3.21E-03	1.28E-02	1.108E+00	2.484E+02	1.138
α_4	3.43E-05	2.59E-03	1.44E-03	9.04E-03	6.509E-01	2.506E+02	1.130
α_5	1.93E-08	9.74E-04	1.76E-04	4.70E-03	2.536E-01	2.600E+02	1.091
α_6	7.54E-17	4.65E-04	2.11E-06	2.71E-03	9.572E-02	2.058E+02	1.379

CCCG = 7, Gamma = 0.235

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9757314	0.9865619	0.9873919	0.9945575	3.814E+02	5.195E+00	--
α_2	9.39E-04	4.95E-03	4.20E-03	1.15E-02	2.105E+00	4.235E+02	0.973
α_3	3.42E-04	3.64E-03	2.78E-03	9.89E-03	1.320E+00	3.612E+02	1.142
α_4	1.39E-04	2.72E-03	1.89E-03	8.16E-03	9.967E-01	3.651E+02	1.132
α_5	7.27E-06	1.44E-03	6.83E-04	5.42E-03	5.249E-01	3.647E+02	1.134
α_6	4.02E-10	5.41E-04	5.30E-05	2.81E-03	1.956E-01	3.611E+02	1.147
α_7	4.27E-28	1.50E-04	3.40E-09	8.13E-04	5.291E-02	3.532E+02	1.173

CCCG = 8, Gamma = 0.235

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9776258	0.9872673	0.9879697	0.9945099	4.522E+02	5.832E+00	--
α_2	8.85E-04	4.36E-03	3.73E-03	9.98E-03	2.229E+00	5.089E+02	0.950
α_3	2.46E-04	2.87E-03	2.16E-03	7.92E-03	1.260E+00	4.379E+02	1.106
α_4	1.41E-04	2.47E-03	1.74E-03	7.29E-03	1.042E+00	4.204E+02	1.153
α_5	4.08E-05	1.74E-03	1.06E-03	5.73E-03	7.626E-01	4.381E+02	1.107
α_6	1.75E-07	7.64E-04	2.13E-04	3.40E-03	3.271E-01	4.278E+02	1.135
α_7	3.26E-13	3.36E-04	9.01E-06	1.89E-03	1.344E-01	3.996E+02	1.215
α_8	1.73E-20	1.92E-04	1.80E-07	1.12E-03	7.682E-02	3.997E+02	1.215

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.83E-01	9.83E-01	9.84E-01	9.86E-01	9.87E-01	9.87E-01
α_2	1.39E-02	1.19E-02	1.13E-02	8.16E-03	5.97E-03	4.95E-03	4.36E-03
α_3		4.90E-03	3.92E-03	4.91E-03	4.44E-03	3.64E-03	2.87E-03
α_4			2.08E-03	1.99E-03	2.59E-03	2.72E-03	2.47E-03
α_5				4.87E-04	9.74E-04	1.44E-03	1.74E-03
α_6					4.65E-04	5.41E-04	7.64E-04
α_7						1.50E-04	3.36E-04
α_8							1.92E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.83E-01	9.83E-01	9.84E-01	9.86E-01	9.87E-01	9.87E-01
Beta	1.39E-02	1.68E-02	1.73E-02	1.56E-02	1.44E-02	1.34E-02	1.27E-02
Gamma		2.92E-01	3.47E-01	4.75E-01	5.87E-01	6.32E-01	6.58E-01
Delta			3.47E-01	3.35E-01	4.76E-01	5.71E-01	6.57E-01
Epsilon				1.97E-01	3.57E-01	4.39E-01	5.51E-01
Mu					3.23E-01	3.25E-01	4.27E-01
Omega						2.17E-01	4.09E-01
Sigma							3.64E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.059

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9854726	0.9962307	0.9982978	0.9999861	1.304E+02	4.932E-01	--
α_2	1.39E-05	3.77E-03	1.70E-03	1.45E-02	4.932E-01	1.304E+02	0.841

CCCG = 3, Gamma = 0.059

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9872813	0.9956576	0.9969143	0.9997428	2.429E+02	1.059E+00	--
α_2	5.23E-05	2.80E-03	1.65E-03	9.44E-03	7.137E-01	2.546E+02	0.975
α_3	5.57E-07	1.55E-03	4.68E-04	6.75E-03	3.458E-01	2.232E+02	1.114

CCCG = 4, Gamma = 0.059

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9893871	0.9954376	0.9961276	0.9991295	4.614E+02	2.115E+00	--
α_2	4.02E-04	3.25E-03	2.59E-03	8.36E-03	1.549E+00	4.755E+02	1.018
α_3	1.83E-08	5.87E-04	1.15E-04	2.79E-03	2.646E-01	4.504E+02	1.078
α_4	8.05E-08	7.28E-04	1.79E-04	3.33E-03	3.010E-01	4.131E+02	1.175

CCCG = 5, Gamma = 0.059

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9927076	0.9959497	0.9961983	0.9983429	1.309E+03	5.325E+00	--
α_2	8.61E-04	2.70E-03	2.46E-03	5.36E-03	3.632E+00	1.342E+03	1.044
α_3	1.06E-04	1.08E-03	8.31E-04	2.92E-03	1.354E+00	1.250E+03	1.122
α_4	2.25E-08	2.37E-04	5.65E-05	1.09E-03	2.961E-01	1.251E+03	1.122
α_5	9.56E-35	3.21E-05	3.54E-11	1.59E-04	4.243E-02	1.322E+03	1.063

CCCG = 6, Gamma = 0.059

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9924724	0.9958960	0.9961675	0.9983925	1.198E+03	4.936E+00	--
α_2	6.04E-04	2.27E-03	2.02E-03	4.80E-03	2.915E+00	1.280E+03	0.989
α_3	9.62E-05	1.13E-03	8.47E-04	3.12E-03	1.257E+00	1.114E+03	1.138
α_4	1.82E-06	4.48E-04	2.05E-04	1.72E-03	5.031E-01	1.122E+03	1.130
α_5	2.87E-15	9.93E-05	1.31E-06	5.69E-04	1.155E-01	1.163E+03	1.091
α_6	7.37E-13	1.58E-04	5.77E-06	8.73E-04	1.451E-01	9.201E+02	1.379

CCCG = 7, Gamma = 0.059

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9941079	0.9962709	0.9963979	0.9980003	2.579E+03	9.654E+00	--
α_2	6.69E-04	1.73E-03	1.61E-03	3.18E-03	4.851E+00	2.803E+03	0.973
α_3	3.00E-04	1.17E-03	1.03E-03	2.51E-03	2.800E+00	2.389E+03	1.142
α_4	5.86E-05	5.73E-04	4.43E-04	1.53E-03	1.384E+00	2.414E+03	1.132
α_5	7.20E-07	2.03E-04	9.09E-05	7.87E-04	4.902E-01	2.409E+03	1.134
α_6	1.14E-15	4.81E-05	6.09E-07	2.76E-04	1.146E-01	2.383E+03	1.147
α_7	3.30E-93	6.28E-06	6.68E-25	7.46E-06	1.464E-02	2.330E+03	1.173

CCCG = 8, Gamma = 0.059

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9938720	0.9963573	0.9965245	0.9982719	1.955E+03	7.148E+00	--
α_2	3.71E-04	1.37E-03	1.22E-03	2.88E-03	2.980E+00	2.174E+03	0.950
α_3	1.82E-04	1.05E-03	8.76E-04	2.50E-03	1.960E+00	1.869E+03	1.106
α_4	4.75E-05	6.49E-04	4.76E-04	1.84E-03	1.166E+00	1.794E+03	1.153
α_5	1.63E-06	2.88E-04	1.39E-04	1.08E-03	5.375E-01	1.869E+03	1.107
α_6	2.19E-11	9.90E-05	7.68E-06	5.23E-04	1.805E-01	1.824E+03	1.135
α_7	1.26E-35	2.43E-05	1.82E-11	1.19E-04	4.139E-02	1.703E+03	1.215
α_8	1.01E-08	1.66E-04	3.66E-05	7.74E-04	2.827E-01	1.703E+03	1.215

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.96E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	3.77E-03	2.80E-03	3.25E-03	2.70E-03	2.27E-03	1.73E-03	1.37E-03
α_3		1.55E-03	5.87E-04	1.08E-03	1.13E-03	1.17E-03	1.05E-03
α_4			7.28E-04	2.37E-04	4.48E-04	5.73E-04	6.49E-04
α_5				3.21E-05	9.93E-05	2.03E-04	2.88E-04
α_6					1.58E-04	4.81E-05	9.90E-05
α_7						6.28E-06	2.43E-05
α_8							1.66E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.96E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	3.77E-03	4.34E-03	4.56E-03	4.05E-03	4.10E-03	3.73E-03	3.64E-03
Gamma		3.56E-01	2.88E-01	3.34E-01	4.46E-01	5.37E-01	6.24E-01
Delta			5.54E-01	1.99E-01	3.85E-01	4.15E-01	5.39E-01
Epsilon				1.19E-01	3.64E-01	3.10E-01	4.70E-01
Mu					6.14E-01	2.11E-01	5.02E-01
Omega						1.16E-01	6.58E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.4.2 CSS-MDP-FH: CSS Motor-Driven Pumps Fail to Run Less Than One Hour

Generic CCF Parameters

System Group: Clean Water
System: Containment Spray Recirculation
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run < 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9293809	0.9818971	0.9920474	0.9999453	1.0000000	2.541E+01	4.685E-01
α_2	5.13E-05	1.81E-02	7.95E-03	7.06E-02	0.00E+00	4.685E-01	2.541E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9483145	0.9818372	0.9866969	0.9987453	1.0000000	6.098E+01	1.128E+00
α_2	4.60E-04	1.37E-02	8.95E-03	4.32E-02	0.00E+00	8.512E-01	6.126E+01
α_3	2.23E-07	4.46E-03	9.56E-04	2.09E-02	0.00E+00	2.768E-01	6.183E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9525994	0.9801860	0.9834318	0.9966772	1.0000000	9.368E+01	1.894E+00
α_2	1.14E-03	1.32E-02	9.97E-03	3.62E-02	0.00E+00	1.260E+00	9.431E+01
α_3	4.58E-06	4.21E-03	1.55E-03	1.74E-02	0.00E+00	4.024E-01	9.517E+01
α_4	1.68E-08	2.42E-03	3.61E-04	1.20E-02	0.00E+00	2.315E-01	9.534E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9650736	0.9826018	0.9842043	0.9946508	1.0000000	1.938E+02	3.432E+00
α_2	1.66E-03	9.75E-03	8.15E-03	2.33E-02	0.00E+00	1.924E+00	1.953E+02
α_3	3.08E-04	5.32E-03	3.77E-03	1.56E-02	0.00E+00	1.049E+00	1.962E+02
α_4	1.47E-06	1.94E-03	6.68E-04	8.17E-03	0.00E+00	3.822E-01	1.969E+02
α_5	3.38E-20	3.89E-04	3.63E-07	2.26E-03	0.00E+00	7.674E-02	1.972E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9677940	0.9834740	0.9848410	0.9944760	1.0000000	2.282E+02	3.835E+00
α_2	1.05E-03	7.33E-03	5.97E-03	1.83E-02	0.00E+00	1.701E+00	2.304E+02
α_3	4.10E-04	5.20E-03	3.87E-03	1.46E-02	0.00E+00	1.207E+00	2.308E+02

α_4	2.35E-05	2.57E-03	1.35E-03	9.25E-03	0.00E+00	5.960E-01	2.315E+02
α_5	3.73E-09	9.53E-04	1.27E-04	4.78E-03	0.00E+00	2.211E-01	2.318E+02
α_6	3.72E-15	4.73E-04	4.79E-06	2.73E-03	0.00E+00	1.098E-01	2.319E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9733872	0.9848971	0.9857364	0.9935299	1.0000000	3.748E+02	5.747E+00
α_2	1.21E-03	5.89E-03	5.05E-03	1.35E-02	0.00E+00	2.243E+00	3.783E+02
α_3	5.75E-04	4.28E-03	3.45E-03	1.08E-02	0.00E+00	1.630E+00	3.789E+02
α_4	1.77E-04	2.85E-03	2.04E-03	8.28E-03	0.00E+00	1.083E+00	3.795E+02
α_5	1.07E-05	1.49E-03	7.49E-04	5.46E-03	0.00E+00	5.654E-01	3.800E+02
α_6	2.76E-10	5.03E-04	4.65E-05	2.62E-03	0.00E+00	1.916E-01	3.804E+02
α_7	6.26E-41	9.14E-05	3.40E-12	4.01E-04	0.00E+00	3.480E-02	3.805E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9746696	0.9856411	0.9864433	0.9938665	1.0000000	3.930E+02	5.726E+00
α_2	9.13E-04	5.06E-03	4.26E-03	1.19E-02	0.00E+00	2.018E+00	3.967E+02
α_3	3.60E-04	3.49E-03	2.70E-03	9.30E-03	0.00E+00	1.391E+00	3.974E+02
α_4	1.58E-04	2.66E-03	1.89E-03	7.80E-03	0.00E+00	1.062E+00	3.977E+02
α_5	3.11E-05	1.76E-03	1.03E-03	5.98E-03	0.00E+00	7.026E-01	3.980E+02
α_6	3.44E-07	8.77E-04	2.69E-04	3.81E-03	0.00E+00	3.497E-01	3.984E+02
α_7	1.32E-15	2.70E-04	2.48E-06	1.56E-03	0.00E+00	1.078E-01	3.986E+02
α_8	2.76E-17	2.37E-04	1.01E-06	1.38E-03	0.00E+00	9.469E-02	3.987E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.81E-02	1.37E-02	1.32E-02	9.75E-03	7.33E-03	5.89E-03	5.06E-03
α_3		4.46E-03	4.21E-03	5.32E-03	5.20E-03	4.28E-03	3.49E-03
α_4			2.42E-03	1.94E-03	2.57E-03	2.85E-03	2.66E-03
α_5				3.89E-04	9.53E-04	1.49E-03	1.76E-03
α_6					4.73E-04	5.03E-04	8.77E-04
α_7						9.14E-05	2.70E-04
α_8							2.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.81E-02	1.82E-02	1.98E-02	1.74E-02	1.65E-02	1.51E-02	1.44E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9697971	0.9922060	0.9965253	0.9999741	6.154E+01	4.834E-01	--
α_2	2.59E-05	7.79E-03	3.47E-03	3.02E-02	4.834E-01	6.154E+01	0.731

CCCG = 3, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9819073	0.9934947	0.9951370	0.9994698	1.872E+02	1.226E+00	--
α_2	2.64E-04	5.43E-03	3.74E-03	1.63E-02	9.769E-01	1.790E+02	0.733
α_3	1.72E-08	1.08E-03	1.87E-04	5.23E-03	2.487E-01	2.304E+02	0.572

CCCG = 4, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9818161	0.9922393	0.9934379	0.9985649	2.630E+02	2.057E+00	--
α_2	6.20E-04	5.62E-03	4.40E-03	1.48E-02	1.442E+00	2.550E+02	0.721
α_3	1.84E-06	1.47E-03	5.50E-04	6.03E-03	4.114E-01	2.803E+02	0.659
α_4	8.81E-10	6.72E-04	7.32E-05	3.45E-03	2.036E-01	3.029E+02	0.610

CCCG = 5, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9852270	0.9925257	0.9931810	0.9975858	4.891E+02	3.683E+00	--
α_2	9.63E-04	4.71E-03	4.04E-03	1.08E-02	2.243E+00	4.736E+02	0.747
α_3	9.25E-05	1.84E-03	1.27E-03	5.53E-03	9.912E-01	5.373E+02	0.660
α_4	4.87E-07	7.15E-04	2.42E-04	3.03E-03	3.765E-01	5.260E+02	0.675
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.540E+02	1.003

CCCG = 6, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9849900	0.9921656	0.9927777	0.9972507	5.242E+02	4.139E+00	--
α_2	8.64E-04	4.49E-03	3.82E-03	1.04E-02	2.128E+00	4.715E+02	0.856
α_3	1.22E-04	1.77E-03	1.29E-03	5.08E-03	1.134E+00	6.380E+02	0.634
α_4	5.95E-06	9.12E-04	4.52E-04	3.38E-03	5.533E-01	6.065E+02	0.668
α_5	1.52E-09	3.91E-04	5.21E-05	1.96E-03	2.210E-01	5.656E+02	0.717
α_6	3.37E-16	2.65E-04	1.84E-06	1.54E-03	1.027E-01	3.876E+02	1.046

CCCG = 7, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9872636	0.9925979	0.9929724	0.9966535	8.625E+02	6.432E+00	--

α_2	1.02E-03	3.93E-03	3.48E-03	8.36E-03	2.840E+00	7.205E+02	0.952
α_3	2.43E-04	1.64E-03	1.34E-03	4.06E-03	1.746E+00	1.062E+03	0.647
α_4	6.63E-05	1.07E-03	7.62E-04	3.10E-03	1.084E+00	1.016E+03	0.677
α_5	2.99E-06	5.26E-04	2.55E-04	1.97E-03	5.376E-01	1.022E+03	0.673
α_6	1.71E-10	1.94E-04	1.96E-05	1.00E-03	1.979E-01	1.018E+03	0.676
α_7	1.09E-52	4.88E-05	4.89E-15	1.67E-04	2.656E-02	5.441E+02	1.265

CCCG = 8, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9870757	0.9925759	0.9929709	0.9967273	8.172E+02	6.112E+00	--
α_2	7.74E-04	3.58E-03	3.09E-03	8.04E-03	2.364E+00	6.588E+02	1.041
α_3	1.78E-04	1.50E-03	1.19E-03	3.89E-03	1.512E+00	1.007E+03	0.683
α_4	5.82E-05	9.92E-04	7.03E-04	2.92E-03	1.056E+00	1.063E+03	0.647
α_5	1.05E-05	6.96E-04	3.96E-04	2.40E-03	6.745E-01	9.682E+02	0.710
α_6	3.91E-08	2.91E-04	7.40E-05	1.32E-03	3.076E-01	1.055E+03	0.652
α_7	6.99E-16	1.00E-04	9.87E-07	5.77E-04	1.093E-01	1.093E+03	0.630
α_8	4.15E-18	2.69E-04	7.47E-07	1.57E-03	8.885E-02	3.304E+02	2.082

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.93E-01	9.92E-01	9.93E-01	9.92E-01	9.93E-01	9.93E-01
α_2	7.79E-03	5.43E-03	5.62E-03	4.71E-03	4.49E-03	3.93E-03	3.58E-03
α_3		1.08E-03	1.47E-03	1.84E-03	1.77E-03	1.64E-03	1.50E-03
α_4			6.72E-04	7.15E-04	9.12E-04	1.07E-03	9.92E-04
α_5				2.04E-04	3.91E-04	5.26E-04	6.96E-04
α_6					2.65E-04	1.94E-04	2.91E-04
α_7						4.88E-05	1.00E-04
α_8							2.69E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.93E-01	9.92E-01	9.93E-01	9.92E-01	9.93E-01	9.93E-01
Beta	7.79E-03	6.51E-03	7.76E-03	7.47E-03	7.83E-03	7.40E-03	7.42E-03
Gamma		1.66E-01	2.75E-01	3.69E-01	4.27E-01	4.70E-01	5.18E-01
Delta			3.14E-01	3.33E-01	4.69E-01	5.28E-01	6.10E-01
Epsilon				2.22E-01	4.18E-01	4.19E-01	5.77E-01
Mu					4.04E-01	3.16E-01	4.87E-01
Omega						2.01E-01	5.59E-01
Sigma							7.29E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₄			0.0000	0.0000	0.0000	0.0000	0.0000

N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--

α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_4			0.0000	0.0000	0.0000	0.0000	0.0000

N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8202288	0.9567621	0.9841236	0.9999658	8.411E+00	3.801E-01	--
α_2	3.42E-05	4.32E-02	1.59E-02	1.80E-01	3.801E-01	8.411E+00	0.731

CCCG = 3, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8661936	0.9549122	0.9682920	0.9978177	2.033E+01	9.600E-01	--
α_2	5.09E-04	3.36E-02	1.96E-02	1.14E-01	6.673E-01	1.920E+01	0.733
α_3	1.00E-06	1.15E-02	2.76E-03	5.29E-02	2.927E-01	2.516E+01	0.572

CCCG = 4, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8804865	0.9513552	0.9598806	0.9930045	3.264E+01	1.669E+00	--
α_2	1.84E-03	3.16E-02	2.27E-02	9.19E-02	1.039E+00	3.182E+01	0.721
α_3	9.39E-06	1.08E-02	3.86E-03	4.52E-02	3.887E-01	3.557E+01	0.659
α_4	7.16E-08	6.22E-03	1.03E-03	3.04E-02	2.414E-01	3.859E+01	0.610

CCCG = 5, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9168504	0.9580194	0.9616510	0.9867670	7.957E+01	3.487E+00	--
α_2	3.53E-03	2.26E-02	1.87E-02	5.50E-02	1.791E+00	7.739E+01	0.747
α_3	1.07E-03	1.35E-02	1.01E-02	3.75E-02	1.207E+00	8.837E+01	0.660
α_4	8.76E-06	4.96E-03	1.98E-03	2.00E-02	4.340E-01	8.715E+01	0.675
α_5	2.07E-26	9.32E-04	3.33E-08	5.14E-03	5.493E-02	5.886E+01	1.003

CCCG = 6, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9255284	0.9613010	0.9643152	0.9867675	9.699E+01	3.905E+00	--
α_2	1.50E-03	1.55E-02	1.20E-02	4.18E-02	1.335E+00	8.461E+01	0.856
α_3	1.62E-03	1.32E-02	1.05E-02	3.39E-02	1.531E+00	1.144E+02	0.634
α_4	1.26E-04	6.53E-03	3.88E-03	2.19E-02	7.191E-01	1.094E+02	0.668
α_5	3.51E-08	2.40E-03	4.11E-04	1.17E-02	2.467E-01	1.024E+02	0.717
α_6	1.14E-20	1.03E-03	6.24E-07	6.00E-03	7.279E-02	7.028E+01	1.046

CCCG = 7, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9386636	0.9649452	0.9668142	0.9848416	1.588E+02	5.770E+00	--

α_2	1.51E-03	1.21E-02	9.64E-03	3.09E-02	1.549E+00	1.268E+02	0.952
α_3	1.87E-03	1.05E-02	8.87E-03	2.49E-02	1.989E+00	1.867E+02	0.647
α_4	6.40E-04	7.13E-03	5.41E-03	1.95E-02	1.287E+00	1.792E+02	0.677
α_5	6.35E-05	3.81E-03	2.21E-03	1.30E-02	6.913E-01	1.807E+02	0.673
α_6	9.50E-09	1.29E-03	1.94E-04	6.37E-03	2.327E-01	1.805E+02	0.676
α_7	1.49E-64	2.19E-04	3.32E-17	5.52E-04	2.112E-02	9.652E+01	1.265

CCCG = 8, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9453664	0.9673960	0.9688349	0.9845112	2.082E+02	7.016E+00	--
α_2	1.30E-03	1.01E-02	8.11E-03	2.57E-02	1.583E+00	1.550E+02	1.041
α_3	1.47E-03	8.32E-03	6.99E-03	1.97E-02	1.986E+00	2.368E+02	0.683
α_4	9.27E-04	6.63E-03	5.38E-03	1.66E-02	1.672E+00	2.504E+02	0.647
α_5	2.33E-04	4.41E-03	3.08E-03	1.31E-02	1.011E+00	2.285E+02	0.710
α_6	1.73E-05	2.28E-03	1.16E-03	8.35E-03	5.709E-01	2.495E+02	0.652
α_7	1.60E-10	6.99E-04	5.47E-05	3.69E-03	1.809E-01	2.587E+02	0.630
α_8	2.30E-107	1.59E-04	4.83E-27	1.20E-04	1.245E-02	7.827E+01	2.082

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.57E-01	9.55E-01	9.51E-01	9.58E-01	9.61E-01	9.65E-01	9.67E-01
α_2	4.32E-02	3.36E-02	3.16E-02	2.26E-02	1.55E-02	1.21E-02	1.01E-02
α_3		1.15E-02	1.08E-02	1.35E-02	1.32E-02	1.05E-02	8.32E-03
α_4			6.22E-03	4.96E-03	6.53E-03	7.13E-03	6.63E-03
α_5				9.32E-04	2.40E-03	3.81E-03	4.41E-03
α_6					1.03E-03	1.29E-03	2.28E-03
α_7						2.19E-04	6.99E-04
α_8							1.59E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.57E-01	9.55E-01	9.51E-01	9.58E-01	9.61E-01	9.65E-01	9.67E-01
Beta	4.32E-02	4.51E-02	4.86E-02	4.20E-02	3.87E-02	3.51E-02	3.26E-02
Gamma		2.55E-01	3.50E-01	4.61E-01	5.99E-01	6.56E-01	6.90E-01
Delta			3.65E-01	3.04E-01	4.30E-01	5.41E-01	6.30E-01
Epsilon				1.58E-01	3.45E-01	4.27E-01	5.32E-01
Mu					3.01E-01	2.83E-01	4.16E-01
Omega						1.45E-01	2.73E-01
Sigma							1.85E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_4			0.0000	0.0000	0.0000	0.0000	0.0000

N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9254105	0.9808392	0.9915376	0.9999442	2.409E+01	4.706E-01	--
α_2	5.58E-05	1.92E-02	8.46E-03	7.46E-02	4.706E-01	2.409E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9492792	0.9823211	0.9871539	0.9988381	6.126E+01	1.103E+00	--
α_2	3.76E-04	1.30E-02	8.28E-03	4.17E-02	8.104E-01	6.155E+01	--
α_3	3.95E-07	4.68E-03	1.10E-03	2.16E-02	2.921E-01	6.207E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9595678	0.9829546	0.9856771	0.9970284	1.126E+02	1.953E+00	--
α_2	1.07E-03	1.15E-02	8.76E-03	3.10E-02	1.312E+00	1.132E+02	--
α_3	6.33E-06	3.76E-03	1.49E-03	1.52E-02	4.307E-01	1.141E+02	--
α_4	3.65E-09	1.83E-03	2.17E-04	9.33E-03	2.099E-01	1.143E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9696218	0.9852970	0.9867994	0.9958370	2.082E+02	3.107E+00	--
α_2	1.13E-03	7.97E-03	6.48E-03	1.99E-02	1.684E+00	2.096E+02	--
α_3	1.97E-04	4.46E-03	3.03E-03	1.36E-02	9.426E-01	2.104E+02	--
α_4	1.36E-06	1.81E-03	6.21E-04	7.62E-03	3.816E-01	2.109E+02	--
α_5	1.87E-16	4.67E-04	2.56E-06	2.72E-03	9.865E-02	2.112E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9733376	0.9863454	0.9874863	0.9954551	2.761E+02	3.822E+00	--
α_2	8.87E-04	6.12E-03	4.99E-03	1.52E-02	1.714E+00	2.782E+02	--
α_3	2.60E-04	3.96E-03	2.86E-03	1.14E-02	1.108E+00	2.788E+02	--
α_4	3.07E-05	2.33E-03	1.30E-03	8.12E-03	6.509E-01	2.793E+02	--
α_5	1.79E-08	9.06E-04	1.63E-04	4.37E-03	2.536E-01	2.797E+02	--
α_6	5.54E-17	3.42E-04	1.55E-06	1.99E-03	9.572E-02	2.798E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9771222	0.9873350	0.9881185	0.9948722	4.050E+02	5.195E+00	--

α_2	9.74E-04	5.13E-03	4.35E-03	1.20E-02	2.105E+00	4.081E+02	--
α_3	3.02E-04	3.22E-03	2.46E-03	8.74E-03	1.320E+00	4.089E+02	--
α_4	1.24E-04	2.43E-03	1.68E-03	7.28E-03	9.967E-01	4.092E+02	--
α_5	6.47E-06	1.28E-03	6.08E-04	4.83E-03	5.249E-01	4.097E+02	--
α_6	3.54E-10	4.77E-04	4.66E-05	2.47E-03	1.956E-01	4.100E+02	--
α_7	3.68E-28	1.29E-04	2.92E-09	7.00E-04	5.291E-02	4.101E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787229	0.9878938	0.9885625	0.9947813	4.759E+02	5.832E+00	--
α_2	9.39E-04	4.63E-03	3.96E-03	1.06E-02	2.229E+00	4.795E+02	--
α_3	2.24E-04	2.62E-03	1.97E-03	7.22E-03	1.260E+00	4.805E+02	--
α_4	1.23E-04	2.16E-03	1.53E-03	6.38E-03	1.042E+00	4.807E+02	--
α_5	3.72E-05	1.58E-03	9.69E-04	5.22E-03	7.626E-01	4.810E+02	--
α_6	1.55E-07	6.79E-04	1.90E-04	3.02E-03	3.271E-01	4.814E+02	--
α_7	2.70E-13	2.79E-04	7.48E-06	1.57E-03	1.344E-01	4.816E+02	--
α_8	1.44E-20	1.59E-04	1.50E-07	9.26E-04	7.682E-02	4.817E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.92E-02	1.30E-02	1.15E-02	7.97E-03	6.12E-03	5.13E-03	4.63E-03
α_3		4.68E-03	3.76E-03	4.46E-03	3.96E-03	3.22E-03	2.62E-03
α_4			1.83E-03	1.81E-03	2.33E-03	2.43E-03	2.16E-03
α_5				4.67E-04	9.06E-04	1.28E-03	1.58E-03
α_6					3.42E-04	4.77E-04	6.79E-04
α_7						1.29E-04	2.79E-04
α_8							1.59E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.92E-02	1.77E-02	1.70E-02	1.47E-02	1.37E-02	1.27E-02	1.21E-02
Gamma		2.65E-01	3.28E-01	4.58E-01	5.52E-01	5.95E-01	6.18E-01
Delta			3.28E-01	3.38E-01	4.74E-01	5.73E-01	6.50E-01
Epsilon				2.05E-01	3.49E-01	4.37E-01	5.55E-01
Mu					2.74E-01	3.21E-01	4.14E-01
Omega						2.13E-01	3.92E-01
Sigma							3.64E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₄			0.0000	0.0000	0.0000	0.0000	0.0000

N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9873686	0.9967233	0.9985212	0.9999880	1.500E+02	4.932E-01	--
α_2	1.20E-05	3.28E-03	1.48E-03	1.26E-02	4.932E-01	1.500E+02	0.731

CCCG = 3, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9915131	0.9971045	0.9979443	0.9998287	3.649E+02	1.059E+00	--
α_2	3.93E-05	2.10E-03	1.24E-03	7.09E-03	7.137E-01	3.390E+02	0.733
α_3	2.85E-07	7.94E-04	2.40E-04	3.47E-03	3.458E-01	4.349E+02	0.572

CCCG = 4, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9929315	0.9969633	0.9974238	0.9994212	6.942E+02	2.115E+00	--
α_2	2.85E-04	2.30E-03	1.83E-03	5.92E-03	1.549E+00	6.720E+02	0.721
α_3	1.12E-08	3.59E-04	7.02E-05	1.71E-03	2.646E-01	7.370E+02	0.659
α_4	4.18E-08	3.78E-04	9.27E-05	1.73E-03	3.010E-01	7.957E+02	0.610

CCCG = 5, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9950651	0.9972602	0.9974288	0.9988796	1.938E+03	5.325E+00	--
α_2	6.16E-04	1.93E-03	1.76E-03	3.84E-03	3.632E+00	1.877E+03	0.747
α_3	6.25E-05	6.36E-04	4.88E-04	1.72E-03	1.354E+00	2.126E+03	0.660
α_4	1.35E-08	1.42E-04	3.40E-05	6.54E-04	2.961E-01	2.080E+03	0.675
α_5	9.02E-35	3.03E-05	3.34E-11	1.50E-04	4.243E-02	1.399E+03	1.003

CCCG = 6, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9944139	0.9969555	0.9971573	0.9988080	1.616E+03	4.936E+00	--
α_2	5.23E-04	1.97E-03	1.75E-03	4.16E-03	2.915E+00	1.479E+03	0.856
α_3	5.36E-05	6.28E-04	4.72E-04	1.74E-03	1.257E+00	1.999E+03	0.634
α_4	1.08E-06	2.65E-04	1.21E-04	1.01E-03	5.031E-01	1.899E+03	0.668
α_5	1.89E-15	6.52E-05	8.60E-07	3.74E-04	1.155E-01	1.771E+03	0.717
α_6	5.59E-13	1.20E-04	4.38E-06	6.62E-04	1.451E-01	1.213E+03	1.046

CCCG = 7, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9954932	0.9971483	0.9972455	0.9984712	3.376E+03	9.654E+00	--

α_2	6.54E-04	1.69E-03	1.58E-03	3.11E-03	4.851E+00	2.866E+03	0.952
α_3	1.70E-04	6.63E-04	5.86E-04	1.42E-03	2.800E+00	4.218E+03	0.647
α_4	3.50E-05	3.43E-04	2.65E-04	9.17E-04	1.384E+00	4.037E+03	0.677
α_5	4.27E-07	1.21E-04	5.40E-05	4.67E-04	4.902E-01	4.057E+03	0.673
α_6	6.74E-16	2.84E-05	3.59E-07	1.63E-04	1.146E-01	4.042E+03	0.676
α_7	3.57E-93	6.78E-06	7.21E-25	8.05E-06	1.464E-02	2.159E+03	1.265

CCCG = 8, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9948703	0.9969513	0.9970914	0.9985540	2.337E+03	7.148E+00	--
α_2	4.07E-04	1.50E-03	1.34E-03	3.15E-03	2.980E+00	1.985E+03	1.041
α_3	1.12E-04	6.47E-04	5.41E-04	1.54E-03	1.960E+00	3.030E+03	0.683
α_4	2.66E-05	3.64E-04	2.67E-04	1.03E-03	1.166E+00	3.198E+03	0.647
α_5	1.05E-06	1.85E-04	8.93E-05	6.91E-04	5.375E-01	2.912E+03	0.710
α_6	1.26E-11	5.69E-05	4.41E-06	3.01E-04	1.805E-01	3.174E+03	0.652
α_7	6.51E-36	1.26E-05	9.42E-12	6.16E-05	4.139E-02	3.286E+03	0.630
α_8	1.74E-08	2.85E-04	6.28E-05	1.33E-03	2.827E-01	9.933E+02	2.082

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	3.28E-03	2.10E-03	2.30E-03	1.93E-03	1.97E-03	1.69E-03	1.50E-03
α_3		7.94E-04	3.59E-04	6.36E-04	6.28E-04	6.63E-04	6.47E-04
α_4			3.78E-04	1.42E-04	2.65E-04	3.43E-04	3.64E-04
α_5				3.03E-05	6.52E-05	1.21E-04	1.85E-04
α_6					1.20E-04	2.84E-05	5.69E-05
α_7						6.78E-06	1.26E-05
α_8							2.85E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	3.28E-03	2.90E-03	3.04E-03	2.74E-03	3.04E-03	2.85E-03	3.05E-03
Gamma		2.74E-01	2.43E-01	2.95E-01	3.54E-01	4.07E-01	5.08E-01
Delta			5.13E-01	2.13E-01	4.17E-01	4.29E-01	5.83E-01
Epsilon				1.76E-01	4.11E-01	3.13E-01	5.96E-01
Mu					6.47E-01	2.25E-01	6.57E-01
Omega						1.93E-01	8.39E-01
Sigma							9.58E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_4			0.0000	0.0000	0.0000	0.0000	0.0000

N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.4.3 CSS-MDP-FHRH: CSS Motor-Driven Pumps Fail to Run Less Than or Greater Than One Hour

Generic CCF Parameters

System Group: Clean Water
 System: Containment Spray Recirculation
 Component Group: Pump
 Component Type: Motor Driven Pump
 Component Subtype: Centrifugal
 Failure Mode: Fail to Run < 1H, Fail to Run > 1H
 Date Range: 2006 through 2020
 Prior: Default 2015

Total Number of Independent Failure Events: 5.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9344075	0.9831957	0.9926358	0.9999492	1.0000000	2.741E+01	4.685E-01
α_2	4.76E-05	1.68E-02	7.37E-03	6.56E-02	0.00E+00	4.685E-01	2.741E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9499123	0.9824038	0.9871113	0.9987856	1.0000000	6.298E+01	1.128E+00
α_2	4.46E-04	1.33E-02	8.67E-03	4.18E-02	0.00E+00	8.512E-01	6.326E+01
α_3	2.16E-07	4.32E-03	9.26E-04	2.03E-02	0.00E+00	2.768E-01	6.383E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9535624	0.9805921	0.9837738	0.9967462	1.0000000	9.568E+01	1.894E+00
α_2	1.12E-03	1.29E-02	9.77E-03	3.55E-02	0.00E+00	1.260E+00	9.631E+01
α_3	4.49E-06	4.12E-03	1.52E-03	1.71E-02	0.00E+00	4.024E-01	9.717E+01
α_4	1.65E-08	2.37E-03	3.54E-04	1.17E-02	0.00E+00	2.315E-01	9.734E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9654219	0.9827764	0.9843634	0.9947051	1.0000000	1.958E+02	3.432E+00
α_2	1.64E-03	9.66E-03	8.07E-03	2.31E-02	0.00E+00	1.924E+00	1.973E+02
α_3	3.05E-04	5.26E-03	3.73E-03	1.55E-02	0.00E+00	1.049E+00	1.982E+02
α_4	1.46E-06	1.92E-03	6.61E-04	8.09E-03	0.00E+00	3.822E-01	1.989E+02
α_5	3.35E-20	3.85E-04	3.59E-07	2.24E-03	0.00E+00	7.674E-02	1.992E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9680677	0.9836153	0.9849709	0.9945233	1.0000000	2.302E+02	3.835E+00
α_2	1.04E-03	7.27E-03	5.92E-03	1.81E-02	0.00E+00	1.701E+00	2.324E+02

α_3	4.07E-04	5.16E-03	3.83E-03	1.44E-02	0.00E+00	1.207E+00	2.328E+02
α_4	2.33E-05	2.55E-03	1.34E-03	9.17E-03	0.00E+00	5.960E-01	2.335E+02
α_5	3.70E-09	9.45E-04	1.26E-04	4.74E-03	0.00E+00	2.211E-01	2.338E+02
α_6	3.69E-15	4.69E-04	4.75E-06	2.71E-03	0.00E+00	1.098E-01	2.339E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9735302	0.9849761	0.9858111	0.9935639	1.0000000	3.768E+02	5.747E+00
α_2	1.20E-03	5.86E-03	5.03E-03	1.34E-02	0.00E+00	2.243E+00	3.803E+02
α_3	5.72E-04	4.26E-03	3.43E-03	1.08E-02	0.00E+00	1.630E+00	3.809E+02
α_4	1.76E-04	2.83E-03	2.03E-03	8.23E-03	0.00E+00	1.083E+00	3.815E+02
α_5	1.07E-05	1.48E-03	7.45E-04	5.43E-03	0.00E+00	5.654E-01	3.820E+02
α_6	2.75E-10	5.01E-04	4.63E-05	2.61E-03	0.00E+00	1.916E-01	3.824E+02
α_7	6.23E-41	9.10E-05	3.38E-12	3.99E-04	0.00E+00	3.480E-02	3.825E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9747953	0.9857127	0.9865111	0.9938970	1.0000000	3.950E+02	5.726E+00
α_2	9.08E-04	5.04E-03	4.24E-03	1.19E-02	0.00E+00	2.018E+00	3.987E+02
α_3	3.58E-04	3.47E-03	2.69E-03	9.26E-03	0.00E+00	1.391E+00	3.994E+02
α_4	1.58E-04	2.65E-03	1.88E-03	7.76E-03	0.00E+00	1.062E+00	3.997E+02
α_5	3.09E-05	1.75E-03	1.02E-03	5.95E-03	0.00E+00	7.026E-01	4.000E+02
α_6	3.43E-07	8.73E-04	2.68E-04	3.80E-03	0.00E+00	3.497E-01	4.004E+02
α_7	1.32E-15	2.69E-04	2.47E-06	1.55E-03	0.00E+00	1.078E-01	4.006E+02
α_8	2.75E-17	2.36E-04	1.00E-06	1.38E-03	0.00E+00	9.469E-02	4.007E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.68E-02	1.33E-02	1.29E-02	9.66E-03	7.27E-03	5.86E-03	5.04E-03
α_3		4.32E-03	4.12E-03	5.26E-03	5.16E-03	4.26E-03	3.47E-03
α_4			2.37E-03	1.92E-03	2.55E-03	2.83E-03	2.65E-03
α_5				3.85E-04	9.45E-04	1.48E-03	1.75E-03
α_6					4.69E-04	5.01E-04	8.73E-04
α_7						9.10E-05	2.69E-04
α_8							2.36E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.68E-02	1.76E-02	1.94E-02	1.72E-02	1.64E-02	1.50E-02	1.43E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.00	5.00	5.00	5.00	5.00	5.00	5.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9683646	0.9918350	0.9963582	0.9999729	5.872E+01	4.834E-01	--
α_2	2.71E-05	8.17E-03	3.64E-03	3.16E-02	4.834E-01	5.872E+01	0.766

CCCG = 3, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9796989	0.9926978	0.9945389	0.9994044	1.666E+02	1.226E+00	--
α_2	2.94E-04	6.05E-03	4.17E-03	1.82E-02	9.769E-01	1.605E+02	0.817
α_3	2.00E-08	1.25E-03	2.17E-04	6.08E-03	2.487E-01	1.981E+02	0.665

CCCG = 4, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787451	0.9909234	0.9923220	0.9983201	2.246E+02	2.057E+00	--
α_2	7.18E-04	6.51E-03	5.10E-03	1.71E-02	1.442E+00	2.201E+02	0.835
α_3	2.16E-06	1.73E-03	6.48E-04	7.10E-03	4.114E-01	2.378E+02	0.776
α_4	1.10E-09	8.42E-04	9.18E-05	4.32E-03	2.036E-01	2.416E+02	0.765

CCCG = 5, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9826351	0.9912103	0.9919790	0.9971591	4.153E+02	3.683E+00	--
α_2	1.13E-03	5.54E-03	4.75E-03	1.27E-02	2.243E+00	4.024E+02	0.878
α_3	1.12E-04	2.22E-03	1.54E-03	6.68E-03	9.912E-01	4.446E+02	0.797
α_4	5.68E-07	8.34E-04	2.82E-04	3.54E-03	3.765E-01	4.512E+02	0.787
α_5	1.63E-21	1.88E-04	1.07E-07	1.09E-03	7.237E-02	3.852E+02	0.922

CCCG = 6, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9826235	0.9909266	0.9916338	0.9968141	4.520E+02	4.139E+00	--
α_2	9.69E-04	5.04E-03	4.28E-03	1.17E-02	2.128E+00	4.202E+02	0.960
α_3	1.53E-04	2.22E-03	1.62E-03	6.36E-03	1.134E+00	5.092E+02	0.794
α_4	7.03E-06	1.08E-03	5.33E-04	3.98E-03	5.533E-01	5.138E+02	0.788
α_5	1.73E-09	4.45E-04	5.93E-05	2.23E-03	2.210E-01	4.967E+02	0.816
α_6	3.72E-16	2.92E-04	2.03E-06	1.69E-03	1.027E-01	3.519E+02	1.152

CCCG = 7, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9855036	0.9915725	0.9919980	0.9961886	7.568E+02	6.432E+00	--
α_2	1.09E-03	4.20E-03	3.72E-03	8.94E-03	2.840E+00	6.733E+02	1.018
α_3	3.05E-04	2.06E-03	1.68E-03	5.09E-03	1.746E+00	8.467E+02	0.811
α_4	7.95E-05	1.28E-03	9.13E-04	3.72E-03	1.084E+00	8.479E+02	0.811
α_5	3.58E-06	6.29E-04	3.05E-04	2.36E-03	5.376E-01	8.535E+02	0.806
α_6	1.99E-10	2.26E-04	2.28E-05	1.17E-03	1.979E-01	8.750E+02	0.787
α_7	8.30E-53	3.71E-05	3.71E-15	1.27E-04	2.656E-02	7.168E+02	0.961

CCCG = 8, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9856761	0.9917700	0.9922073	0.9963710	7.366E+02	6.112E+00	--
α_2	7.86E-04	3.63E-03	3.14E-03	8.17E-03	2.364E+00	6.482E+02	1.058
α_3	2.21E-04	1.86E-03	1.47E-03	4.82E-03	1.512E+00	8.132E+02	0.845
α_4	7.15E-05	1.22E-03	8.64E-04	3.58E-03	1.056E+00	8.643E+02	0.795
α_5	1.23E-05	8.11E-04	4.62E-04	2.80E-03	6.745E-01	8.311E+02	0.827
α_6	4.86E-08	3.62E-04	9.19E-05	1.64E-03	3.076E-01	8.496E+02	0.810
α_7	8.10E-16	1.16E-04	1.14E-06	6.68E-04	1.093E-01	9.432E+02	0.730
α_8	3.57E-18	2.31E-04	6.42E-07	1.35E-03	8.885E-02	3.842E+02	1.791

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01
α_2	8.17E-03	6.05E-03	6.51E-03	5.54E-03	5.04E-03	4.20E-03	3.63E-03
α_3		1.25E-03	1.73E-03	2.22E-03	2.22E-03	2.06E-03	1.86E-03
α_4			8.42E-04	8.34E-04	1.08E-03	1.28E-03	1.22E-03
α_5				1.88E-04	4.45E-04	6.29E-04	8.11E-04
α_6					2.92E-04	2.26E-04	3.62E-04
α_7						3.71E-05	1.16E-04
α_8							2.31E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01
Beta	8.17E-03	7.30E-03	9.08E-03	8.79E-03	9.07E-03	8.43E-03	8.23E-03
Gamma		1.72E-01	2.83E-01	3.69E-01	4.45E-01	5.02E-01	5.58E-01
Delta			3.28E-01	3.15E-01	4.49E-01	5.13E-01	5.96E-01
Epsilon				1.84E-01	4.06E-01	4.11E-01	5.55E-01
Mu					3.96E-01	2.95E-01	4.66E-01
Omega						1.41E-01	4.90E-01
Sigma							6.66E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8118629	0.9547041	0.9833082	0.9999641	8.011E+00	3.801E-01	--
α_2	3.59E-05	4.53E-02	1.67E-02	1.88E-01	3.801E-01	8.011E+00	0.766

CCCG = 3, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8497072	0.9491931	0.9641271	0.9975261	1.794E+01	9.600E-01	--
α_2	5.70E-04	3.74E-02	2.19E-02	1.27E-01	6.673E-01	1.716E+01	0.817
α_3	1.17E-06	1.34E-02	3.22E-03	6.16E-02	2.927E-01	2.159E+01	0.665

CCCG = 4, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8602542	0.9428803	0.9527303	0.9917325	2.755E+01	1.669E+00	--
α_2	2.14E-03	3.66E-02	2.63E-02	1.06E-01	1.039E+00	2.735E+01	0.835
α_3	1.11E-05	1.27E-02	4.56E-03	5.32E-02	3.887E-01	3.013E+01	0.776
α_4	9.01E-08	7.79E-03	1.29E-03	3.81E-02	2.414E-01	3.074E+01	0.765

CCCG = 5, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9022065	0.9504848	0.9547029	0.9843326	6.693E+01	3.487E+00	--
α_2	4.16E-03	2.66E-02	2.21E-02	6.46E-02	1.791E+00	6.553E+01	0.878
α_3	1.30E-03	1.63E-02	1.22E-02	4.53E-02	1.207E+00	7.293E+01	0.797
α_4	1.02E-05	5.78E-03	2.31E-03	2.33E-02	4.340E-01	7.470E+01	0.787
α_5	1.90E-26	8.57E-04	3.05E-08	4.72E-03	5.493E-02	6.405E+01	0.922

CCCG = 6, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9125969	0.9544690	0.9579662	0.9843810	8.185E+01	3.905E+00	--
α_2	1.69E-03	1.74E-02	1.34E-02	4.68E-02	1.335E+00	7.530E+01	0.960
α_3	2.03E-03	1.65E-02	1.32E-02	4.24E-02	1.531E+00	9.108E+01	0.794
α_4	1.49E-04	7.70E-03	4.59E-03	2.59E-02	7.191E-01	9.263E+01	0.788
α_5	4.00E-08	2.74E-03	4.68E-04	1.33E-02	2.467E-01	8.992E+01	0.816
α_6	1.26E-20	1.14E-03	6.87E-07	6.62E-03	7.279E-02	6.380E+01	1.152

CCCG = 7, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9285764	0.9591072	0.9612612	0.9822776	1.353E+02	5.770E+00	--
α_2	1.61E-03	1.29E-02	1.03E-02	3.31E-02	1.549E+00	1.184E+02	1.018
α_3	2.35E-03	1.32E-02	1.11E-02	3.12E-02	1.989E+00	1.486E+02	0.811
α_4	7.68E-04	8.54E-03	6.49E-03	2.33E-02	1.287E+00	1.493E+02	0.811
α_5	7.61E-05	4.56E-03	2.65E-03	1.56E-02	6.913E-01	1.508E+02	0.806
α_6	1.11E-08	1.50E-03	2.26E-04	7.41E-03	2.327E-01	1.551E+02	0.787
α_7	1.13E-64	1.66E-04	2.52E-17	4.18E-04	2.112E-02	1.272E+02	0.961

CCCG = 8, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9370250	0.9623648	0.9640086	0.9820901	1.794E+02	7.016E+00	--
α_2	1.32E-03	1.03E-02	8.24E-03	2.62E-02	1.583E+00	1.525E+02	1.058
α_3	1.82E-03	1.03E-02	8.66E-03	2.44E-02	1.986E+00	1.910E+02	0.845
α_4	1.14E-03	8.16E-03	6.62E-03	2.04E-02	1.672E+00	2.033E+02	0.795
α_5	2.72E-04	5.13E-03	3.58E-03	1.53E-02	1.011E+00	1.960E+02	0.827
α_6	2.15E-05	2.84E-03	1.44E-03	1.04E-02	5.709E-01	2.007E+02	0.810
α_7	1.86E-10	8.10E-04	6.34E-05	4.28E-03	1.809E-01	2.233E+02	0.730
α_8	1.98E-107	1.37E-04	4.15E-27	1.03E-04	1.245E-02	9.102E+01	1.791

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.55E-01	9.49E-01	9.43E-01	9.50E-01	9.54E-01	9.59E-01	9.62E-01
α_2	4.53E-02	3.74E-02	3.66E-02	2.66E-02	1.74E-02	1.29E-02	1.03E-02
α_3		1.34E-02	1.27E-02	1.63E-02	1.65E-02	1.32E-02	1.03E-02
α_4			7.79E-03	5.78E-03	7.70E-03	8.54E-03	8.16E-03
α_5				8.57E-04	2.74E-03	4.56E-03	5.13E-03
α_6					1.14E-03	1.50E-03	2.84E-03
α_7						1.66E-04	8.10E-04
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.55E-01	9.49E-01	9.43E-01	9.50E-01	9.54E-01	9.59E-01	9.62E-01
Beta	4.53E-02	5.08E-02	5.71E-02	4.95E-02	4.55E-02	4.09E-02	3.76E-02
Gamma		2.63E-01	3.59E-01	4.63E-01	6.17E-01	6.84E-01	7.27E-01
Delta			3.80E-01	2.89E-01	4.12E-01	5.28E-01	6.24E-01
Epsilon				1.29E-01	3.35E-01	4.22E-01	5.22E-01
Mu					2.94E-01	2.67E-01	4.24E-01
Omega						9.98E-02	2.50E-01
Sigma							1.45E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9470641	0.9864360	0.9940552	0.9999609	3.422E+01	4.706E-01	--
α_2	3.91E-05	1.36E-02	5.94E-03	5.29E-02	4.706E-01	3.422E+01	0.766

CCCG = 3, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9617476	0.9866968	0.9903587	0.9991293	8.177E+01	1.103E+00	--
α_2	2.97E-04	1.03E-02	6.54E-03	3.30E-02	8.104E-01	7.799E+01	0.817
α_3	2.54E-07	3.02E-03	7.09E-04	1.39E-02	2.921E-01	9.645E+01	0.665

CCCG = 4, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9675903	0.9863575	0.9885497	0.9976271	1.412E+02	1.953E+00	--
α_2	8.77E-04	9.40E-03	7.18E-03	2.55E-02	1.312E+00	1.383E+02	0.835
α_3	4.82E-06	2.87E-03	1.13E-03	1.16E-02	4.307E-01	1.497E+02	0.776
α_4	2.74E-09	1.38E-03	1.63E-04	7.01E-03	2.099E-01	1.522E+02	0.765

CCCG = 5, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9745843	0.9877102	0.9889717	0.9965247	2.497E+02	3.107E+00	--
α_2	9.79E-04	6.93E-03	5.63E-03	1.73E-02	1.684E+00	2.412E+02	0.878
α_3	1.56E-04	3.52E-03	2.39E-03	1.08E-02	9.426E-01	2.666E+02	0.797
α_4	1.06E-06	1.41E-03	4.84E-04	5.94E-03	3.816E-01	2.707E+02	0.787
α_5	1.70E-16	4.26E-04	2.34E-06	2.48E-03	9.865E-02	2.312E+02	0.922

CCCG = 6, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9767411	0.9880958	0.9890938	0.9960410	3.173E+02	3.822E+00	--
α_2	8.45E-04	5.84E-03	4.76E-03	1.45E-02	1.714E+00	2.919E+02	0.960
α_3	2.05E-04	3.12E-03	2.25E-03	9.01E-03	1.108E+00	3.538E+02	0.794
α_4	2.40E-05	1.82E-03	1.01E-03	6.35E-03	6.509E-01	3.570E+02	0.788
α_5	1.45E-08	7.34E-04	1.32E-04	3.54E-03	2.536E-01	3.453E+02	0.816
α_6	6.34E-17	3.91E-04	1.78E-06	2.28E-03	9.572E-02	2.447E+02	1.152

CCCG = 7, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9796092	0.9887167	0.9894166	0.9954341	4.552E+02	5.195E+00	--
α_2	9.87E-04	5.20E-03	4.41E-03	1.21E-02	2.105E+00	4.027E+02	1.018
α_3	2.44E-04	2.60E-03	1.98E-03	7.06E-03	1.320E+00	5.066E+02	0.811
α_4	1.00E-04	1.96E-03	1.36E-03	5.88E-03	9.967E-01	5.072E+02	0.811
α_5	5.19E-06	1.03E-03	4.88E-04	3.87E-03	5.249E-01	5.107E+02	0.806
α_6	2.77E-10	3.73E-04	3.65E-05	1.93E-03	1.956E-01	5.238E+02	0.787
α_7	3.52E-28	1.23E-04	2.79E-09	6.69E-04	5.291E-02	4.291E+02	0.961

CCCG = 8, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804377	0.9888728	0.9894886	0.9952051	5.183E+02	5.832E+00	--
α_2	9.89E-04	4.87E-03	4.17E-03	1.12E-02	2.229E+00	4.550E+02	1.058
α_3	1.89E-04	2.20E-03	1.66E-03	6.07E-03	1.260E+00	5.714E+02	0.845
α_4	9.73E-05	1.71E-03	1.21E-03	5.05E-03	1.042E+00	6.072E+02	0.795
α_5	3.06E-05	1.30E-03	7.98E-04	4.30E-03	7.626E-01	5.839E+02	0.827
α_6	1.25E-07	5.48E-04	1.53E-04	2.44E-03	3.271E-01	5.970E+02	0.810
α_7	1.96E-13	2.03E-04	5.43E-06	1.14E-03	1.344E-01	6.629E+02	0.730
α_8	2.56E-20	2.84E-04	2.67E-07	1.65E-03	7.682E-02	2.700E+02	1.791

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.87E-01	9.86E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01
α_2	1.36E-02	1.03E-02	9.40E-03	6.93E-03	5.84E-03	5.20E-03	4.87E-03
α_3		3.02E-03	2.87E-03	3.52E-03	3.12E-03	2.60E-03	2.20E-03
α_4			1.38E-03	1.41E-03	1.82E-03	1.96E-03	1.71E-03
α_5				4.26E-04	7.34E-04	1.03E-03	1.30E-03
α_6					3.91E-04	3.73E-04	5.48E-04
α_7						1.23E-04	2.03E-04
α_8							2.84E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.87E-01	9.86E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01
Beta	1.36E-02	1.33E-02	1.36E-02	1.23E-02	1.19E-02	1.13E-02	1.11E-02
Gamma		2.27E-01	3.11E-01	4.36E-01	5.10E-01	5.39E-01	5.62E-01
Delta			3.24E-01	3.42E-01	4.85E-01	5.73E-01	6.48E-01
Epsilon				2.33E-01	3.82E-01	4.37E-01	5.77E-01
Mu					3.48E-01	3.26E-01	4.42E-01
Omega						2.48E-01	4.71E-01
Sigma							5.84E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9867683	0.9965673	0.9984505	0.9999874	1.432E+02	4.932E-01	--
α_2	1.26E-05	3.43E-03	1.55E-03	1.32E-02	4.932E-01	1.432E+02	0.766

CCCG = 3, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9904303	0.9967345	0.9976811	0.9998068	3.234E+02	1.059E+00	--
α_2	4.38E-05	2.34E-03	1.38E-03	7.91E-03	7.137E-01	3.041E+02	0.817
α_3	3.32E-07	9.24E-04	2.79E-04	4.03E-03	3.458E-01	3.739E+02	0.665

CCCG = 4, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9917196	0.9964418	0.9969809	0.9993215	5.922E+02	2.115E+00	--
α_2	3.30E-04	2.66E-03	2.12E-03	6.85E-03	1.549E+00	5.805E+02	0.835
α_3	1.32E-08	4.23E-04	8.27E-05	2.01E-03	2.646E-01	6.254E+02	0.776
α_4	5.23E-08	4.74E-04	1.16E-04	2.17E-03	3.010E-01	6.348E+02	0.765

CCCG = 5, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941767	0.9967665	0.9969653	0.9986775	1.641E+03	5.325E+00	--
α_2	7.24E-04	2.27E-03	2.07E-03	4.51E-03	3.632E+00	1.596E+03	0.878
α_3	7.55E-05	7.69E-04	5.90E-04	2.07E-03	1.354E+00	1.760E+03	0.797
α_4	1.57E-08	1.66E-04	3.96E-05	7.62E-04	2.961E-01	1.785E+03	0.787
α_5	8.29E-35	2.79E-05	3.07E-11	1.38E-04	4.243E-02	1.523E+03	0.922

CCCG = 6, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9935590	0.9964890	0.9967215	0.9986251	1.401E+03	4.936E+00	--
α_2	5.87E-04	2.21E-03	1.96E-03	4.66E-03	2.915E+00	1.319E+03	0.960
α_3	6.71E-05	7.87E-04	5.91E-04	2.18E-03	1.257E+00	1.596E+03	0.794
α_4	1.27E-06	3.12E-04	1.43E-04	1.20E-03	5.031E-01	1.609E+03	0.788
α_5	2.15E-15	7.43E-05	9.80E-07	4.26E-04	1.155E-01	1.555E+03	0.816
α_6	6.16E-13	1.32E-04	4.82E-06	7.30E-04	1.451E-01	1.102E+03	1.152

CCCG = 7, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9948917	0.9967673	0.9968775	0.9982668	2.977E+03	9.654E+00	--
α_2	7.00E-04	1.81E-03	1.69E-03	3.33E-03	4.851E+00	2.679E+03	1.018
α_3	2.13E-04	8.31E-04	7.35E-04	1.78E-03	2.800E+00	3.365E+03	0.811
α_4	4.20E-05	4.11E-04	3.17E-04	1.10E-03	1.384E+00	3.368E+03	0.811
α_5	5.12E-07	1.45E-04	6.46E-05	5.59E-04	4.902E-01	3.389E+03	0.806
α_6	7.85E-16	3.30E-05	4.18E-07	1.89E-04	1.146E-01	3.474E+03	0.787
α_7	2.71E-93	5.15E-06	5.47E-25	6.11E-06	1.464E-02	2.845E+03	0.961

CCCG = 8, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9944197	0.9966832	0.9968356	0.9984267	2.148E+03	7.148E+00	--
α_2	4.13E-04	1.52E-03	1.36E-03	3.20E-03	2.980E+00	1.953E+03	1.058
α_3	1.39E-04	8.00E-04	6.69E-04	1.91E-03	1.960E+00	2.447E+03	0.845
α_4	3.28E-05	4.48E-04	3.29E-04	1.27E-03	1.166E+00	2.601E+03	0.795
α_5	1.22E-06	2.15E-04	1.04E-04	8.05E-04	5.375E-01	2.500E+03	0.827
α_6	1.56E-11	7.06E-05	5.48E-06	3.73E-04	1.805E-01	2.555E+03	0.810
α_7	7.55E-36	1.46E-05	1.09E-11	7.14E-05	4.139E-02	2.836E+03	0.730
α_8	1.49E-08	2.45E-04	5.40E-05	1.14E-03	2.827E-01	1.155E+03	1.791

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01
α_2	3.43E-03	2.34E-03	2.66E-03	2.27E-03	2.21E-03	1.81E-03	1.52E-03
α_3		9.24E-04	4.23E-04	7.69E-04	7.87E-04	8.31E-04	8.00E-04
α_4			4.74E-04	1.66E-04	3.12E-04	4.11E-04	4.48E-04
α_5				2.79E-05	7.43E-05	1.45E-04	2.15E-04
α_6					1.32E-04	3.30E-05	7.06E-05
α_7						5.15E-06	1.46E-05
α_8							2.45E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01
Beta	3.43E-03	3.27E-03	3.56E-03	3.23E-03	3.51E-03	3.23E-03	3.32E-03
Gamma		2.83E-01	2.52E-01	2.98E-01	3.72E-01	4.41E-01	5.41E-01
Delta			5.28E-01	2.01E-01	3.97E-01	4.17E-01	5.54E-01
Epsilon				1.44E-01	3.97E-01	3.08E-01	5.49E-01
Mu					6.39E-01	2.09E-01	6.06E-01
Omega						1.35E-01	7.86E-01
Sigma							9.44E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.4.4 CSS-MDP-RH: CSS Motor-Driven Pumps Fail to Run Greater Than One Hour

Generic CCF Parameters

System Group: Clean Water
System: Containment Spray Recirculation
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run > 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9265716	0.9811696	0.9917194	0.9999431	1.0000000	2.441E+01	4.685E-01
α_2	5.35E-05	1.88E-02	8.28E-03	7.34E-02	0.00E+00	4.685E-01	2.441E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9474768	0.9815399	0.9864769	0.9987198	1.0000000	5.998E+01	1.128E+00
α_2	4.68E-04	1.39E-02	9.10E-03	4.39E-02	0.00E+00	8.512E-01	6.026E+01
α_3	2.27E-07	4.53E-03	9.72E-04	2.13E-02	0.00E+00	2.768E-01	6.083E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9521027	0.9799764	0.9832554	0.9966416	1.0000000	9.268E+01	1.894E+00
α_2	1.15E-03	1.33E-02	1.01E-02	3.66E-02	0.00E+00	1.260E+00	9.331E+01
α_3	4.63E-06	4.26E-03	1.56E-03	1.76E-02	0.00E+00	4.024E-01	9.417E+01
α_4	1.70E-08	2.45E-03	3.65E-04	1.21E-02	0.00E+00	2.315E-01	9.434E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9648968	0.9825131	0.9841236	0.9946232	1.0000000	1.928E+02	3.432E+00
α_2	1.67E-03	9.80E-03	8.20E-03	2.34E-02	0.00E+00	1.924E+00	1.943E+02
α_3	3.10E-04	5.34E-03	3.79E-03	1.57E-02	0.00E+00	1.049E+00	1.952E+02
α_4	1.48E-06	1.95E-03	6.71E-04	8.21E-03	0.00E+00	3.822E-01	1.959E+02
α_5	3.40E-20	3.91E-04	3.64E-07	2.27E-03	0.00E+00	7.674E-02	1.962E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9676555	0.9834025	0.9847752	0.9944521	1.0000000	2.272E+02	3.835E+00
α_2	1.06E-03	7.36E-03	6.00E-03	1.83E-02	0.00E+00	1.701E+00	2.294E+02
α_3	4.12E-04	5.22E-03	3.88E-03	1.46E-02	0.00E+00	1.207E+00	2.298E+02

α_4	2.36E-05	2.58E-03	1.35E-03	9.29E-03	0.00E+00	5.960E-01	2.305E+02
α_5	3.75E-09	9.57E-04	1.28E-04	4.80E-03	0.00E+00	2.211E-01	2.308E+02
α_6	3.74E-15	4.75E-04	4.81E-06	2.74E-03	0.00E+00	1.098E-01	2.309E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9733172	0.9848573	0.9856988	0.9935127	1.0000000	3.738E+02	5.747E+00
α_2	1.21E-03	5.91E-03	5.07E-03	1.35E-02	0.00E+00	2.243E+00	3.773E+02
α_3	5.76E-04	4.29E-03	3.46E-03	1.09E-02	0.00E+00	1.630E+00	3.779E+02
α_4	1.78E-04	2.85E-03	2.04E-03	8.30E-03	0.00E+00	1.083E+00	3.785E+02
α_5	1.08E-05	1.49E-03	7.51E-04	5.47E-03	0.00E+00	5.654E-01	3.790E+02
α_6	2.77E-10	5.05E-04	4.66E-05	2.63E-03	0.00E+00	1.916E-01	3.794E+02
α_7	6.28E-41	9.17E-05	3.41E-12	4.02E-04	0.00E+00	3.480E-02	3.795E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9746063	0.9856050	0.9864091	0.9938511	1.0000000	3.920E+02	5.726E+00
α_2	9.15E-04	5.07E-03	4.27E-03	1.20E-02	0.00E+00	2.018E+00	3.957E+02
α_3	3.61E-04	3.50E-03	2.71E-03	9.33E-03	0.00E+00	1.391E+00	3.964E+02
α_4	1.59E-04	2.67E-03	1.90E-03	7.82E-03	0.00E+00	1.062E+00	3.967E+02
α_5	3.12E-05	1.77E-03	1.03E-03	6.00E-03	0.00E+00	7.026E-01	3.970E+02
α_6	3.45E-07	8.79E-04	2.70E-04	3.82E-03	0.00E+00	3.497E-01	3.974E+02
α_7	1.33E-15	2.71E-04	2.49E-06	1.57E-03	0.00E+00	1.078E-01	3.976E+02
α_8	2.77E-17	2.38E-04	1.01E-06	1.39E-03	0.00E+00	9.469E-02	3.977E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.88E-02	1.39E-02	1.33E-02	9.80E-03	7.36E-03	5.91E-03	5.07E-03
α_3		4.53E-03	4.26E-03	5.34E-03	5.22E-03	4.29E-03	3.50E-03
α_4			2.45E-03	1.95E-03	2.58E-03	2.85E-03	2.67E-03
α_5				3.91E-04	9.57E-04	1.49E-03	1.77E-03
α_6					4.75E-04	5.05E-04	8.79E-04
α_7						9.17E-05	2.71E-04
α_8							2.38E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.88E-02	1.85E-02	2.00E-02	1.75E-02	1.66E-02	1.51E-02	1.44E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9266853	0.9811696	0.9916872	0.9999452	2.452E+01	4.706E-01	--
α_2	5.48E-05	1.88E-02	8.31E-03	7.33E-02	4.706E-01	2.452E+01	1.063

CCCG = 3, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9470593	0.9815399	0.9865800	0.9987859	5.862E+01	1.103E+00	--
α_2	4.03E-04	1.39E-02	8.89E-03	4.47E-02	8.104E-01	5.737E+01	1.106
α_3	3.82E-07	4.53E-03	1.07E-03	2.09E-02	2.921E-01	6.419E+01	0.998

CCCG = 4, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9525673	0.9799764	0.9831576	0.9965021	9.556E+01	1.953E+00	--
α_2	1.25E-03	1.33E-02	1.02E-02	3.61E-02	1.312E+00	9.718E+01	1.183
α_3	7.17E-06	4.26E-03	1.69E-03	1.72E-02	4.307E-01	1.008E+02	1.152
α_4	4.89E-09	2.45E-03	2.90E-04	1.25E-02	2.099E-01	8.554E+01	1.359

CCCG = 5, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9639087	0.9825131	0.9842907	0.9950415	1.746E+02	3.107E+00	--
α_2	1.39E-03	9.80E-03	7.98E-03	2.45E-02	1.684E+00	1.701E+02	1.242
α_3	2.37E-04	5.34E-03	3.63E-03	1.63E-02	9.426E-01	1.754E+02	1.209
α_4	1.46E-06	1.95E-03	6.70E-04	8.22E-03	3.816E-01	1.956E+02	1.089
α_5	1.56E-16	3.91E-04	2.14E-06	2.27E-03	9.865E-02	2.522E+02	0.845

CCCG = 6, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9676250	0.9834025	0.9847815	0.9944679	2.265E+02	3.822E+00	--
α_2	1.07E-03	7.36E-03	6.01E-03	1.83E-02	1.714E+00	2.311E+02	1.211
α_3	3.43E-04	5.22E-03	3.77E-03	1.51E-02	1.108E+00	2.110E+02	1.329
α_4	3.41E-05	2.58E-03	1.44E-03	9.00E-03	6.509E-01	2.517E+02	1.117
α_5	1.90E-08	9.57E-04	1.72E-04	4.61E-03	2.536E-01	2.648E+02	1.064
α_6	7.71E-17	4.75E-04	2.16E-06	2.77E-03	9.572E-02	2.014E+02	1.399

CCCG = 7, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9726677	0.9848573	0.9857895	0.9938629	3.379E+02	5.195E+00	--
α_2	1.12E-03	5.91E-03	5.01E-03	1.38E-02	2.105E+00	3.541E+02	1.157
α_3	4.03E-04	4.29E-03	3.28E-03	1.17E-02	1.320E+00	3.061E+02	1.341
α_4	1.46E-04	2.85E-03	1.98E-03	8.55E-03	9.967E-01	3.483E+02	1.180
α_5	7.54E-06	1.49E-03	7.08E-04	5.62E-03	5.249E-01	3.519E+02	1.170
α_6	3.75E-10	5.05E-04	4.94E-05	2.62E-03	1.956E-01	3.873E+02	1.064
α_7	2.61E-28	9.17E-05	2.08E-09	4.97E-04	5.291E-02	5.770E+02	0.714

CCCG = 8, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9747174	0.9856050	0.9863965	0.9937893	3.993E+02	5.832E+00	--
α_2	1.03E-03	5.07E-03	4.35E-03	1.16E-02	2.229E+00	4.371E+02	1.101
α_3	3.00E-04	3.50E-03	2.63E-03	9.65E-03	1.260E+00	3.592E+02	1.342
α_4	1.52E-04	2.67E-03	1.88E-03	7.87E-03	1.042E+00	3.892E+02	1.240
α_5	4.15E-05	1.77E-03	1.08E-03	5.82E-03	7.626E-01	4.310E+02	1.120
α_6	2.01E-07	8.79E-04	2.46E-04	3.91E-03	3.271E-01	3.717E+02	1.300
α_7	2.63E-13	2.71E-04	7.27E-06	1.52E-03	1.344E-01	4.956E+02	0.976
α_8	2.15E-20	2.38E-04	2.23E-07	1.38E-03	7.682E-02	3.226E+02	1.499

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.88E-02	1.39E-02	1.33E-02	9.80E-03	7.36E-03	5.91E-03	5.07E-03
α_3		4.53E-03	4.26E-03	5.34E-03	5.22E-03	4.29E-03	3.50E-03
α_4			2.45E-03	1.95E-03	2.58E-03	2.85E-03	2.67E-03
α_5				3.91E-04	9.57E-04	1.49E-03	1.77E-03
α_6					4.75E-04	5.05E-04	8.79E-04
α_7						9.17E-05	2.71E-04
α_8							2.38E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.88E-02	1.85E-02	2.00E-02	1.75E-02	1.66E-02	1.51E-02	1.44E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.5 BWR Residual Heat Removal Pumps

2.1.5.1 BWR-RHR-MDP-FS: BWR RHR Motor-Driven Pumps Fail to Start

Generic CCF Parameters

Plant Type:	BWR
System Group:	Clean Water
System:	Residual Heat Removal (LCI in BWRs; LPI in PWRs)
Component Group:	Pump
Component Type:	Motor Driven Pump
Component Subtype:	Centrifugal
Failure Mode:	Fail to Start
Date Range:	2006 through 2020
Prior:	Default 2015

Total Number of Independent Failure Events: 23.7

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9324165	0.9797492	0.9878059	0.9996017	0.9801587	3.476E+01	7.185E-01
α_2	3.96E-04	2.03E-02	1.22E-02	6.76E-02	1.98E-02	7.185E-01	3.476E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9474391	0.9790625	0.9830172	0.9971618	0.9731903	7.613E+01	1.628E+00
α_2	1.30E-03	1.58E-02	1.18E-02	4.37E-02	2.01E-02	1.226E+00	7.653E+01
α_3	5.57E-06	5.17E-03	1.90E-03	2.14E-02	6.70E-03	4.018E-01	7.736E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9521352	0.9779781	0.9806412	0.9947239	0.9720954	1.146E+02	2.581E+00
α_2	1.89E-03	1.39E-02	1.13E-02	3.51E-02	1.52E-02	1.635E+00	1.156E+02
α_3	7.46E-05	5.57E-03	3.12E-03	1.94E-02	1.01E-02	6.524E-01	1.166E+02
α_4	2.24E-07	2.51E-03	5.94E-04	1.15E-02	2.54E-03	2.940E-01	1.169E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9642073	0.9811235	0.9825298	0.9932266	0.9734423	2.206E+02	4.245E+00
α_2	2.03E-03	9.95E-03	8.54E-03	2.27E-02	1.02E-02	2.237E+00	2.226E+02
α_3	6.03E-04	6.05E-03	4.67E-03	1.62E-02	1.02E-02	1.362E+00	2.235E+02
α_4	1.38E-05	2.39E-03	1.16E-03	8.95E-03	5.11E-03	5.385E-01	2.243E+02
α_5	2.44E-15	4.80E-04	4.45E-06	2.77E-03	1.02E-03	1.080E-01	2.248E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
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α_1	0.9671523	0.9822073	0.9834018	0.9931689	0.9756223	2.609E+02	4.726E+00
α_2	1.25E-03	7.29E-03	6.09E-03	1.74E-02	6.42E-03	1.935E+00	2.637E+02
α_3	6.88E-04	5.72E-03	4.54E-03	1.48E-02	8.55E-03	1.520E+00	2.641E+02
α_4	9.64E-05	3.13E-03	2.00E-03	9.99E-03	6.42E-03	8.303E-01	2.648E+02
α_5	1.96E-07	1.19E-03	3.13E-04	5.34E-03	2.57E-03	3.148E-01	2.653E+02
α_6	9.86E-14	4.72E-04	9.31E-06	2.68E-03	4.28E-04	1.254E-01	2.655E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9729142	0.9840842	0.9848441	0.9926517	0.9779241	4.133E+02	6.685E+00
α_2	1.27E-03	5.73E-03	4.97E-03	1.28E-02	3.86E-03	2.407E+00	4.176E+02
α_3	7.57E-04	4.53E-03	3.77E-03	1.09E-02	6.44E-03	1.903E+00	4.181E+02
α_4	3.19E-04	3.23E-03	2.48E-03	8.69E-03	6.44E-03	1.356E+00	4.187E+02
α_5	3.50E-05	1.74E-03	1.04E-03	5.82E-03	3.86E-03	7.294E-01	4.193E+02
α_6	8.37E-09	5.86E-04	9.95E-05	2.85E-03	1.29E-03	2.463E-01	4.198E+02
α_7	4.08E-34	1.01E-04	1.19E-10	5.04E-04	1.84E-04	4.261E-02	4.200E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9743626	0.9849363	0.9856561	0.9930442	0.9800636	4.375E+02	6.690E+00
α_2	9.21E-04	4.79E-03	4.07E-03	1.11E-02	2.26E-03	2.127E+00	4.420E+02
α_3	4.77E-04	3.62E-03	2.91E-03	9.20E-03	4.52E-03	1.609E+00	4.425E+02
α_4	2.89E-04	3.01E-03	2.30E-03	8.13E-03	5.65E-03	1.336E+00	4.428E+02
α_5	8.61E-05	2.07E-03	1.39E-03	6.39E-03	4.52E-03	9.213E-01	4.432E+02
α_6	2.54E-06	1.03E-03	4.35E-04	4.09E-03	2.26E-03	4.591E-01	4.437E+02
α_7	6.24E-13	3.13E-04	9.69E-06	1.75E-03	6.46E-04	1.391E-01	4.440E+02
α_8	8.72E-17	2.22E-04	1.21E-06	1.29E-03	8.07E-05	9.860E-02	4.440E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.80E-01	9.79E-01	9.78E-01	9.81E-01	9.82E-01	9.84E-01	9.85E-01
α_2	2.03E-02	1.58E-02	1.39E-02	9.95E-03	7.29E-03	5.73E-03	4.79E-03
α_3		5.17E-03	5.57E-03	6.05E-03	5.72E-03	4.53E-03	3.62E-03
α_4			2.51E-03	2.39E-03	3.13E-03	3.23E-03	3.01E-03
α_5				4.80E-04	1.19E-03	1.74E-03	2.07E-03
α_6					4.72E-04	5.86E-04	1.03E-03
α_7						1.01E-04	3.13E-04
α_8							2.22E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.80E-01	9.79E-01	9.78E-01	9.81E-01	9.82E-01	9.84E-01	9.85E-01
Beta	2.03E-02	2.09E-02	2.20E-02	1.89E-02	1.78E-02	1.59E-02	1.51E-02
Gamma		2.47E-01	3.67E-01	4.73E-01	5.90E-01	6.40E-01	6.82E-01
Delta			3.11E-01	3.22E-01	4.55E-01	5.55E-01	6.47E-01
Epsilon				1.67E-01	3.46E-01	4.29E-01	5.48E-01
Mu					2.85E-01	2.84E-01	4.31E-01

Omega						1.48E-01	3.41E-01
Sigma							4.15E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	11.85	17.78	23.70	29.63	35.55	41.48	47.40
N₁	0.5000	0.3750	0.2500	0.1563	0.0938	0.0547	0.0313
N₂	0.2500	0.3750	0.3750	0.3125	0.2344	0.1641	0.1094
N₃		0.1250	0.2500	0.3125	0.3125	0.2734	0.2188
N₄			0.0625	0.1563	0.2344	0.2734	0.2734
N₅				0.0313	0.0938	0.1641	0.2188
N₆					0.0156	0.0547	0.1094
N₇						0.0078	0.0313
N₈							0.0039

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 7.7

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.306

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9515442	0.9874696	0.9943786	0.9999581	3.809E+01	4.834E-01	--
α_2	4.19E-05	1.25E-02	5.62E-03	4.85E-02	4.834E-01	3.809E+01	1.249

CCCG = 3, Gamma = 0.310

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9662621	0.9878353	0.9908786	0.9990036	9.953E+01	1.226E+00	--
α_2	4.69E-04	9.61E-03	6.64E-03	2.89E-02	9.769E-01	1.006E+02	1.345
α_3	4.09E-08	2.55E-03	4.44E-04	1.24E-02	2.487E-01	9.721E+01	1.403

CCCG = 4, Gamma = 0.313

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9657002	0.9853167	0.9875567	0.9972723	1.380E+02	2.057E+00	--
α_2	1.08E-03	9.78E-03	7.67E-03	2.57E-02	1.442E+00	1.460E+02	1.300
α_3	4.23E-06	3.36E-03	1.27E-03	1.38E-02	4.114E-01	1.219E+02	1.567
α_4	2.03E-09	1.54E-03	1.68E-04	7.91E-03	2.036E-01	1.319E+02	1.451

CCCG = 5, Gamma = 0.315

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9729184	0.9862675	0.9874574	0.9955511	2.645E+02	3.683E+00	--
α_2	1.62E-03	7.90E-03	6.78E-03	1.80E-02	2.243E+00	2.815E+02	1.282
α_3	2.01E-04	3.99E-03	2.76E-03	1.20E-02	9.912E-01	2.476E+02	1.464
α_4	1.07E-06	1.57E-03	5.30E-04	6.65E-03	3.765E-01	2.397E+02	1.516
α_5	2.35E-21	2.71E-04	1.55E-07	1.57E-03	7.237E-02	2.667E+02	1.364

CCCG = 6, Gamma = 0.316

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9743628	0.9865932	0.9876295	0.9952834	3.046E+02	4.139E+00	--
α_2	1.18E-03	6.14E-03	5.22E-03	1.42E-02	2.128E+00	3.444E+02	1.201
α_3	2.80E-04	4.06E-03	2.95E-03	1.16E-02	1.134E+00	2.784E+02	1.488
α_4	1.32E-05	2.02E-03	1.00E-03	7.49E-03	5.533E-01	2.728E+02	1.522
α_5	3.11E-09	7.99E-04	1.07E-04	4.01E-03	2.210E-01	2.765E+02	1.503
α_6	4.92E-16	3.86E-04	2.69E-06	2.24E-03	1.027E-01	2.659E+02	1.564

CCCG = 7, Gamma = 0.317

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9791337	0.9878565	0.9884652	0.9945008	5.232E+02	6.432E+00	--
α_2	1.22E-03	4.68E-03	4.15E-03	9.95E-03	2.840E+00	6.043E+02	1.155
α_3	5.31E-04	3.58E-03	2.93E-03	8.85E-03	1.746E+00	4.865E+02	1.436
α_4	1.41E-04	2.27E-03	1.62E-03	6.59E-03	1.084E+00	4.773E+02	1.465
α_5	6.60E-06	1.16E-03	5.62E-04	4.34E-03	5.376E-01	4.631E+02	1.512
α_6	3.66E-10	4.17E-04	4.21E-05	2.15E-03	1.979E-01	4.746E+02	1.477
α_7	1.07E-52	4.76E-05	4.77E-15	1.63E-04	2.656E-02	5.585E+02	1.255

CCCG = 8, Gamma = 0.318

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9801134	0.9885632	0.9891670	0.9949511	5.283E+02	6.112E+00	--
α_2	8.06E-04	3.72E-03	3.22E-03	8.37E-03	2.364E+00	6.328E+02	1.106
α_3	3.54E-04	2.97E-03	2.35E-03	7.71E-03	1.512E+00	5.069E+02	1.382
α_4	1.31E-04	2.24E-03	1.59E-03	6.57E-03	1.056E+00	4.708E+02	1.489
α_5	2.14E-05	1.41E-03	8.05E-04	4.87E-03	6.745E-01	4.765E+02	1.473
α_6	9.32E-08	6.93E-04	1.76E-04	3.14E-03	3.076E-01	4.436E+02	1.583
α_7	1.60E-15	2.29E-04	2.26E-06	1.32E-03	1.093E-01	4.770E+02	1.473
α_8	2.59E-18	1.68E-04	4.65E-07	9.77E-04	8.885E-02	5.301E+02	1.325

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.88E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01
α_2	1.25E-02	9.61E-03	9.78E-03	7.90E-03	6.14E-03	4.68E-03	3.72E-03
α_3		2.55E-03	3.36E-03	3.99E-03	4.06E-03	3.58E-03	2.97E-03
α_4			1.54E-03	1.57E-03	2.02E-03	2.27E-03	2.24E-03
α_5				2.71E-04	7.99E-04	1.16E-03	1.41E-03
α_6					3.86E-04	4.17E-04	6.93E-04
α_7						4.76E-05	2.29E-04
α_8							1.68E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.88E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01
Beta	1.25E-02	1.22E-02	1.47E-02	1.37E-02	1.34E-02	1.21E-02	1.14E-02
Gamma		2.10E-01	3.34E-01	4.24E-01	5.42E-01	6.15E-01	6.75E-01
Delta			3.14E-01	3.16E-01	4.42E-01	5.21E-01	6.15E-01
Epsilon				1.47E-01	3.69E-01	4.17E-01	5.28E-01
Mu					3.26E-01	2.86E-01	4.35E-01
Omega						1.02E-01	3.64E-01
Sigma							4.22E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.85	5.77	7.70	9.62	11.55	13.47	15.40
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.139

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8179613	0.9449011	0.9662265	0.9989757	1.200E+01	6.998E-01	--
α_2	1.02E-03	5.51E-02	3.38E-02	1.82E-01	6.998E-01	1.200E+01	1.249

CCCG = 3, Gamma = 0.127

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8542266	0.9402325	0.9504321	0.9912618	2.640E+01	1.678E+00	--
α_2	4.47E-03	4.64E-02	3.61E-02	1.23E-01	1.314E+00	2.703E+01	1.345
α_3	7.40E-06	1.34E-02	4.45E-03	5.73E-02	3.646E-01	2.682E+01	1.403

CCCG = 4, Gamma = 0.119

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8616410	0.9351408	0.9423260	0.9840247	3.728E+01	2.586E+00	--
α_2	5.54E-03	3.91E-02	3.21E-02	9.68E-02	1.660E+00	4.076E+01	1.300
α_3	2.34E-04	1.83E-02	1.03E-02	6.36E-02	6.427E-01	3.454E+01	1.567
α_4	4.70E-07	7.45E-03	1.68E-03	3.47E-02	2.832E-01	3.771E+01	1.451

CCCG = 5, Gamma = 0.113

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9018620	0.9474095	0.9510127	0.9806350	7.779E+01	4.318E+00	--
α_2	5.60E-03	2.63E-02	2.27E-02	5.89E-02	2.305E+00	8.547E+01	1.282
α_3	1.89E-03	1.81E-02	1.41E-02	4.79E-02	1.391E+00	7.550E+01	1.464
α_4	3.38E-05	7.00E-03	3.32E-03	2.64E-02	5.195E-01	7.374E+01	1.516
α_5	2.13E-15	1.26E-03	9.32E-06	7.30E-03	1.037E-01	8.242E+01	1.364

CCCG = 6, Gamma = 0.109

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9106238	0.9501772	0.9530944	0.9797587	9.707E+01	5.090E+00	--
α_2	3.71E-03	1.86E-02	1.59E-02	4.27E-02	2.175E+00	1.147E+02	1.201
α_3	2.40E-03	1.74E-02	1.42E-02	4.37E-02	1.645E+00	9.263E+01	1.488
α_4	3.11E-04	9.25E-03	6.02E-03	2.92E-02	8.525E-01	9.132E+01	1.522
α_5	7.60E-07	3.48E-03	9.68E-04	1.55E-02	3.251E-01	9.300E+01	1.503
α_6	5.76E-17	1.03E-03	3.76E-06	6.02E-03	9.247E-02	8.960E+01	1.564

CCCG = 7, Gamma = 0.106

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9273033	0.9562893	0.9581365	0.9789652	1.566E+02	7.160E+00	--
α_2	3.85E-03	1.48E-02	1.32E-02	3.15E-02	2.818E+00	1.872E+02	1.155
α_3	2.13E-03	1.26E-02	1.05E-02	3.00E-02	1.918E+00	1.509E+02	1.436
α_4	9.60E-04	9.27E-03	7.20E-03	2.47E-02	1.388E+00	1.483E+02	1.465
α_5	1.27E-04	5.29E-03	3.26E-03	1.74E-02	7.675E-01	1.443E+02	1.512
α_6	1.16E-08	1.57E-03	2.36E-04	7.74E-03	2.327E-01	1.484E+02	1.477
α_7	3.23E-40	2.01E-04	9.05E-12	8.90E-04	3.515E-02	1.748E+02	1.255

CCCG = 8, Gamma = 0.103

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9300522	0.9578978	0.9596707	0.9796874	1.641E+02	7.211E+00	--
α_2	3.07E-03	1.27E-02	1.12E-02	2.76E-02	2.613E+00	2.030E+02	1.106
α_3	1.35E-03	9.95E-03	8.05E-03	2.51E-02	1.638E+00	1.630E+02	1.382
α_4	7.81E-04	8.51E-03	6.49E-03	2.32E-02	1.300E+00	1.515E+02	1.489
α_5	2.81E-04	6.17E-03	4.21E-03	1.87E-02	9.525E-01	1.535E+02	1.473
α_6	1.50E-05	3.53E-03	1.63E-03	1.35E-02	5.069E-01	1.432E+02	1.583
α_7	3.83E-15	7.01E-04	6.59E-06	4.05E-03	1.083E-01	1.543E+02	1.473
α_8	2.05E-17	5.33E-04	1.79E-06	3.11E-03	9.140E-02	1.715E+02	1.325

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.45E-01	9.40E-01	9.35E-01	9.47E-01	9.50E-01	9.56E-01	9.58E-01
α_2	5.51E-02	4.64E-02	3.91E-02	2.63E-02	1.86E-02	1.48E-02	1.27E-02
α_3		1.34E-02	1.83E-02	1.81E-02	1.74E-02	1.26E-02	9.95E-03
α_4			7.45E-03	7.00E-03	9.25E-03	9.27E-03	8.51E-03
α_5				1.26E-03	3.48E-03	5.29E-03	6.17E-03
α_6					1.03E-03	1.57E-03	3.53E-03
α_7						2.01E-04	7.01E-04
α_8							5.33E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.45E-01	9.40E-01	9.35E-01	9.47E-01	9.50E-01	9.56E-01	9.58E-01
Beta	5.51E-02	5.98E-02	6.49E-02	5.26E-02	4.98E-02	4.37E-02	4.21E-02
Gamma		2.24E-01	3.97E-01	5.01E-01	6.26E-01	6.61E-01	6.98E-01
Delta			2.90E-01	3.13E-01	4.41E-01	5.65E-01	6.61E-01
Epsilon				1.52E-01	3.28E-01	4.32E-01	5.62E-01
Mu					2.28E-01	2.50E-01	4.36E-01
Omega						1.14E-01	2.59E-01
Sigma							4.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.50	2.00	2.50	3.00	3.50	4.00
N ₁	0.5000	0.3750	0.2500	0.1563	0.0938	0.0547	0.0313
N ₂	0.2500	0.3750	0.3750	0.3125	0.2344	0.1641	0.1094
N ₃		0.1250	0.2500	0.3125	0.3125	0.2734	0.2188

N₄			0.0625	0.1563	0.2344	0.2734	0.2734
N₅				0.0313	0.0938	0.1641	0.2188
N₆					0.0156	0.0547	0.1094
N₇						0.0078	0.0313
N₈							0.0039

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 10.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.397

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9226383	0.9801205	0.9912115	0.9999420	2.320E+01	4.706E-01	--
α_2	5.80E-05	1.99E-02	8.79E-03	7.74E-02	4.706E-01	2.320E+01	1.249

CCCG = 3, Gamma = 0.402

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9385280	0.9785318	0.9843650	0.9985841	5.025E+01	1.103E+00	--
α_2	4.53E-04	1.56E-02	9.97E-03	5.00E-02	8.104E-01	5.113E+01	1.345
α_3	4.96E-07	5.86E-03	1.38E-03	2.70E-02	2.921E-01	4.952E+01	1.403

CCCG = 4, Gamma = 0.406

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9489776	0.9784462	0.9818609	0.9962309	8.864E+01	1.953E+00	--
α_2	1.28E-03	1.37E-02	1.05E-02	3.71E-02	1.312E+00	9.453E+01	1.300
α_3	9.14E-06	5.42E-03	2.15E-03	2.19E-02	4.307E-01	7.905E+01	1.567
α_4	4.88E-09	2.45E-03	2.89E-04	1.25E-02	2.099E-01	8.562E+01	1.451

CCCG = 5, Gamma = 0.409

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9608036	0.9809976	0.9829236	0.9946074	1.604E+02	3.107E+00	--
α_2	1.37E-03	9.65E-03	7.85E-03	2.41E-02	1.684E+00	1.728E+02	1.282
α_3	2.73E-04	6.17E-03	4.19E-03	1.88E-02	9.426E-01	1.519E+02	1.464
α_4	1.94E-06	2.58E-03	8.90E-04	1.09E-02	3.816E-01	1.473E+02	1.516
α_5	2.40E-16	6.01E-04	3.30E-06	3.50E-03	9.865E-02	1.640E+02	1.364

CCCG = 6, Gamma = 0.411

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9654362	0.9822733	0.9837429	0.9940884	2.118E+02	3.822E+00	--
α_2	1.01E-03	6.98E-03	5.69E-03	1.73E-02	1.714E+00	2.439E+02	1.201
α_3	3.67E-04	5.59E-03	4.04E-03	1.61E-02	1.108E+00	1.971E+02	1.488
α_4	4.44E-05	3.36E-03	1.87E-03	1.17E-02	6.509E-01	1.931E+02	1.522
α_5	2.56E-08	1.29E-03	2.33E-04	6.23E-03	2.536E-01	1.959E+02	1.503
α_6	8.24E-17	5.08E-04	2.31E-06	2.96E-03	9.572E-02	1.885E+02	1.564

CCCG = 7, Gamma = 0.412

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9707424	0.9837852	0.9847813	0.9934256	3.152E+02	5.195E+00	--
α_2	1.08E-03	5.68E-03	4.82E-03	1.32E-02	2.105E+00	3.683E+02	1.155
α_3	4.16E-04	4.43E-03	3.38E-03	1.20E-02	1.320E+00	2.966E+02	1.436
α_4	1.74E-04	3.42E-03	2.37E-03	1.02E-02	9.967E-01	2.909E+02	1.465
α_5	9.39E-06	1.86E-03	8.82E-04	7.00E-03	5.249E-01	2.823E+02	1.512
α_6	5.02E-10	6.75E-04	6.61E-05	3.50E-03	1.956E-01	2.895E+02	1.477
α_7	4.43E-28	1.55E-04	3.52E-09	8.43E-04	5.291E-02	3.407E+02	1.255

CCCG = 8, Gamma = 0.413

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9730574	0.9846554	0.9854977	0.9933773	3.742E+02	5.832E+00	--
α_2	9.97E-04	4.91E-03	4.21E-03	1.12E-02	2.229E+00	4.513E+02	1.106
α_3	2.98E-04	3.47E-03	2.61E-03	9.57E-03	1.260E+00	3.618E+02	1.382
α_4	1.76E-04	3.09E-03	2.18E-03	9.12E-03	1.042E+00	3.359E+02	1.489
α_5	5.26E-05	2.24E-03	1.37E-03	7.38E-03	7.626E-01	3.400E+02	1.473
α_6	2.36E-07	1.03E-03	2.88E-04	4.59E-03	3.271E-01	3.167E+02	1.583
α_7	3.82E-13	3.95E-04	1.06E-05	2.22E-03	1.344E-01	3.405E+02	1.473
α_8	1.83E-20	2.03E-04	1.90E-07	1.18E-03	7.682E-02	3.785E+02	1.325

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.80E-01	9.79E-01	9.78E-01	9.81E-01	9.82E-01	9.84E-01	9.85E-01
α_2	1.99E-02	1.56E-02	1.37E-02	9.65E-03	6.98E-03	5.68E-03	4.91E-03
α_3		5.86E-03	5.42E-03	6.17E-03	5.59E-03	4.43E-03	3.47E-03
α_4			2.45E-03	2.58E-03	3.36E-03	3.42E-03	3.09E-03
α_5				6.01E-04	1.29E-03	1.86E-03	2.24E-03
α_6					5.08E-04	6.75E-04	1.03E-03
α_7						1.55E-04	3.95E-04
α_8							2.03E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.80E-01	9.79E-01	9.78E-01	9.81E-01	9.82E-01	9.84E-01	9.85E-01
Beta	1.99E-02	2.15E-02	2.16E-02	1.90E-02	1.77E-02	1.62E-02	1.53E-02
Gamma		2.73E-01	3.65E-01	4.92E-01	6.06E-01	6.50E-01	6.80E-01
Delta			3.11E-01	3.41E-01	4.80E-01	5.79E-01	6.67E-01
Epsilon				1.89E-01	3.49E-01	4.40E-01	5.56E-01
Mu					2.82E-01	3.09E-01	4.21E-01
Omega						1.87E-01	3.67E-01
Sigma							3.40E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.00	7.50	10.00	12.50	15.00	17.50	20.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.159

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9786310	0.9944513	0.9974884	0.9999795	8.839E+01	4.932E-01	--
α_2	2.05E-05	5.55E-03	2.51E-03	2.14E-02	4.932E-01	8.839E+01	1.249

CCCG = 3, Gamma = 0.161

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9831464	0.9942418	0.9959046	0.9996584	1.829E+02	1.059E+00	--
α_2	7.16E-05	3.83E-03	2.26E-03	1.29E-02	7.137E-01	1.859E+02	1.345
α_3	6.96E-07	1.93E-03	5.85E-04	8.43E-03	3.458E-01	1.786E+02	1.403

CCCG = 4, Gamma = 0.162

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9863761	0.9941399	0.9950242	0.9988809	3.587E+02	2.115E+00	--
α_2	5.11E-04	4.12E-03	3.28E-03	1.06E-02	1.549E+00	3.746E+02	1.300
α_3	2.65E-08	8.48E-04	1.66E-04	4.04E-03	2.646E-01	3.117E+02	1.567
α_4	9.88E-08	8.94E-04	2.19E-04	4.08E-03	3.010E-01	3.366E+02	1.451

CCCG = 5, Gamma = 0.163

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9908656	0.9949250	0.9952360	0.9979228	1.044E+03	5.325E+00	--
α_2	1.06E-03	3.31E-03	3.01E-03	6.57E-03	3.632E+00	1.094E+03	1.282
α_3	1.38E-04	1.41E-03	1.08E-03	3.79E-03	1.354E+00	9.605E+02	1.464
α_4	3.03E-08	3.19E-04	7.61E-05	1.46E-03	2.961E-01	9.287E+02	1.516
α_5	1.22E-34	4.11E-05	4.53E-11	2.04E-04	4.243E-02	1.032E+03	1.364

CCCG = 6, Gamma = 0.164

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9905923	0.9948693	0.9952080	0.9979895	9.571E+02	4.936E+00	--
α_2	7.31E-04	2.75E-03	2.44E-03	5.81E-03	2.915E+00	1.058E+03	1.201
α_3	1.25E-04	1.47E-03	1.10E-03	4.06E-03	1.257E+00	8.549E+02	1.488
α_4	2.44E-06	6.01E-04	2.75E-04	2.30E-03	5.031E-01	8.365E+02	1.522
α_5	3.95E-15	1.36E-04	1.80E-06	7.82E-04	1.155E-01	8.473E+02	1.503
α_6	8.33E-13	1.78E-04	6.53E-06	9.87E-04	1.451E-01	8.144E+02	1.564

CCCG = 7, Gamma = 0.165

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9927450	0.9954073	0.9955635	0.9975367	2.092E+03	9.654E+00	--
α_2	7.92E-04	2.05E-03	1.91E-03	3.77E-03	4.851E+00	2.367E+03	1.155
α_3	3.76E-04	1.47E-03	1.30E-03	3.14E-03	2.800E+00	1.905E+03	1.436
α_4	7.57E-05	7.41E-04	5.72E-04	1.98E-03	1.384E+00	1.867E+03	1.465
α_5	9.58E-07	2.71E-04	1.21E-04	1.05E-03	4.902E-01	1.811E+03	1.512
α_6	1.47E-15	6.18E-05	7.83E-07	3.55E-04	1.146E-01	1.855E+03	1.477
α_7	3.53E-93	6.71E-06	7.14E-25	7.97E-06	1.464E-02	2.182E+03	1.255

CCCG = 8, Gamma = 0.165

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9925032	0.9955427	0.9957470	0.9978849	1.597E+03	7.148E+00	--
α_2	4.31E-04	1.59E-03	1.41E-03	3.34E-03	2.980E+00	1.874E+03	1.106
α_3	2.26E-04	1.30E-03	1.09E-03	3.11E-03	1.960E+00	1.500E+03	1.382
α_4	6.12E-05	8.36E-04	6.13E-04	2.37E-03	1.166E+00	1.393E+03	1.489
α_5	2.16E-06	3.81E-04	1.85E-04	1.43E-03	5.375E-01	1.409E+03	1.473
α_6	3.04E-11	1.38E-04	1.07E-05	7.27E-04	1.805E-01	1.312E+03	1.583
α_7	1.52E-35	2.94E-05	2.20E-11	1.44E-04	4.139E-02	1.410E+03	1.473
α_8	1.10E-08	1.80E-04	3.98E-05	8.41E-04	2.827E-01	1.566E+03	1.325

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.94E-01	9.94E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01
α_2	5.55E-03	3.83E-03	4.12E-03	3.31E-03	2.75E-03	2.05E-03	1.59E-03
α_3		1.93E-03	8.48E-04	1.41E-03	1.47E-03	1.47E-03	1.30E-03
α_4			8.94E-04	3.19E-04	6.01E-04	7.41E-04	8.36E-04
α_5				4.11E-05	1.36E-04	2.71E-04	3.81E-04
α_6					1.78E-04	6.18E-05	1.38E-04
α_7						6.71E-06	2.94E-05
α_8							1.80E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.94E-01	9.94E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01
Beta	5.55E-03	5.76E-03	5.86E-03	5.07E-03	5.13E-03	4.59E-03	4.46E-03
Gamma		3.36E-01	2.97E-01	3.48E-01	4.65E-01	5.55E-01	6.44E-01
Delta			5.13E-01	2.04E-01	3.84E-01	4.24E-01	5.45E-01
Epsilon				1.14E-01	3.43E-01	3.14E-01	4.66E-01
Mu					5.67E-01	2.02E-01	4.77E-01
Omega						9.80E-02	6.04E-01
Sigma							8.60E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	3.00	4.00	5.00	6.00	7.00	8.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.5.2 BWR-RHR-MDP-FH: BWR RHR Motor-Driven Pumps Fail to Run Less Than One Hour

Generic CCF Parameters

Plant Type: BWR
 System Group: Clean Water
 System: Residual Heat Removal (LCI in BWRs; LPI in PWRs)
 Component Group: Pump
 Component Type: Motor Driven Pump
 Component Subtype: Centrifugal
 Failure Mode: Fail to Run < 1H
 Date Range: 2006 through 2020
 Prior: Default 2015

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9265716	0.9811696	0.9917194	0.9999431	1.0000000	2.441E+01	4.685E-01
α_2	5.35E-05	1.88E-02	8.28E-03	7.34E-02	0.00E+00	4.685E-01	2.441E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9474768	0.9815399	0.9864769	0.9987198	1.0000000	5.998E+01	1.128E+00
α_2	4.68E-04	1.39E-02	9.10E-03	4.39E-02	0.00E+00	8.512E-01	6.026E+01
α_3	2.27E-07	4.53E-03	9.72E-04	2.13E-02	0.00E+00	2.768E-01	6.083E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9521027	0.9799764	0.9832554	0.9966416	1.0000000	9.268E+01	1.894E+00
α_2	1.15E-03	1.33E-02	1.01E-02	3.66E-02	0.00E+00	1.260E+00	9.331E+01
α_3	4.63E-06	4.26E-03	1.56E-03	1.76E-02	0.00E+00	4.024E-01	9.417E+01
α_4	1.70E-08	2.45E-03	3.65E-04	1.21E-02	0.00E+00	2.315E-01	9.434E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9648968	0.9825131	0.9841236	0.9946232	1.0000000	1.928E+02	3.432E+00
α_2	1.67E-03	9.80E-03	8.20E-03	2.34E-02	0.00E+00	1.924E+00	1.943E+02
α_3	3.10E-04	5.34E-03	3.79E-03	1.57E-02	0.00E+00	1.049E+00	1.952E+02
α_4	1.48E-06	1.95E-03	6.71E-04	8.21E-03	0.00E+00	3.822E-01	1.959E+02
α_5	3.40E-20	3.91E-04	3.64E-07	2.27E-03	0.00E+00	7.674E-02	1.962E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9676555	0.9834025	0.9847752	0.9944521	1.0000000	2.272E+02	3.835E+00

α_2	1.06E-03	7.36E-03	6.00E-03	1.83E-02	0.00E+00	1.701E+00	2.294E+02
α_3	4.12E-04	5.22E-03	3.88E-03	1.46E-02	0.00E+00	1.207E+00	2.298E+02
α_4	2.36E-05	2.58E-03	1.35E-03	9.29E-03	0.00E+00	5.960E-01	2.305E+02
α_5	3.75E-09	9.57E-04	1.28E-04	4.80E-03	0.00E+00	2.211E-01	2.308E+02
α_6	3.74E-15	4.75E-04	4.81E-06	2.74E-03	0.00E+00	1.098E-01	2.309E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9733172	0.9848573	0.9856988	0.9935127	1.0000000	3.738E+02	5.747E+00
α_2	1.21E-03	5.91E-03	5.07E-03	1.35E-02	0.00E+00	2.243E+00	3.773E+02
α_3	5.76E-04	4.29E-03	3.46E-03	1.09E-02	0.00E+00	1.630E+00	3.779E+02
α_4	1.78E-04	2.85E-03	2.04E-03	8.30E-03	0.00E+00	1.083E+00	3.785E+02
α_5	1.08E-05	1.49E-03	7.51E-04	5.47E-03	0.00E+00	5.654E-01	3.790E+02
α_6	2.77E-10	5.05E-04	4.66E-05	2.63E-03	0.00E+00	1.916E-01	3.794E+02
α_7	6.28E-41	9.17E-05	3.41E-12	4.02E-04	0.00E+00	3.480E-02	3.795E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9746063	0.9856050	0.9864091	0.9938511	1.0000000	3.920E+02	5.726E+00
α_2	9.15E-04	5.07E-03	4.27E-03	1.20E-02	0.00E+00	2.018E+00	3.957E+02
α_3	3.61E-04	3.50E-03	2.71E-03	9.33E-03	0.00E+00	1.391E+00	3.964E+02
α_4	1.59E-04	2.67E-03	1.90E-03	7.82E-03	0.00E+00	1.062E+00	3.967E+02
α_5	3.12E-05	1.77E-03	1.03E-03	6.00E-03	0.00E+00	7.026E-01	3.970E+02
α_6	3.45E-07	8.79E-04	2.70E-04	3.82E-03	0.00E+00	3.497E-01	3.974E+02
α_7	1.33E-15	2.71E-04	2.49E-06	1.57E-03	0.00E+00	1.078E-01	3.976E+02
α_8	2.77E-17	2.38E-04	1.01E-06	1.39E-03	0.00E+00	9.469E-02	3.977E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.88E-02	1.39E-02	1.33E-02	9.80E-03	7.36E-03	5.91E-03	5.07E-03
α_3		4.53E-03	4.26E-03	5.34E-03	5.22E-03	4.29E-03	3.50E-03
α_4			2.45E-03	1.95E-03	2.58E-03	2.85E-03	2.67E-03
α_5				3.91E-04	9.57E-04	1.49E-03	1.77E-03
α_6					4.75E-04	5.05E-04	8.79E-04
α_7						9.17E-05	2.71E-04
α_8							2.38E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.88E-02	1.85E-02	2.00E-02	1.75E-02	1.66E-02	1.51E-02	1.44E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8827326	0.9697149	0.9864170	0.9999102	1.507E+01	4.706E-01	--
α_2	8.98E-05	3.03E-02	1.36E-02	1.17E-01	4.706E-01	1.507E+01	1.645

CCCG = 3, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9152630	0.9702788	0.9782467	0.9980244	3.599E+01	1.103E+00	--
α_2	6.65E-04	2.28E-02	1.46E-02	7.26E-02	8.104E-01	3.480E+01	1.779
α_3	5.90E-07	6.96E-03	1.65E-03	3.21E-02	2.921E-01	4.166E+01	1.510

CCCG = 4, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9248969	0.9681240	0.9730796	0.9943863	5.930E+01	1.953E+00	--
α_2	1.96E-03	2.08E-02	1.60E-02	5.61E-02	1.312E+00	6.177E+01	1.832
α_3	1.26E-05	7.43E-03	2.96E-03	3.00E-02	4.307E-01	5.757E+01	1.992
α_4	7.31E-09	3.65E-03	4.34E-04	1.86E-02	2.099E-01	5.729E+01	2.010

CCCG = 5, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9428748	0.9722114	0.9749809	0.9920773	1.087E+02	3.107E+00	--
α_2	2.10E-03	1.48E-02	1.21E-02	3.68E-02	1.684E+00	1.122E+02	1.864
α_3	3.90E-04	8.78E-03	5.98E-03	2.67E-02	9.426E-01	1.064E+02	1.978
α_4	2.63E-06	3.49E-03	1.20E-03	1.47E-02	3.816E-01	1.091E+02	1.940
α_5	2.94E-16	7.34E-04	4.03E-06	4.27E-03	9.865E-02	1.343E+02	1.580

CCCG = 6, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9496425	0.9740976	0.9762112	0.9913285	1.437E+02	3.822E+00	--
α_2	1.55E-03	1.07E-02	8.74E-03	2.65E-02	1.714E+00	1.585E+02	1.753
α_3	5.50E-04	8.35E-03	6.04E-03	2.40E-02	1.108E+00	1.316E+02	2.117
α_4	5.84E-05	4.40E-03	2.46E-03	1.54E-02	6.509E-01	1.471E+02	1.901
α_5	3.45E-08	1.74E-03	3.14E-04	8.38E-03	2.536E-01	1.456E+02	1.926
α_6	1.16E-16	7.11E-04	3.24E-06	4.15E-03	9.572E-02	1.344E+02	2.088

CCCG = 7, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1							

α_1	0.9572983	0.9762782	0.9777141	0.9903530	2.138E+02	5.195E+00	--
α_2	1.67E-03	8.78E-03	7.45E-03	2.04E-02	2.105E+00	2.377E+02	1.714
α_3	6.13E-04	6.51E-03	4.98E-03	1.76E-02	1.320E+00	2.015E+02	2.028
α_4	2.41E-04	4.72E-03	3.28E-03	1.41E-02	9.967E-01	2.102E+02	1.947
α_5	1.32E-05	2.61E-03	1.24E-03	9.85E-03	5.249E-01	2.004E+02	2.046
α_6	6.90E-10	9.28E-04	9.09E-05	4.81E-03	1.956E-01	2.106E+02	1.950
α_7	5.02E-28	1.76E-04	3.99E-09	9.56E-04	5.291E-02	3.005E+02	1.368

CCCG = 8, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9606580	0.9775457	0.9787609	0.9902828	2.539E+02	5.832E+00	--
α_2	1.57E-03	7.74E-03	6.63E-03	1.77E-02	2.229E+00	2.859E+02	1.675
α_3	4.41E-04	5.13E-03	3.86E-03	1.41E-02	1.260E+00	2.443E+02	1.965
α_4	2.41E-04	4.23E-03	2.99E-03	1.25E-02	1.042E+00	2.450E+02	1.962
α_5	7.13E-05	3.03E-03	1.86E-03	1.00E-02	7.626E-01	2.506E+02	1.921
α_6	3.57E-07	1.56E-03	4.36E-04	6.93E-03	3.271E-01	2.096E+02	2.299
α_7	4.91E-13	5.06E-04	1.36E-05	2.84E-03	1.344E-01	2.655E+02	1.817
α_8	2.31E-20	2.56E-04	2.40E-07	1.49E-03	7.682E-02	2.998E+02	1.610

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.70E-01	9.70E-01	9.68E-01	9.72E-01	9.74E-01	9.76E-01	9.78E-01
α_2	3.03E-02	2.28E-02	2.08E-02	1.48E-02	1.07E-02	8.78E-03	7.74E-03
α_3		6.96E-03	7.43E-03	8.78E-03	8.35E-03	6.51E-03	5.13E-03
α_4			3.65E-03	3.49E-03	4.40E-03	4.72E-03	4.23E-03
α_5				7.34E-04	1.74E-03	2.61E-03	3.03E-03
α_6					7.11E-04	9.28E-04	1.56E-03
α_7						1.76E-04	5.06E-04
α_8							2.56E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.70E-01	9.70E-01	9.68E-01	9.72E-01	9.74E-01	9.76E-01	9.78E-01
Beta	3.03E-02	2.97E-02	3.19E-02	2.78E-02	2.59E-02	2.37E-02	2.25E-02
Gamma		2.34E-01	3.47E-01	4.68E-01	5.87E-01	6.30E-01	6.56E-01
Delta			3.30E-01	3.25E-01	4.51E-01	5.64E-01	6.51E-01
Epsilon				1.74E-01	3.57E-01	4.40E-01	5.58E-01
Mu					2.90E-01	2.97E-01	4.33E-01
Omega						1.59E-01	3.28E-01
Sigma							3.36E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9716175	0.9926243	0.9966535	0.9999727	6.637E+01	4.932E-01	--
α_2	2.73E-05	7.38E-03	3.35E-03	2.84E-02	4.932E-01	6.637E+01	1.645

CCCG = 3, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9789447	0.9928011	0.9948754	0.9995724	1.461E+02	1.059E+00	--
α_2	9.57E-05	5.10E-03	3.02E-03	1.72E-02	7.137E-01	1.392E+02	1.779
α_3	7.56E-07	2.10E-03	6.35E-04	9.15E-03	3.458E-01	1.645E+02	1.510

CCCG = 4, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9810222	0.9918288	0.9930568	0.9984373	2.567E+02	2.115E+00	--
α_2	7.25E-04	5.84E-03	4.65E-03	1.50E-02	1.549E+00	2.636E+02	1.832
α_3	3.39E-08	1.09E-03	2.12E-04	5.16E-03	2.646E-01	2.436E+02	1.992
α_4	1.38E-07	1.25E-03	3.06E-04	5.69E-03	3.010E-01	2.414E+02	2.010

CCCG = 5, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9870761	0.9928149	0.9932533	0.9970567	7.357E+02	5.325E+00	--
α_2	1.54E-03	4.82E-03	4.39E-03	9.57E-03	3.632E+00	7.497E+02	1.864
α_3	1.87E-04	1.91E-03	1.46E-03	5.14E-03	1.354E+00	7.086E+02	1.978
α_4	3.88E-08	4.09E-04	9.76E-05	1.88E-03	2.961E-01	7.238E+02	1.940
α_5	1.42E-34	4.77E-05	5.26E-11	2.37E-04	4.243E-02	8.886E+02	1.580

CCCG = 6, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9866375	0.9927074	0.9931869	0.9971399	6.719E+02	4.936E+00	--
α_2	1.07E-03	4.03E-03	3.58E-03	8.51E-03	2.915E+00	7.209E+02	1.753
α_3	1.79E-04	2.10E-03	1.58E-03	5.79E-03	1.257E+00	5.981E+02	2.117
α_4	3.07E-06	7.54E-04	3.45E-04	2.89E-03	5.031E-01	6.670E+02	1.901
α_5	5.08E-15	1.75E-04	2.31E-06	1.01E-03	1.155E-01	6.588E+02	1.926
α_6	1.12E-12	2.39E-04	8.75E-06	1.32E-03	1.451E-01	6.076E+02	2.088

CCCG = 7, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9896365	0.9934364	0.9936587	0.9964776	1.461E+03	9.654E+00	--
α_2	1.18E-03	3.04E-03	2.84E-03	5.61E-03	4.851E+00	1.589E+03	1.714
α_3	5.33E-04	2.08E-03	1.84E-03	4.44E-03	2.800E+00	1.345E+03	2.028
α_4	1.01E-04	9.86E-04	7.62E-04	2.64E-03	1.384E+00	1.402E+03	1.947
α_5	1.30E-06	3.67E-04	1.64E-04	1.42E-03	4.902E-01	1.335E+03	2.046
α_6	1.95E-15	8.18E-05	1.04E-06	4.69E-04	1.146E-01	1.401E+03	1.950
α_7	3.85E-93	7.33E-06	7.80E-25	8.71E-06	1.464E-02	1.997E+03	1.368

CCCG = 8, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9893492	0.9936642	0.9939536	0.9969916	1.121E+03	7.148E+00	--
α_2	6.55E-04	2.41E-03	2.15E-03	5.07E-03	2.980E+00	1.232E+03	1.675
α_3	3.23E-04	1.86E-03	1.56E-03	4.44E-03	1.960E+00	1.051E+03	1.965
α_4	8.09E-05	1.11E-03	8.11E-04	3.14E-03	1.166E+00	1.053E+03	1.962
α_5	2.83E-06	4.99E-04	2.41E-04	1.87E-03	5.375E-01	1.077E+03	1.921
α_6	4.44E-11	2.01E-04	1.56E-05	1.06E-03	1.805E-01	8.997E+02	2.299
α_7	1.88E-35	3.63E-05	2.72E-11	1.78E-04	4.139E-02	1.139E+03	1.817
α_8	1.34E-08	2.20E-04	4.85E-05	1.03E-03	2.827E-01	1.285E+03	1.610

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.93E-01	9.92E-01	9.93E-01	9.93E-01	9.93E-01	9.94E-01
α_2	7.38E-03	5.10E-03	5.84E-03	4.82E-03	4.03E-03	3.04E-03	2.41E-03
α_3		2.10E-03	1.09E-03	1.91E-03	2.10E-03	2.08E-03	1.86E-03
α_4			1.25E-03	4.09E-04	7.54E-04	9.86E-04	1.11E-03
α_5				4.77E-05	1.75E-04	3.67E-04	4.99E-04
α_6					2.39E-04	8.18E-05	2.01E-04
α_7						7.33E-06	3.63E-05
α_8							2.20E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.93E-01	9.92E-01	9.93E-01	9.93E-01	9.93E-01	9.94E-01
Beta	7.38E-03	7.20E-03	8.17E-03	7.19E-03	7.29E-03	6.56E-03	6.34E-03
Gamma		2.91E-01	2.85E-01	3.29E-01	4.48E-01	5.36E-01	6.19E-01
Delta			5.34E-01	1.93E-01	3.58E-01	4.10E-01	5.25E-01
Epsilon				1.05E-01	3.55E-01	3.16E-01	4.64E-01
Mu					5.77E-01	1.95E-01	4.78E-01
Omega						8.22E-02	5.61E-01
Sigma							8.58E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.5.3 BWR-RHR-MDP-FHRH: BWR RHR Motor-Driven Pumps Fail to Run Less Than or Greater Than One Hour

Generic CCF Parameters

Plant Type: BWR
 System Group: Clean Water
 System: Residual Heat Removal (LCI in BWRs; LPI in PWRs)
 Component Group: Pump
 Component Type: Motor Driven Pump
 Component Subtype: Centrifugal
 Failure Mode: Fail to Run < 1H, Fail to Run > 1H
 Date Range: 2006 through 2020
 Prior: Default 2015

Total Number of Independent Failure Events: 13.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9420768	0.9851358	0.9934600	0.9999533	0.9996239	3.127E+01	4.719E-01
α_2	4.36E-05	1.49E-02	6.54E-03	5.79E-02	3.76E-04	4.719E-01	3.127E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9553486	0.9842806	0.9884647	0.9988973	0.9992476	7.126E+01	1.138E+00
α_2	4.13E-04	1.19E-02	7.80E-03	3.74E-02	7.52E-04	8.612E-01	7.154E+01
α_3	1.91E-07	3.82E-03	8.19E-04	1.79E-02	0.00E+00	2.768E-01	7.212E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9585961	0.9826572	0.9854837	0.9970584	0.9989274	1.084E+02	1.913E+00
α_2	1.03E-03	1.16E-02	8.80E-03	3.17E-02	1.04E-03	1.278E+00	1.090E+02
α_3	4.00E-06	3.65E-03	1.34E-03	1.51E-02	2.82E-05	4.029E-01	1.099E+02
α_4	1.46E-08	2.10E-03	3.13E-04	1.04E-02	0.00E+00	2.315E-01	1.101E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9679412	0.9839998	0.9854647	0.9950506	0.9986277	2.129E+02	3.463E+00
α_2	1.57E-03	9.03E-03	7.56E-03	2.15E-02	1.31E-03	1.953E+00	2.145E+02
α_3	2.82E-04	4.85E-03	3.44E-03	1.43E-02	6.32E-05	1.050E+00	2.154E+02
α_4	1.34E-06	1.77E-03	6.09E-04	7.45E-03	0.00E+00	3.822E-01	2.160E+02
α_5	3.08E-20	3.55E-04	3.30E-07	2.06E-03	0.00E+00	7.674E-02	2.163E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9705020	0.9848249	0.9860693	0.9948939	0.9983453	2.517E+02	3.879E+00

α_2	1.01E-03	6.82E-03	5.58E-03	1.68E-02	1.55E-03	1.742E+00	2.539E+02
α_3	3.75E-04	4.73E-03	3.52E-03	1.32E-02	1.05E-04	1.210E+00	2.544E+02
α_4	2.14E-05	2.33E-03	1.22E-03	8.40E-03	3.53E-06	5.961E-01	2.550E+02
α_5	3.39E-09	8.65E-04	1.16E-04	4.34E-03	0.00E+00	2.211E-01	2.554E+02
α_6	3.38E-15	4.29E-04	4.35E-06	2.48E-03	0.00E+00	1.098E-01	2.555E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9750062	0.9857858	0.9865691	0.9938834	0.9980831	4.027E+02	5.807E+00
α_2	1.18E-03	5.62E-03	4.84E-03	1.27E-02	1.76E-03	2.298E+00	4.062E+02
α_3	5.39E-04	4.00E-03	3.23E-03	1.01E-02	1.52E-04	1.634E+00	4.069E+02
α_4	1.65E-04	2.65E-03	1.90E-03	7.71E-03	7.36E-06	1.083E+00	4.074E+02
α_5	1.00E-05	1.38E-03	6.98E-04	5.08E-03	0.00E+00	5.654E-01	4.080E+02
α_6	2.58E-10	4.69E-04	4.33E-05	2.44E-03	0.00E+00	1.916E-01	4.083E+02
α_7	5.83E-41	8.52E-05	3.17E-12	3.74E-04	0.00E+00	3.480E-02	4.085E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9763257	0.9865422	0.9872857	0.9942136	0.9978390	4.253E+02	5.802E+00
α_2	9.09E-04	4.84E-03	4.10E-03	1.13E-02	1.95E-03	2.087E+00	4.290E+02
α_3	3.38E-04	3.24E-03	2.51E-03	8.63E-03	2.03E-04	1.398E+00	4.297E+02
α_4	1.47E-04	2.46E-03	1.75E-03	7.22E-03	1.28E-05	1.063E+00	4.301E+02
α_5	2.88E-05	1.63E-03	9.52E-04	5.54E-03	0.00E+00	7.026E-01	4.304E+02
α_6	3.18E-07	8.11E-04	2.49E-04	3.53E-03	0.00E+00	3.497E-01	4.308E+02
α_7	1.22E-15	2.50E-04	2.30E-06	1.44E-03	0.00E+00	1.078E-01	4.310E+02
α_8	2.56E-17	2.20E-04	9.30E-07	1.28E-03	0.00E+00	9.469E-02	4.310E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.84E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01	9.87E-01
α_2	1.49E-02	1.19E-02	1.16E-02	9.03E-03	6.82E-03	5.62E-03	4.84E-03
α_3		3.82E-03	3.65E-03	4.85E-03	4.73E-03	4.00E-03	3.24E-03
α_4			2.10E-03	1.77E-03	2.33E-03	2.65E-03	2.46E-03
α_5				3.55E-04	8.65E-04	1.38E-03	1.63E-03
α_6					4.29E-04	4.69E-04	8.11E-04
α_7						8.52E-05	2.50E-04
α_8							2.20E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.84E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01	9.87E-01
Beta	1.49E-02	1.57E-02	1.73E-02	1.60E-02	1.52E-02	1.42E-02	1.35E-02
Gamma		2.43E-01	3.32E-01	4.36E-01	5.51E-01	6.04E-01	6.40E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.34E-01	6.24E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.41E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.73	13.10	17.47	21.83	26.20	30.57	34.93
N₁	0.1267	0.1800	0.2280	0.2708	0.3087	0.3421	0.3714
N₂	0.0033	0.0100	0.0185	0.0290	0.0411	0.0544	0.0688
N₃		0.0000	0.0005	0.0014	0.0028	0.0047	0.0072
N₄			0.0000	0.0000	0.0001	0.0002	0.0005
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.150

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9569399	0.9888718	0.9950170	0.9999629	4.296E+01	4.834E-01	--
α_2	3.71E-05	1.11E-02	4.98E-03	4.31E-02	4.834E-01	4.296E+01	1.051

CCCG = 3, Gamma = 0.150

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9710610	0.9895747	0.9921901	0.9991474	1.163E+02	1.226E+00	--
α_2	4.09E-04	8.39E-03	5.79E-03	2.52E-02	9.769E-01	1.154E+02	1.142
α_3	3.26E-08	2.03E-03	3.53E-04	9.86E-03	2.487E-01	1.220E+02	1.087

CCCG = 4, Gamma = 0.151

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9691176	0.9867882	0.9888091	0.9975481	1.536E+02	2.057E+00	--
α_2	1.01E-03	9.11E-03	7.15E-03	2.40E-02	1.442E+00	1.568E+02	1.180
α_3	3.35E-06	2.67E-03	1.01E-03	1.10E-02	4.114E-01	1.535E+02	1.213
α_4	1.87E-09	1.42E-03	1.55E-04	7.31E-03	2.036E-01	1.427E+02	1.305

CCCG = 5, Gamma = 0.151

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9746670	0.9871583	0.9882729	0.9958415	2.831E+02	3.683E+00	--
α_2	1.60E-03	7.80E-03	6.69E-03	1.78E-02	2.243E+00	2.854E+02	1.243
α_3	1.78E-04	3.53E-03	2.45E-03	1.06E-02	9.912E-01	2.797E+02	1.274
α_4	8.85E-07	1.30E-03	4.39E-04	5.50E-03	3.765E-01	2.898E+02	1.233
α_5	1.87E-21	2.16E-04	1.23E-07	1.25E-03	7.237E-02	3.353E+02	1.066

CCCG = 6, Gamma = 0.151

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9759375	0.9874203	0.9883942	0.9955760	3.249E+02	4.139E+00	--
α_2	1.19E-03	6.21E-03	5.28E-03	1.44E-02	2.128E+00	3.407E+02	1.191
α_3	2.55E-04	3.69E-03	2.68E-03	1.05E-02	1.134E+00	3.066E+02	1.327
α_4	1.09E-05	1.66E-03	8.25E-04	6.15E-03	5.533E-01	3.323E+02	1.227
α_5	2.53E-09	6.51E-04	8.69E-05	3.26E-03	2.210E-01	3.394E+02	1.202
α_6	4.77E-16	3.74E-04	2.60E-06	2.17E-03	1.027E-01	2.746E+02	1.487

CCCG = 7, Gamma = 0.151

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9800367	0.9883837	0.9889666	0.9947405	5.473E+02	6.432E+00	--
α_2	1.26E-03	4.84E-03	4.29E-03	1.03E-02	2.840E+00	5.840E+02	1.179
α_3	5.02E-04	3.38E-03	2.77E-03	8.37E-03	1.746E+00	5.142E+02	1.342
α_4	1.24E-04	2.00E-03	1.43E-03	5.81E-03	1.084E+00	5.416E+02	1.276
α_5	5.69E-06	1.00E-03	4.85E-04	3.74E-03	5.376E-01	5.367E+02	1.289
α_6	3.13E-10	3.56E-04	3.60E-05	1.84E-03	1.979E-01	5.552E+02	1.246
α_7	8.64E-53	3.86E-05	3.86E-15	1.32E-04	2.656E-02	6.886E+02	1.005

CCCG = 8, Gamma = 0.151

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9810333	0.9890939	0.9896703	0.9951863	5.543E+02	6.112E+00	--
α_2	8.46E-04	3.91E-03	3.38E-03	8.78E-03	2.364E+00	6.028E+02	1.144
α_3	3.40E-04	2.86E-03	2.26E-03	7.41E-03	1.512E+00	5.276E+02	1.309
α_4	1.16E-04	1.98E-03	1.40E-03	5.80E-03	1.056E+00	5.336E+02	1.295
α_5	1.82E-05	1.20E-03	6.85E-04	4.14E-03	6.745E-01	5.605E+02	1.234
α_6	8.09E-08	6.01E-04	1.53E-04	2.73E-03	3.076E-01	5.111E+02	1.354
α_7	1.33E-15	1.90E-04	1.88E-06	1.10E-03	1.093E-01	5.743E+02	1.206
α_8	2.67E-18	1.73E-04	4.80E-07	1.01E-03	8.885E-02	5.134E+02	1.349

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.90E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01
α_2	1.11E-02	8.39E-03	9.11E-03	7.80E-03	6.21E-03	4.84E-03	3.91E-03
α_3		2.03E-03	2.67E-03	3.53E-03	3.69E-03	3.38E-03	2.86E-03
α_4			1.42E-03	1.30E-03	1.66E-03	2.00E-03	1.98E-03
α_5				2.16E-04	6.51E-04	1.00E-03	1.20E-03
α_6					3.74E-04	3.56E-04	6.01E-04
α_7						3.86E-05	1.90E-04
α_8							1.73E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.90E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01
Beta	1.11E-02	1.04E-02	1.32E-02	1.28E-02	1.26E-02	1.16E-02	1.09E-02
Gamma		1.95E-01	3.10E-01	3.93E-01	5.07E-01	5.83E-01	6.42E-01
Delta			3.48E-01	3.00E-01	4.22E-01	5.01E-01	5.92E-01
Epsilon				1.43E-01	3.81E-01	4.11E-01	5.23E-01
Mu					3.65E-01	2.83E-01	4.45E-01
Omega						9.77E-02	3.77E-01
Sigma							4.76E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.33	2.00	2.67	3.33	4.00	4.67	5.33
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.075

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8741709	0.9680059	0.9862122	0.9999266	1.361E+01	4.498E-01	--
α_2	7.34E-05	3.20E-02	1.38E-02	1.26E-01	4.498E-01	1.361E+01	1.051

CCCG = 3, Gamma = 0.075

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8993342	0.9637458	0.9727849	0.9972009	3.132E+01	1.178E+00	--
α_2	1.31E-03	2.92E-02	2.01E-02	8.80E-02	9.387E-01	3.125E+01	1.142
α_3	7.51E-08	7.09E-03	1.15E-03	3.48E-02	2.396E-01	3.356E+01	1.087

CCCG = 4, Gamma = 0.075

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8992395	0.9573990	0.9640691	0.9927107	4.266E+01	1.898E+00	--
α_2	2.58E-03	2.83E-02	2.17E-02	7.67E-02	1.285E+00	4.409E+01	1.180
α_3	8.27E-06	8.90E-03	3.20E-03	3.71E-02	3.927E-01	4.375E+01	1.213
α_4	2.09E-08	5.38E-03	7.26E-04	2.70E-02	2.207E-01	4.078E+01	1.305

CCCG = 5, Gamma = 0.075

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9218177	0.9605072	0.9639227	0.9875156	8.526E+01	3.506E+00	--
α_2	4.01E-03	2.24E-02	1.89E-02	5.26E-02	1.992E+00	8.712E+01	1.243
α_3	7.71E-04	1.24E-02	8.91E-03	3.60E-02	1.078E+00	8.586E+01	1.274
α_4	2.13E-06	4.04E-03	1.31E-03	1.73E-02	3.632E-01	8.951E+01	1.233
α_5	6.45E-21	6.98E-04	4.04E-07	4.04E-03	7.248E-02	1.038E+02	1.066

CCCG = 6, Gamma = 0.075

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9285403	0.9621723	0.9649192	0.9864137	1.068E+02	4.199E+00	--
α_2	2.89E-03	1.67E-02	1.40E-02	3.97E-02	1.941E+00	1.141E+02	1.191
α_3	1.23E-03	1.28E-02	9.83E-03	3.45E-02	1.332E+00	1.029E+02	1.327
α_4	5.90E-05	5.48E-03	2.96E-03	1.95E-02	6.181E-01	1.121E+02	1.227
α_5	1.38E-08	2.01E-03	2.99E-04	9.96E-03	2.313E-01	1.148E+02	1.202
α_6	7.55E-20	8.26E-04	7.80E-07	4.81E-03	7.684E-02	9.293E+01	1.487

CCCG = 7, Gamma = 0.075

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9383820	0.9641612	0.9659311	0.9838937	1.674E+02	6.223E+00	--
α_2	3.53E-03	1.44E-02	1.27E-02	3.12E-02	2.654E+00	1.815E+02	1.179
α_3	1.39E-03	1.02E-02	8.22E-03	2.55E-02	1.645E+00	1.603E+02	1.342
α_4	4.37E-04	6.55E-03	4.74E-03	1.88E-02	1.115E+00	1.692E+02	1.276
α_5	3.47E-05	3.58E-03	1.90E-03	1.28E-02	6.034E-01	1.680E+02	1.289
α_6	1.82E-10	1.02E-03	7.62E-05	5.42E-03	1.780E-01	1.741E+02	1.246
α_7	6.89E-51	1.26E-04	2.60E-14	4.47E-04	2.734E-02	2.161E+02	1.005

CCCG = 8, Gamma = 0.075

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9411511	0.9657594	0.9674498	0.9845930	1.762E+02	6.246E+00	--
α_2	2.94E-03	1.27E-02	1.11E-02	2.80E-02	2.504E+00	1.942E+02	1.144
α_3	8.86E-04	8.25E-03	6.44E-03	2.18E-02	1.419E+00	1.706E+02	1.309
α_4	3.25E-04	5.91E-03	4.15E-03	1.75E-02	1.027E+00	1.728E+02	1.295
α_5	8.30E-05	4.02E-03	2.41E-03	1.34E-02	7.337E-01	1.817E+02	1.234
α_6	2.39E-06	2.39E-03	8.64E-04	9.95E-03	3.975E-01	1.658E+02	1.354
α_7	4.13E-20	4.13E-04	3.96E-07	2.40E-03	7.703E-02	1.866E+02	1.206
α_8	4.87E-18	5.24E-04	1.31E-06	3.06E-03	8.749E-02	1.668E+02	1.349

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.64E-01	9.57E-01	9.61E-01	9.62E-01	9.64E-01	9.66E-01
α_2	3.20E-02	2.92E-02	2.83E-02	2.24E-02	1.67E-02	1.44E-02	1.27E-02
α_3		7.09E-03	8.90E-03	1.24E-02	1.28E-02	1.02E-02	8.25E-03
α_4			5.38E-03	4.04E-03	5.48E-03	6.55E-03	5.91E-03
α_5				6.98E-04	2.01E-03	3.58E-03	4.02E-03
α_6					8.26E-04	1.02E-03	2.39E-03
α_7						1.26E-04	4.13E-04
α_8							5.24E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.64E-01	9.57E-01	9.61E-01	9.62E-01	9.64E-01	9.66E-01
Beta	3.20E-02	3.63E-02	4.26E-02	3.95E-02	3.78E-02	3.58E-02	3.42E-02
Gamma		1.96E-01	3.35E-01	4.34E-01	5.58E-01	5.98E-01	6.28E-01
Delta			3.77E-01	2.76E-01	3.94E-01	5.26E-01	6.16E-01
Epsilon				1.47E-01	3.41E-01	4.19E-01	5.54E-01
Mu					2.91E-01	2.43E-01	4.53E-01
Omega						1.10E-01	2.81E-01
Sigma							5.60E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.67	1.00	1.33	1.67	2.00	2.33	2.67
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.008

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7024574	0.9272410	0.9718473	0.9999391	4.844E+00	3.801E-01	--
α_2	6.09E-05	7.28E-02	2.82E-02	2.98E-01	3.801E-01	4.844E+00	1.051

CCCG = 3, Gamma = 0.008

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7699571	0.9209261	0.9430455	0.9960319	1.118E+01	9.600E-01	--
α_2	8.70E-04	5.58E-02	3.33E-02	1.87E-01	6.673E-01	1.130E+01	1.142
α_3	2.09E-06	2.33E-02	5.73E-03	1.07E-01	2.927E-01	1.227E+01	1.087

CCCG = 4, Gamma = 0.008

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7877986	0.9118767	0.9261531	0.9869345	1.727E+01	1.669E+00	--
α_2	3.19E-03	5.37E-02	3.91E-02	1.54E-01	1.039E+00	1.832E+01	1.180
α_3	1.83E-05	2.06E-02	7.49E-03	8.60E-02	3.887E-01	1.844E+01	1.213
α_4	1.62E-07	1.38E-02	2.32E-03	6.76E-02	2.414E-01	1.725E+01	1.305

CCCG = 5, Gamma = 0.008

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8537595	0.9252316	0.9312681	0.9760355	4.315E+01	3.487E+00	--
α_2	6.03E-03	3.82E-02	3.18E-02	9.22E-02	1.791E+00	4.510E+01	1.243
α_3	2.12E-03	2.64E-02	1.98E-02	7.30E-02	1.207E+00	4.453E+01	1.274
α_4	1.63E-05	9.18E-03	3.69E-03	3.69E-02	4.340E-01	4.685E+01	1.233
α_5	2.24E-26	1.01E-03	3.59E-08	5.55E-03	5.493E-02	5.460E+01	1.066

CCCG = 6, Gamma = 0.008

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8715156	0.9325289	0.9374767	0.9766110	5.397E+01	3.905E+00	--
α_2	2.13E-03	2.19E-02	1.69E-02	5.86E-02	1.335E+00	5.975E+01	1.191
α_3	3.46E-03	2.79E-02	2.24E-02	7.13E-02	1.531E+00	5.329E+01	1.327
α_4	2.36E-04	1.21E-02	7.25E-03	4.06E-02	7.191E-01	5.858E+01	1.227
α_5	5.99E-08	4.08E-03	7.00E-04	1.98E-02	2.467E-01	6.027E+01	1.202
α_6	1.64E-20	1.49E-03	8.99E-07	8.65E-03	7.279E-02	4.887E+01	1.487

CCCG = 7, Gamma = 0.008

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.8950536	0.9395491	0.9426036	0.9736035	8.968E+01	5.770E+00	--
α_2	1.88E-03	1.50E-02	1.20E-02	3.85E-02	1.549E+00	1.014E+02	1.179
α_3	3.94E-03	2.20E-02	1.86E-02	5.17E-02	1.989E+00	8.851E+01	1.342
α_4	1.22E-03	1.35E-02	1.03E-02	3.69E-02	1.287E+00	9.389E+01	1.276
α_5	1.23E-04	7.34E-03	4.27E-03	2.50E-02	6.913E-01	9.353E+01	1.289
α_6	1.77E-08	2.39E-03	3.61E-04	1.18E-02	2.327E-01	9.718E+01	1.246
α_7	1.19E-64	1.75E-04	2.65E-17	4.41E-04	2.112E-02	1.208E+02	1.005

CCCG = 8, Gamma = 0.008

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9093597	0.9455729	0.9478668	0.9739485	1.219E+02	7.016E+00	--
α_2	1.44E-03	1.12E-02	8.96E-03	2.84E-02	1.583E+00	1.402E+02	1.144
α_3	2.85E-03	1.60E-02	1.35E-02	3.78E-02	1.986E+00	1.220E+02	1.309
α_4	1.87E-03	1.33E-02	1.09E-02	3.33E-02	1.672E+00	1.236E+02	1.295
α_5	4.08E-04	7.69E-03	5.38E-03	2.29E-02	1.011E+00	1.305E+02	1.234
α_6	3.62E-05	4.76E-03	2.43E-03	1.74E-02	5.709E-01	1.193E+02	1.354
α_7	3.09E-10	1.34E-03	1.05E-04	7.11E-03	1.809E-01	1.344E+02	1.206
α_8	1.50E-107	1.03E-04	3.13E-27	7.76E-05	1.245E-02	1.203E+02	1.349

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.27E-01	9.21E-01	9.12E-01	9.25E-01	9.33E-01	9.40E-01	9.46E-01
α_2	7.28E-02	5.58E-02	5.37E-02	3.82E-02	2.19E-02	1.50E-02	1.12E-02
α_3		2.33E-02	2.06E-02	2.64E-02	2.79E-02	2.20E-02	1.60E-02
α_4			1.38E-02	9.18E-03	1.21E-02	1.35E-02	1.33E-02
α_5				1.01E-03	4.08E-03	7.34E-03	7.69E-03
α_6					1.49E-03	2.39E-03	4.76E-03
α_7						1.75E-04	1.34E-03
α_8							1.03E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.27E-01	9.21E-01	9.12E-01	9.25E-01	9.33E-01	9.40E-01	9.46E-01
Beta	7.28E-02	7.91E-02	8.81E-02	7.48E-02	6.75E-02	6.05E-02	5.44E-02
Gamma		2.95E-01	3.91E-01	4.89E-01	6.76E-01	7.51E-01	7.95E-01
Delta			4.01E-01	2.78E-01	3.88E-01	5.16E-01	6.30E-01
Epsilon				9.87E-02	3.15E-01	4.23E-01	5.10E-01
Mu					2.67E-01	2.59E-01	4.47E-01
Omega						6.82E-02	2.33E-01
Sigma							7.15E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.07	0.10	0.13	0.17	0.20	0.23	0.27
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 7.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.541

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9340491	0.9830323	0.9924796	0.9999488	2.746E+01	4.739E-01	--
α_2	5.12E-05	1.70E-02	7.52E-03	6.60E-02	4.739E-01	2.746E+01	1.051

CCCG = 3, Gamma = 0.541

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9484329	0.9819662	0.9868526	0.9987903	6.058E+01	1.113E+00	--
α_2	4.05E-04	1.35E-02	8.64E-03	4.30E-02	8.204E-01	6.010E+01	1.142
α_3	3.85E-07	4.57E-03	1.08E-03	2.11E-02	2.921E-01	6.367E+01	1.087

CCCG = 4, Gamma = 0.541

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9549611	0.9809371	0.9839427	0.9966308	1.015E+02	1.972E+00	--
α_2	1.21E-03	1.26E-02	9.72E-03	3.41E-02	1.331E+00	1.039E+02	1.180
α_3	7.14E-06	4.21E-03	1.67E-03	1.70E-02	4.312E-01	1.019E+02	1.213
α_4	4.40E-09	2.21E-03	2.61E-04	1.12E-02	2.099E-01	9.487E+01	1.305

CCCG = 5, Gamma = 0.541

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9639769	0.9824982	0.9842603	0.9949961	1.761E+02	3.137E+00	--
α_2	1.38E-03	9.54E-03	7.79E-03	2.37E-02	1.713E+00	1.779E+02	1.243
α_3	2.40E-04	5.39E-03	3.66E-03	1.64E-02	9.440E-01	1.743E+02	1.274
α_4	1.58E-06	2.11E-03	7.25E-04	8.89E-03	3.816E-01	1.808E+02	1.233
α_5	1.88E-16	4.71E-04	2.58E-06	2.74E-03	9.865E-02	2.093E+02	1.066

CCCG = 6, Gamma = 0.541

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9682002	0.9836492	0.9849932	0.9945060	2.326E+02	3.866E+00	--
α_2	1.07E-03	7.11E-03	5.83E-03	1.75E-02	1.755E+00	2.453E+02	1.191
α_3	3.31E-04	5.01E-03	3.62E-03	1.44E-02	1.111E+00	2.206E+02	1.327
α_4	3.59E-05	2.71E-03	1.51E-03	9.47E-03	6.510E-01	2.391E+02	1.227
α_5	2.05E-08	1.04E-03	1.87E-04	4.99E-03	2.536E-01	2.445E+02	1.202
α_6	7.85E-17	4.84E-04	2.20E-06	2.82E-03	9.572E-02	1.978E+02	1.487

CCCG = 7, Gamma = 0.540

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9723056	0.9846132	0.9855495	0.9937233	3.362E+02	5.254E+00	--
α_2	1.17E-03	5.97E-03	5.08E-03	1.38E-02	2.159E+00	3.598E+02	1.179
α_3	3.94E-04	4.16E-03	3.18E-03	1.13E-02	1.325E+00	3.169E+02	1.342
α_4	1.52E-04	2.98E-03	2.07E-03	8.92E-03	9.969E-01	3.337E+02	1.276
α_5	8.02E-06	1.58E-03	7.53E-04	5.98E-03	5.249E-01	3.308E+02	1.289
α_6	4.24E-10	5.71E-04	5.59E-05	2.96E-03	1.956E-01	3.424E+02	1.246
α_7	3.55E-28	1.25E-04	2.82E-09	6.76E-04	5.291E-02	4.247E+02	1.005

CCCG = 8, Gamma = 0.540

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9745201	0.9854478	0.9862375	0.9936786	4.001E+02	5.908E+00	--
α_2	1.10E-03	5.25E-03	4.52E-03	1.19E-02	2.298E+00	4.353E+02	1.144
α_3	2.88E-04	3.31E-03	2.50E-03	9.12E-03	1.267E+00	3.814E+02	1.309
α_4	1.53E-04	2.70E-03	1.90E-03	7.95E-03	1.042E+00	3.856E+02	1.295
α_5	4.41E-05	1.88E-03	1.15E-03	6.20E-03	7.626E-01	4.051E+02	1.234
α_6	2.02E-07	8.84E-04	2.47E-04	3.93E-03	3.271E-01	3.695E+02	1.354
α_7	3.14E-13	3.24E-04	8.67E-06	1.82E-03	1.344E-01	4.153E+02	1.206
α_8	1.86E-20	2.07E-04	1.94E-07	1.20E-03	7.682E-02	3.713E+02	1.349

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.82E-01	9.81E-01	9.82E-01	9.84E-01	9.85E-01	9.85E-01
α_2	1.70E-02	1.35E-02	1.26E-02	9.54E-03	7.11E-03	5.97E-03	5.25E-03
α_3		4.57E-03	4.21E-03	5.39E-03	5.01E-03	4.16E-03	3.31E-03
α_4			2.21E-03	2.11E-03	2.71E-03	2.98E-03	2.70E-03
α_5				4.71E-04	1.04E-03	1.58E-03	1.88E-03
α_6					4.84E-04	5.71E-04	8.84E-04
α_7						1.25E-04	3.24E-04
α_8							2.07E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.82E-01	9.81E-01	9.82E-01	9.84E-01	9.85E-01	9.85E-01
Beta	1.70E-02	1.80E-02	1.91E-02	1.75E-02	1.64E-02	1.54E-02	1.46E-02
Gamma		2.53E-01	3.37E-01	4.55E-01	5.65E-01	6.12E-01	6.39E-01
Delta			3.44E-01	3.24E-01	4.58E-01	5.58E-01	6.44E-01
Epsilon				1.83E-01	3.59E-01	4.34E-01	5.50E-01
Mu					3.18E-01	3.05E-01	4.30E-01
Omega						1.79E-01	3.75E-01
Sigma							3.90E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.67	7.00	9.33	11.67	14.00	16.33	18.67
N_1	0.1267	0.1800	0.2280	0.2708	0.3087	0.3421	0.3714
N_2	0.0033	0.0100	0.0185	0.0290	0.0411	0.0544	0.0688
N_3		0.0000	0.0005	0.0014	0.0028	0.0047	0.0072

N₄			0.0000	0.0000	0.0001	0.0002	0.0005
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.226

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9820070	0.9953297	0.9978884	0.9999828	1.051E+02	4.932E-01	--
α_2	1.72E-05	4.67E-03	2.11E-03	1.80E-02	4.932E-01	1.051E+02	1.051

CCCG = 3, Gamma = 0.226

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9861041	0.9952548	0.9966272	0.9997188	2.222E+02	1.059E+00	--
α_2	6.08E-05	3.25E-03	1.92E-03	1.10E-02	7.137E-01	2.191E+02	1.142
α_3	5.39E-07	1.50E-03	4.53E-04	6.54E-03	3.458E-01	2.305E+02	1.087

CCCG = 4, Gamma = 0.226

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9879113	0.9948017	0.9955870	0.9990077	4.047E+02	2.115E+00	--
α_2	4.63E-04	3.74E-03	2.98E-03	9.62E-03	1.549E+00	4.128E+02	1.180
α_3	2.05E-08	6.56E-04	1.28E-04	3.12E-03	2.646E-01	4.029E+02	1.213
α_4	8.89E-08	8.04E-04	1.97E-04	3.67E-03	3.010E-01	3.741E+02	1.305

CCCG = 5, Gamma = 0.226

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9914998	0.9952779	0.9955674	0.9980675	1.122E+03	5.325E+00	--
α_2	1.02E-03	3.21E-03	2.92E-03	6.37E-03	3.632E+00	1.129E+03	1.243
α_3	1.20E-04	1.23E-03	9.41E-04	3.30E-03	1.354E+00	1.104E+03	1.274
α_4	2.46E-08	2.59E-04	6.19E-05	1.19E-03	2.961E-01	1.142E+03	1.233
α_5	9.56E-35	3.21E-05	3.54E-11	1.59E-04	4.243E-02	1.321E+03	1.066

CCCG = 6, Gamma = 0.226

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9911998	0.9952011	0.9955181	0.9981198	1.024E+03	4.936E+00	--
α_2	7.25E-04	2.73E-03	2.42E-03	5.76E-03	2.915E+00	1.066E+03	1.191
α_3	1.12E-04	1.31E-03	9.84E-04	3.62E-03	1.257E+00	9.584E+02	1.327
α_4	1.97E-06	4.85E-04	2.22E-04	1.86E-03	5.031E-01	1.038E+03	1.227
α_5	3.16E-15	1.09E-04	1.44E-06	6.25E-04	1.155E-01	1.059E+03	1.202
α_6	7.92E-13	1.69E-04	6.20E-06	9.38E-04	1.451E-01	8.566E+02	1.487

CCCG = 7, Gamma = 0.226

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9930592	0.9956064	0.9957559	0.9976436	2.188E+03	9.654E+00	--
α_2	8.09E-04	2.09E-03	1.95E-03	3.85E-03	4.851E+00	2.317E+03	1.179
α_3	3.51E-04	1.37E-03	1.21E-03	2.93E-03	2.800E+00	2.039E+03	1.342
α_4	6.59E-05	6.45E-04	4.98E-04	1.72E-03	1.384E+00	2.146E+03	1.276
α_5	8.16E-07	2.31E-04	1.03E-04	8.92E-04	4.902E-01	2.125E+03	1.289
α_6	1.24E-15	5.22E-05	6.61E-07	2.99E-04	1.146E-01	2.197E+03	1.246
α_7	2.83E-93	5.37E-06	5.72E-25	6.38E-06	1.464E-02	2.725E+03	1.005

CCCG = 8, Gamma = 0.226

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928501	0.9957492	0.9959441	0.9979830	1.674E+03	7.148E+00	--
α_2	4.45E-04	1.64E-03	1.46E-03	3.45E-03	2.980E+00	1.811E+03	1.144
α_3	2.14E-04	1.24E-03	1.03E-03	2.95E-03	1.960E+00	1.584E+03	1.309
α_4	5.32E-05	7.27E-04	5.33E-04	2.06E-03	1.166E+00	1.602E+03	1.295
α_5	1.81E-06	3.19E-04	1.55E-04	1.20E-03	5.375E-01	1.682E+03	1.234
α_6	2.60E-11	1.18E-04	9.13E-06	6.22E-04	1.805E-01	1.533E+03	1.354
α_7	1.24E-35	2.40E-05	1.80E-11	1.18E-04	4.139E-02	1.722E+03	1.206
α_8	1.12E-08	1.84E-04	4.05E-05	8.56E-04	2.827E-01	1.539E+03	1.349

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
α_2	4.67E-03	3.25E-03	3.74E-03	3.21E-03	2.73E-03	2.09E-03	1.64E-03
α_3		1.50E-03	6.56E-04	1.23E-03	1.31E-03	1.37E-03	1.24E-03
α_4			8.04E-04	2.59E-04	4.85E-04	6.45E-04	7.27E-04
α_5				3.21E-05	1.09E-04	2.31E-04	3.19E-04
α_6					1.69E-04	5.22E-05	1.18E-04
α_7						5.37E-06	2.40E-05
α_8							1.84E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
Beta	4.67E-03	4.75E-03	5.20E-03	4.72E-03	4.80E-03	4.39E-03	4.25E-03
Gamma		3.16E-01	2.81E-01	3.21E-01	4.32E-01	5.24E-01	6.14E-01
Delta			5.51E-01	1.92E-01	3.68E-01	4.05E-01	5.26E-01
Epsilon				1.10E-01	3.65E-01	3.09E-01	4.70E-01
Mu					6.08E-01	2.00E-01	5.05E-01
Omega						9.34E-02	6.38E-01
Sigma							8.84E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	3.00	4.00	5.00	6.00	7.00	8.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.5.4 BWR-RHR-MDP-RH: BWR RHR Motor-Driven Pumps Fail to Run Greater Than One Hour

Generic CCF Parameters

Plant Type: BWR
 System Group: Clean Water
 System: Residual Heat Removal (LCI in BWRs; LPI in PWRs)
 Component Group: Pump
 Component Type: Motor Driven Pump
 Component Subtype: Centrifugal
 Failure Mode: Fail to Run > 1H
 Date Range: 2006 through 2020
 Prior: Default 2015

Total Number of Independent Failure Events: 11.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9395551	0.9844841	0.9931673	0.9999513	0.9995573	2.994E+01	4.719E-01
α_2	4.56E-05	1.55E-02	6.84E-03	6.04E-02	4.43E-04	4.719E-01	2.994E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9540904	0.9838340	0.9881339	0.9988651	0.9991143	6.926E+01	1.138E+00
α_2	4.25E-04	1.22E-02	8.02E-03	3.84E-02	8.86E-04	8.612E-01	6.954E+01
α_3	1.97E-07	3.93E-03	8.42E-04	1.84E-02	0.00E+00	2.768E-01	7.012E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9575784	0.9822275	0.9851218	0.9969846	0.9987373	1.057E+02	1.913E+00
α_2	1.06E-03	1.19E-02	9.02E-03	3.25E-02	1.23E-03	1.278E+00	1.063E+02
α_3	4.10E-06	3.74E-03	1.38E-03	1.55E-02	3.32E-05	4.029E-01	1.072E+02
α_4	1.49E-08	2.15E-03	3.21E-04	1.07E-02	0.00E+00	2.315E-01	1.074E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9674426	0.9837495	0.9852366	0.9949725	0.9983844	2.096E+02	3.463E+00
α_2	1.59E-03	9.17E-03	7.68E-03	2.18E-02	1.54E-03	1.953E+00	2.111E+02
α_3	2.86E-04	4.93E-03	3.49E-03	1.45E-02	7.45E-05	1.050E+00	2.120E+02
α_4	1.36E-06	1.79E-03	6.18E-04	7.57E-03	0.00E+00	3.822E-01	2.127E+02
α_5	3.13E-20	3.60E-04	3.36E-07	2.09E-03	0.00E+00	7.674E-02	2.130E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9700357	0.9845837	0.9858473	0.9948121	0.9980518	2.477E+02	3.879E+00

α_2	1.03E-03	6.92E-03	5.67E-03	1.71E-02	1.82E-03	1.742E+00	2.499E+02
α_3	3.81E-04	4.81E-03	3.58E-03	1.34E-02	1.23E-04	1.210E+00	2.504E+02
α_4	2.17E-05	2.37E-03	1.24E-03	8.54E-03	4.16E-06	5.961E-01	2.510E+02
α_5	3.44E-09	8.79E-04	1.17E-04	4.41E-03	0.00E+00	2.211E-01	2.514E+02
α_6	3.43E-15	4.36E-04	4.42E-06	2.52E-03	0.00E+00	1.098E-01	2.515E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9747190	0.9856215	0.9864137	0.9938129	0.9977429	3.980E+02	5.807E+00
α_2	1.20E-03	5.69E-03	4.90E-03	1.29E-02	2.07E-03	2.298E+00	4.016E+02
α_3	5.45E-04	4.05E-03	3.26E-03	1.02E-02	1.78E-04	1.634E+00	4.022E+02
α_4	1.67E-04	2.68E-03	1.92E-03	7.80E-03	8.67E-06	1.083E+00	4.028E+02
α_5	1.01E-05	1.40E-03	7.06E-04	5.14E-03	0.00E+00	5.654E-01	4.033E+02
α_6	2.61E-10	4.74E-04	4.38E-05	2.47E-03	0.00E+00	1.916E-01	4.037E+02
α_7	5.90E-41	8.62E-05	3.21E-12	3.78E-04	0.00E+00	3.480E-02	4.038E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9760356	0.9863736	0.9871262	0.9941363	0.9974555	4.200E+02	5.802E+00
α_2	9.21E-04	4.90E-03	4.15E-03	1.14E-02	2.29E-03	2.087E+00	4.237E+02
α_3	3.42E-04	3.28E-03	2.55E-03	8.74E-03	2.39E-04	1.398E+00	4.244E+02
α_4	1.49E-04	2.50E-03	1.77E-03	7.31E-03	1.50E-05	1.063E+00	4.247E+02
α_5	2.91E-05	1.65E-03	9.64E-04	5.60E-03	0.00E+00	7.026E-01	4.251E+02
α_6	3.22E-07	8.21E-04	2.52E-04	3.57E-03	0.00E+00	3.497E-01	4.254E+02
α_7	1.24E-15	2.53E-04	2.32E-06	1.46E-03	0.00E+00	1.078E-01	4.257E+02
α_8	2.59E-17	2.22E-04	9.42E-07	1.29E-03	0.00E+00	9.469E-02	4.257E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.84E-01	9.82E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
α_2	1.55E-02	1.22E-02	1.19E-02	9.17E-03	6.92E-03	5.69E-03	4.90E-03
α_3		3.93E-03	3.74E-03	4.93E-03	4.81E-03	4.05E-03	3.28E-03
α_4			2.15E-03	1.79E-03	2.37E-03	2.68E-03	2.50E-03
α_5				3.60E-04	8.79E-04	1.40E-03	1.65E-03
α_6					4.36E-04	4.74E-04	8.21E-04
α_7						8.62E-05	2.53E-04
α_8							2.22E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.84E-01	9.82E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
Beta	1.55E-02	1.62E-02	1.78E-02	1.63E-02	1.54E-02	1.44E-02	1.36E-02
Gamma		2.43E-01	3.32E-01	4.36E-01	5.51E-01	6.04E-01	6.40E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.34E-01	6.24E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.41E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.40	11.10	14.80	18.50	22.20	25.90	29.60
N₁	0.1267	0.1800	0.2280	0.2708	0.3087	0.3421	0.3714
N₂	0.0033	0.0100	0.0185	0.0290	0.0411	0.0544	0.0688
N₃		0.0000	0.0005	0.0014	0.0028	0.0047	0.0072
N₄			0.0000	0.0000	0.0001	0.0002	0.0005
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577151	0.9890731	0.9951084	0.9999636	4.376E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.89E-03	4.23E-02	4.834E-01	4.376E+01	1.032

CCCG = 3, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9718899	0.9898748	0.9924162	0.9991722	1.198E+02	1.226E+00	--
α_2	3.96E-04	8.13E-03	5.61E-03	2.44E-02	9.769E-01	1.192E+02	1.106
α_3	3.20E-08	2.00E-03	3.47E-04	9.69E-03	2.487E-01	1.241E+02	1.069

CCCG = 4, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9701353	0.9872261	0.9891814	0.9976300	1.590E+02	2.057E+00	--
α_2	9.75E-04	8.82E-03	6.92E-03	2.32E-02	1.442E+00	1.620E+02	1.142
α_3	3.22E-06	2.57E-03	9.66E-04	1.06E-02	4.114E-01	1.597E+02	1.166
α_4	1.82E-09	1.38E-03	1.51E-04	7.09E-03	2.036E-01	1.472E+02	1.266

CCCG = 5, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9756889	0.9876786	0.9887490	0.9960109	2.952E+02	3.683E+00	--
α_2	1.53E-03	7.49E-03	6.43E-03	1.71E-02	2.243E+00	2.970E+02	1.195
α_3	1.70E-04	3.38E-03	2.34E-03	1.01E-02	9.912E-01	2.922E+02	1.220
α_4	8.45E-07	1.24E-03	4.19E-04	5.26E-03	3.765E-01	3.034E+02	1.177
α_5	1.80E-21	2.07E-04	1.18E-07	1.20E-03	7.237E-02	3.489E+02	1.025

CCCG = 6, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9768798	0.9879150	0.9888514	0.9957509	3.384E+02	4.139E+00	--
α_2	1.15E-03	5.99E-03	5.09E-03	1.39E-02	2.128E+00	3.534E+02	1.149
α_3	2.43E-04	3.52E-03	2.56E-03	1.01E-02	1.134E+00	3.208E+02	1.269
α_4	1.04E-05	1.59E-03	7.90E-04	5.90E-03	5.533E-01	3.467E+02	1.176
α_5	2.42E-09	6.21E-04	8.29E-05	3.11E-03	2.210E-01	3.557E+02	1.148
α_6	4.62E-16	3.63E-04	2.53E-06	2.10E-03	1.027E-01	2.829E+02	1.443

CCCG = 7, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9808940	0.9888842	0.9894425	0.9949680	5.722E+02	6.432E+00	--
α_2	1.21E-03	4.65E-03	4.12E-03	9.89E-03	2.840E+00	6.084E+02	1.132
α_3	4.80E-04	3.24E-03	2.65E-03	8.01E-03	1.746E+00	5.379E+02	1.283
α_4	1.19E-04	1.91E-03	1.36E-03	5.55E-03	1.084E+00	5.674E+02	1.218
α_5	5.41E-06	9.51E-04	4.61E-04	3.56E-03	5.376E-01	5.648E+02	1.224
α_6	2.98E-10	3.39E-04	3.42E-05	1.75E-03	1.979E-01	5.836E+02	1.186
α_7	8.35E-53	3.73E-05	3.73E-15	1.27E-04	2.656E-02	7.124E+02	0.972

CCCG = 8, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9818218	0.9895487	0.9901015	0.9953878	5.787E+02	6.112E+00	--
α_2	8.12E-04	3.75E-03	3.24E-03	8.44E-03	2.364E+00	6.278E+02	1.099
α_3	3.26E-04	2.74E-03	2.17E-03	7.11E-03	1.512E+00	5.503E+02	1.255
α_4	1.11E-04	1.89E-03	1.34E-03	5.55E-03	1.056E+00	5.574E+02	1.240
α_5	1.74E-05	1.15E-03	6.53E-04	3.95E-03	6.745E-01	5.875E+02	1.177
α_6	7.64E-08	5.69E-04	1.44E-04	2.58E-03	3.076E-01	5.407E+02	1.280
α_7	1.27E-15	1.82E-04	1.80E-06	1.05E-03	1.093E-01	6.001E+02	1.154
α_8	2.64E-18	1.71E-04	4.76E-07	9.99E-04	8.885E-02	5.186E+02	1.335

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.90E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01	9.90E-01
α_2	1.09E-02	8.13E-03	8.82E-03	7.49E-03	5.99E-03	4.65E-03	3.75E-03
α_3		2.00E-03	2.57E-03	3.38E-03	3.52E-03	3.24E-03	2.74E-03
α_4			1.38E-03	1.24E-03	1.59E-03	1.91E-03	1.89E-03
α_5				2.07E-04	6.21E-04	9.51E-04	1.15E-03
α_6					3.63E-04	3.39E-04	5.69E-04
α_7						3.73E-05	1.82E-04
α_8							1.71E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.90E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01	9.90E-01
Beta	1.09E-02	1.01E-02	1.28E-02	1.23E-02	1.21E-02	1.11E-02	1.05E-02
Gamma		1.97E-01	3.09E-01	3.92E-01	5.05E-01	5.82E-01	6.41E-01
Delta			3.50E-01	3.00E-01	4.23E-01	5.00E-01	5.91E-01
Epsilon				1.43E-01	3.82E-01	4.10E-01	5.22E-01
Mu					3.69E-01	2.84E-01	4.46E-01
Omega						9.91E-02	3.83E-01
Sigma							4.85E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.33	2.00	2.67	3.33	4.00	4.67	5.33
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.089

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8764118	0.9685846	0.9864730	0.9999280	1.387E+01	4.498E-01	--
α_2	7.20E-05	3.14E-02	1.35E-02	1.24E-01	4.498E-01	1.387E+01	1.032

CCCG = 3, Gamma = 0.089

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9021775	0.9647892	0.9735838	0.9972841	3.229E+01	1.178E+00	--
α_2	1.27E-03	2.82E-02	1.95E-02	8.53E-02	9.387E-01	3.230E+01	1.106
α_3	7.37E-08	6.97E-03	1.13E-03	3.42E-02	2.396E-01	3.415E+01	1.069

CCCG = 4, Gamma = 0.089

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9025150	0.9588112	0.9652774	0.9929593	4.419E+01	1.898E+00	--
α_2	2.50E-03	2.74E-02	2.10E-02	7.42E-02	1.285E+00	4.559E+01	1.142
α_3	7.94E-06	8.55E-03	3.08E-03	3.57E-02	3.927E-01	4.553E+01	1.166
α_4	2.02E-08	5.22E-03	7.04E-04	2.62E-02	2.207E-01	4.205E+01	1.266

CCCG = 5, Gamma = 0.089

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9249534	0.9621140	0.9654011	0.9880332	8.903E+01	3.506E+00	--
α_2	3.85E-03	2.15E-02	1.81E-02	5.05E-02	1.992E+00	9.071E+01	1.195
α_3	7.37E-04	1.19E-02	8.53E-03	3.44E-02	1.078E+00	8.975E+01	1.220
α_4	2.03E-06	3.86E-03	1.25E-03	1.66E-02	3.632E-01	9.375E+01	1.177
α_5	6.20E-21	6.70E-04	3.89E-07	3.88E-03	7.248E-02	1.080E+02	1.025

CCCG = 6, Gamma = 0.089

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9313520	0.9636798	0.9663253	0.9869641	1.114E+02	4.199E+00	--
α_2	2.79E-03	1.61E-02	1.35E-02	3.83E-02	1.941E+00	1.184E+02	1.149
α_3	1.18E-03	1.22E-02	9.39E-03	3.29E-02	1.332E+00	1.077E+02	1.269
α_4	5.65E-05	5.26E-03	2.84E-03	1.87E-02	6.181E-01	1.170E+02	1.176
α_5	1.32E-08	1.92E-03	2.85E-04	9.51E-03	2.313E-01	1.203E+02	1.148
α_6	7.33E-20	8.02E-04	7.57E-07	4.67E-03	7.684E-02	9.576E+01	1.443

CCCG = 7, Gamma = 0.089

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9410183	0.9657102	0.9674091	0.9845986	1.753E+02	6.223E+00	--
α_2	3.39E-03	1.38E-02	1.22E-02	2.99E-02	2.654E+00	1.892E+02	1.132
α_3	1.33E-03	9.71E-03	7.86E-03	2.44E-02	1.645E+00	1.677E+02	1.283
α_4	4.17E-04	6.25E-03	4.53E-03	1.80E-02	1.115E+00	1.773E+02	1.218
α_5	3.29E-05	3.40E-03	1.80E-03	1.22E-02	6.034E-01	1.768E+02	1.224
α_6	1.73E-10	9.72E-04	7.25E-05	5.16E-03	1.780E-01	1.830E+02	1.186
α_7	6.66E-51	1.22E-04	2.51E-14	4.32E-04	2.734E-02	2.236E+02	0.972

CCCG = 8, Gamma = 0.089

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9435935	0.9671943	0.9688187	0.9852464	1.841E+02	6.246E+00	--
α_2	2.83E-03	1.22E-02	1.07E-02	2.69E-02	2.504E+00	2.023E+02	1.099
α_3	8.50E-04	7.91E-03	6.17E-03	2.09E-02	1.419E+00	1.780E+02	1.255
α_4	3.12E-04	5.66E-03	3.98E-03	1.67E-02	1.027E+00	1.805E+02	1.240
α_5	7.92E-05	3.84E-03	2.30E-03	1.28E-02	7.337E-01	1.904E+02	1.177
α_6	2.26E-06	2.26E-03	8.17E-04	9.41E-03	3.975E-01	1.754E+02	1.280
α_7	3.95E-20	3.95E-04	3.79E-07	2.29E-03	7.703E-02	1.950E+02	1.154
α_8	4.82E-18	5.19E-04	1.30E-06	3.03E-03	8.749E-02	1.685E+02	1.335

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.69E-01	9.65E-01	9.59E-01	9.62E-01	9.64E-01	9.66E-01	9.67E-01
α_2	3.14E-02	2.82E-02	2.74E-02	2.15E-02	1.61E-02	1.38E-02	1.22E-02
α_3		6.97E-03	8.55E-03	1.19E-02	1.22E-02	9.71E-03	7.91E-03
α_4			5.22E-03	3.86E-03	5.26E-03	6.25E-03	5.66E-03
α_5				6.70E-04	1.92E-03	3.40E-03	3.84E-03
α_6					8.02E-04	9.72E-04	2.26E-03
α_7						1.22E-04	3.95E-04
α_8							5.19E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.69E-01	9.65E-01	9.59E-01	9.62E-01	9.64E-01	9.66E-01	9.67E-01
Beta	3.14E-02	3.52E-02	4.12E-02	3.79E-02	3.63E-02	3.43E-02	3.28E-02
Gamma		1.98E-01	3.34E-01	4.33E-01	5.56E-01	5.97E-01	6.27E-01
Delta			3.79E-01	2.76E-01	3.95E-01	5.25E-01	6.16E-01
Epsilon				1.48E-01	3.41E-01	4.18E-01	5.53E-01
Mu					2.95E-01	2.43E-01	4.53E-01
Omega						1.12E-01	2.88E-01
Sigma							5.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.67	1.00	1.33	1.67	2.00	2.33	2.67
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.009

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7075958	0.9285571	0.9724222	0.9999403	4.940E+00	3.801E-01	--
α_2	5.97E-05	7.14E-02	2.76E-02	2.92E-01	3.801E-01	4.940E+00	1.032

CCCG = 3, Gamma = 0.009

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7759566	0.9230898	0.9446890	0.9961495	1.152E+01	9.600E-01	--
α_2	8.41E-04	5.40E-02	3.22E-02	1.82E-01	6.673E-01	1.169E+01	1.106
α_3	2.05E-06	2.29E-02	5.63E-03	1.05E-01	2.927E-01	1.249E+01	1.069

CCCG = 4, Gamma = 0.009

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7945421	0.9148080	0.9286944	0.9873981	1.792E+01	1.669E+00	--
α_2	3.08E-03	5.20E-02	3.78E-02	1.49E-01	1.039E+00	1.896E+01	1.142
α_3	1.75E-05	1.98E-02	7.19E-03	8.27E-02	3.887E-01	1.920E+01	1.166
α_4	1.57E-07	1.34E-02	2.25E-03	6.55E-02	2.414E-01	1.779E+01	1.266

CCCG = 5, Gamma = 0.009

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8595844	0.9282952	0.9341233	0.9770536	4.514E+01	3.487E+00	--
α_2	5.79E-03	3.67E-02	3.06E-02	8.87E-02	1.791E+00	4.699E+01	1.195
α_3	2.03E-03	2.53E-02	1.90E-02	6.99E-02	1.207E+00	4.658E+01	1.220
α_4	1.56E-05	8.76E-03	3.52E-03	3.53E-02	4.340E-01	4.908E+01	1.177
α_5	2.15E-26	9.66E-04	3.45E-08	5.33E-03	5.493E-02	5.682E+01	1.025

CCCG = 6, Gamma = 0.009

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8766308	0.9352808	0.9400551	0.9775946	5.643E+01	3.905E+00	--
α_2	2.05E-03	2.11E-02	1.63E-02	5.65E-02	1.335E+00	6.201E+01	1.149
α_3	3.30E-03	2.67E-02	2.14E-02	6.82E-02	1.531E+00	5.583E+01	1.269
α_4	2.26E-04	1.16E-02	6.94E-03	3.89E-02	7.191E-01	6.116E+01	1.176
α_5	5.71E-08	3.89E-03	6.68E-04	1.89E-02	2.467E-01	6.317E+01	1.148
α_6	1.59E-20	1.44E-03	8.73E-07	8.39E-03	7.279E-02	5.036E+01	1.443

CCCG = 7, Gamma = 0.009

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.8995951	0.9422131	0.9451499	0.9747927	9.408E+01	5.770E+00	--
α_2	1.81E-03	1.44E-02	1.16E-02	3.70E-02	1.549E+00	1.057E+02	1.132
α_3	3.76E-03	2.10E-02	1.77E-02	4.95E-02	1.989E+00	9.265E+01	1.283
α_4	1.16E-03	1.29E-02	9.83E-03	3.52E-02	1.287E+00	9.841E+01	1.218
α_5	1.17E-04	6.97E-03	4.05E-03	2.38E-02	6.913E-01	9.846E+01	1.224
α_6	1.68E-08	2.27E-03	3.43E-04	1.12E-02	2.327E-01	1.022E+02	1.186
α_7	1.15E-64	1.69E-04	2.56E-17	4.26E-04	2.112E-02	1.249E+02	0.972

CCCG = 8, Gamma = 0.009

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9132038	0.9479160	0.9501223	0.9750903	1.277E+02	7.016E+00	--
α_2	1.38E-03	1.07E-02	8.61E-03	2.73E-02	1.583E+00	1.461E+02	1.099
α_3	2.73E-03	1.54E-02	1.29E-02	3.63E-02	1.986E+00	1.273E+02	1.255
α_4	1.79E-03	1.28E-02	1.04E-02	3.19E-02	1.672E+00	1.292E+02	1.240
α_5	3.89E-04	7.34E-03	5.13E-03	2.18E-02	1.011E+00	1.368E+02	1.177
α_6	3.42E-05	4.50E-03	2.30E-03	1.65E-02	5.709E-01	1.262E+02	1.280
α_7	2.96E-10	1.29E-03	1.01E-04	6.80E-03	1.809E-01	1.405E+02	1.154
α_8	1.48E-107	1.02E-04	3.10E-27	7.68E-05	1.245E-02	1.215E+02	1.335

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.29E-01	9.23E-01	9.15E-01	9.28E-01	9.35E-01	9.42E-01	9.48E-01
α_2	7.14E-02	5.40E-02	5.20E-02	3.67E-02	2.11E-02	1.44E-02	1.07E-02
α_3		2.29E-02	1.98E-02	2.53E-02	2.67E-02	2.10E-02	1.54E-02
α_4			1.34E-02	8.76E-03	1.16E-02	1.29E-02	1.28E-02
α_5				9.66E-04	3.89E-03	6.97E-03	7.34E-03
α_6					1.44E-03	2.27E-03	4.50E-03
α_7						1.69E-04	1.29E-03
α_8							1.02E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.29E-01	9.23E-01	9.15E-01	9.28E-01	9.35E-01	9.42E-01	9.48E-01
Beta	7.14E-02	7.69E-02	8.52E-02	7.17E-02	6.47E-02	5.78E-02	5.21E-02
Gamma		2.98E-01	3.90E-01	4.88E-01	6.74E-01	7.50E-01	7.94E-01
Delta			4.03E-01	2.78E-01	3.88E-01	5.15E-01	6.29E-01
Epsilon				9.93E-02	3.15E-01	4.22E-01	5.09E-01
Mu					2.71E-01	2.59E-01	4.45E-01
Omega						6.92E-02	2.36E-01
Sigma							7.38E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.07	0.10	0.13	0.17	0.20	0.23	0.27
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 6.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.548

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9337398	0.9829521	0.9924433	0.9999485	2.733E+01	4.739E-01	--
α_2	5.15E-05	1.70E-02	7.56E-03	6.63E-02	4.739E-01	2.733E+01	1.032

CCCG = 3, Gamma = 0.548

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9491368	0.9822146	0.9870356	0.9988072	6.144E+01	1.113E+00	--
α_2	3.98E-04	1.32E-02	8.49E-03	4.23E-02	8.204E-01	6.118E+01	1.106
α_3	3.84E-07	4.55E-03	1.07E-03	2.10E-02	2.921E-01	6.386E+01	1.069

CCCG = 4, Gamma = 0.548

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9559774	0.9813709	0.9843104	0.9967085	1.039E+02	1.972E+00	--
α_2	1.19E-03	1.24E-02	9.51E-03	3.34E-02	1.331E+00	1.062E+02	1.142
α_3	6.94E-06	4.09E-03	1.62E-03	1.65E-02	4.312E-01	1.049E+02	1.166
α_4	4.32E-09	2.16E-03	2.56E-04	1.10E-02	2.099E-01	9.677E+01	1.266

CCCG = 5, Gamma = 0.548

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9651781	0.9830856	0.9847905	0.9951656	1.823E+02	3.137E+00	--
α_2	1.34E-03	9.24E-03	7.54E-03	2.29E-02	1.713E+00	1.837E+02	1.195
α_3	2.31E-04	5.20E-03	3.53E-03	1.58E-02	9.440E-01	1.808E+02	1.220
α_4	1.52E-06	2.03E-03	6.97E-04	8.55E-03	3.816E-01	1.879E+02	1.177
α_5	1.82E-16	4.56E-04	2.50E-06	2.65E-03	9.865E-02	2.162E+02	1.025

CCCG = 6, Gamma = 0.548

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9692497	0.9841919	0.9854926	0.9946897	2.407E+02	3.866E+00	--
α_2	1.03E-03	6.90E-03	5.66E-03	1.70E-02	1.755E+00	2.526E+02	1.149
α_3	3.18E-04	4.82E-03	3.49E-03	1.39E-02	1.111E+00	2.293E+02	1.269
α_4	3.47E-05	2.62E-03	1.46E-03	9.14E-03	6.510E-01	2.479E+02	1.176
α_5	1.97E-08	9.96E-04	1.79E-04	4.80E-03	2.536E-01	2.544E+02	1.148
α_6	7.67E-17	4.73E-04	2.15E-06	2.75E-03	9.572E-02	2.024E+02	1.443

CCCG = 7, Gamma = 0.548

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9733545	0.9851987	0.9861003	0.9939635	3.497E+02	5.254E+00	--
α_2	1.13E-03	5.76E-03	4.91E-03	1.33E-02	2.159E+00	3.728E+02	1.132
α_3	3.79E-04	4.00E-03	3.06E-03	1.09E-02	1.325E+00	3.297E+02	1.283
α_4	1.46E-04	2.86E-03	1.98E-03	8.56E-03	9.969E-01	3.477E+02	1.218
α_5	7.66E-06	1.51E-03	7.19E-04	5.71E-03	5.249E-01	3.463E+02	1.224
α_6	4.06E-10	5.46E-04	5.34E-05	2.83E-03	1.956E-01	3.579E+02	1.186
α_7	3.45E-28	1.21E-04	2.74E-09	6.57E-04	5.291E-02	4.370E+02	0.972

CCCG = 8, Gamma = 0.547

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9754538	0.9859833	0.9867447	0.9939124	4.156E+02	5.908E+00	--
α_2	1.06E-03	5.07E-03	4.36E-03	1.15E-02	2.298E+00	4.510E+02	1.099
α_3	2.77E-04	3.19E-03	2.41E-03	8.79E-03	1.267E+00	3.957E+02	1.255
α_4	1.48E-04	2.60E-03	1.83E-03	7.65E-03	1.042E+00	4.007E+02	1.240
α_5	4.23E-05	1.80E-03	1.10E-03	5.94E-03	7.626E-01	4.223E+02	1.177
α_6	1.92E-07	8.41E-04	2.35E-04	3.74E-03	3.271E-01	3.888E+02	1.280
α_7	3.02E-13	3.11E-04	8.34E-06	1.75E-03	1.344E-01	4.316E+02	1.154
α_8	1.86E-20	2.06E-04	1.93E-07	1.20E-03	7.682E-02	3.730E+02	1.335

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.70E-02	1.32E-02	1.24E-02	9.24E-03	6.90E-03	5.76E-03	5.07E-03
α_3		4.55E-03	4.09E-03	5.20E-03	4.82E-03	4.00E-03	3.19E-03
α_4			2.16E-03	2.03E-03	2.62E-03	2.86E-03	2.60E-03
α_5				4.56E-04	9.96E-04	1.51E-03	1.80E-03
α_6					4.73E-04	5.46E-04	8.41E-04
α_7						1.21E-04	3.11E-04
α_8							2.06E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.70E-02	1.78E-02	1.86E-02	1.69E-02	1.58E-02	1.48E-02	1.40E-02
Gamma		2.56E-01	3.36E-01	4.54E-01	5.64E-01	6.11E-01	6.38E-01
Delta			3.46E-01	3.23E-01	4.59E-01	5.57E-01	6.43E-01
Epsilon				1.84E-01	3.59E-01	4.33E-01	5.49E-01
Mu					3.22E-01	3.06E-01	4.30E-01
Omega						1.81E-01	3.81E-01
Sigma							3.98E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	6.00	8.00	10.00	12.00	14.00	16.00
N_1	0.1267	0.1800	0.2280	0.2708	0.3087	0.3421	0.3714
N_2	0.0033	0.0100	0.0185	0.0290	0.0411	0.0544	0.0688
N_3		0.0000	0.0005	0.0014	0.0028	0.0047	0.0072

N₄			0.0000	0.0000	0.0001	0.0002	0.0005
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9822253	0.9953864	0.9979143	0.9999830	1.064E+02	4.932E-01	--
α_2	1.70E-05	4.61E-03	2.09E-03	1.78E-02	4.932E-01	1.064E+02	1.032

CCCG = 3, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9864253	0.9953647	0.9967055	0.9997253	2.275E+02	1.059E+00	--
α_2	5.91E-05	3.16E-03	1.86E-03	1.07E-02	7.137E-01	2.254E+02	1.106
α_3	5.32E-07	1.48E-03	4.47E-04	6.45E-03	3.458E-01	2.336E+02	1.069

CCCG = 4, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9882718	0.9949571	0.9957191	0.9990375	4.172E+02	2.115E+00	--
α_2	4.50E-04	3.63E-03	2.89E-03	9.34E-03	1.549E+00	4.254E+02	1.142
α_3	1.98E-08	6.33E-04	1.24E-04	3.01E-03	2.646E-01	4.180E+02	1.166
α_4	8.64E-08	7.82E-04	1.92E-04	3.57E-03	3.010E-01	3.847E+02	1.266

CCCG = 5, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9918310	0.9954622	0.9957404	0.9981430	1.168E+03	5.325E+00	--
α_2	9.84E-04	3.09E-03	2.81E-03	6.13E-03	3.632E+00	1.174E+03	1.195
α_3	1.15E-04	1.17E-03	9.01E-04	3.16E-03	1.354E+00	1.152E+03	1.220
α_4	2.35E-08	2.48E-04	5.91E-05	1.14E-03	2.961E-01	1.195E+03	1.177
α_5	9.20E-35	3.09E-05	3.40E-11	1.53E-04	4.243E-02	1.373E+03	1.025

CCCG = 6, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9915260	0.9953793	0.9956846	0.9981897	1.063E+03	4.936E+00	--
α_2	7.00E-04	2.63E-03	2.34E-03	5.57E-03	2.915E+00	1.104E+03	1.149
α_3	1.07E-04	1.25E-03	9.42E-04	3.47E-03	1.257E+00	1.001E+03	1.269
α_4	1.89E-06	4.65E-04	2.13E-04	1.78E-03	5.031E-01	1.081E+03	1.176
α_5	3.02E-15	1.04E-04	1.37E-06	5.98E-04	1.155E-01	1.108E+03	1.148
α_6	7.70E-13	1.65E-04	6.03E-06	9.12E-04	1.451E-01	8.813E+02	1.443

CCCG = 7, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9933485	0.9957898	0.9959330	0.9977421	2.283E+03	9.654E+00	--
α_2	7.78E-04	2.01E-03	1.87E-03	3.70E-03	4.851E+00	2.412E+03	1.132
α_3	3.36E-04	1.31E-03	1.16E-03	2.81E-03	2.800E+00	2.130E+03	1.283
α_4	6.29E-05	6.16E-04	4.76E-04	1.65E-03	1.384E+00	2.246E+03	1.218
α_5	7.76E-07	2.19E-04	9.81E-05	8.48E-04	4.902E-01	2.234E+03	1.224
α_6	1.18E-15	4.97E-05	6.29E-07	2.85E-04	1.146E-01	2.308E+03	1.186
α_7	2.73E-93	5.20E-06	5.53E-25	6.18E-06	1.464E-02	2.816E+03	0.972

CCCG = 8, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931287	0.9959150	0.9961024	0.9980618	1.743E+03	7.148E+00	--
α_2	4.28E-04	1.58E-03	1.41E-03	3.32E-03	2.980E+00	1.884E+03	1.099
α_3	2.06E-04	1.19E-03	9.92E-04	2.83E-03	1.960E+00	1.650E+03	1.255
α_4	5.10E-05	6.97E-04	5.11E-04	1.98E-03	1.166E+00	1.671E+03	1.240
α_5	1.73E-06	3.05E-04	1.48E-04	1.14E-03	5.375E-01	1.760E+03	1.177
α_6	2.46E-11	1.11E-04	8.65E-06	5.89E-04	1.805E-01	1.620E+03	1.280
α_7	1.19E-35	2.30E-05	1.72E-11	1.13E-04	4.139E-02	1.797E+03	1.154
α_8	1.11E-08	1.82E-04	4.01E-05	8.49E-04	2.827E-01	1.553E+03	1.335

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
α_2	4.61E-03	3.16E-03	3.63E-03	3.09E-03	2.63E-03	2.01E-03	1.58E-03
α_3		1.48E-03	6.33E-04	1.17E-03	1.25E-03	1.31E-03	1.19E-03
α_4			7.82E-04	2.48E-04	4.65E-04	6.16E-04	6.97E-04
α_5				3.09E-05	1.04E-04	2.19E-04	3.05E-04
α_6					1.65E-04	4.97E-05	1.11E-04
α_7						5.20E-06	2.30E-05
α_8							1.82E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
Beta	4.61E-03	4.64E-03	5.04E-03	4.54E-03	4.62E-03	4.21E-03	4.08E-03
Gamma		3.19E-01	2.80E-01	3.20E-01	4.30E-01	5.23E-01	6.13E-01
Delta			5.53E-01	1.92E-01	3.69E-01	4.04E-01	5.27E-01
Epsilon				1.11E-01	3.66E-01	3.08E-01	4.71E-01
Mu					6.12E-01	2.00E-01	5.09E-01
Omega						9.48E-02	6.48E-01
Sigma							8.88E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.33	2.00	2.67	3.33	4.00	4.67	5.33
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.6 Auxiliary Feedwater Motor-Driven Pumps

2.1.6.1 AFW-MDP-FS: AFW Motor-Driven Pumps Fail to Start

Generic CCF Parameters

System Group: Clean Water
System: Auxiliary Feedwater
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Start
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 24.5

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9058862	0.9634829	0.9708773	0.9957424	0.9423077	3.875E+01	1.469E+00
α_2	4.26E-03	3.65E-02	2.91E-02	9.41E-02	5.77E-02	1.469E+00	3.875E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9421279	0.9748480	0.9784938	0.9951029	0.9607843	8.248E+01	2.128E+00
α_2	3.37E-04	1.01E-02	6.55E-03	3.18E-02	0.00E+00	8.512E-01	8.376E+01
α_3	1.34E-03	1.51E-02	1.15E-02	4.12E-02	3.92E-02	1.277E+00	8.333E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9518251	0.9770777	0.9795531	0.9938718	0.9702970	1.233E+02	2.894E+00
α_2	8.62E-04	9.98E-03	7.54E-03	2.74E-02	0.00E+00	1.260E+00	1.250E+02
α_3	2.82E-04	7.15E-03	4.77E-03	2.21E-02	1.49E-02	9.024E-01	1.253E+02
α_4	1.19E-04	5.79E-03	3.48E-03	1.94E-02	1.49E-02	7.315E-01	1.255E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9647959	0.9812280	0.9825683	0.9930773	0.9760956	2.317E+02	4.432E+00
α_2	1.39E-03	8.15E-03	6.81E-03	1.95E-02	0.00E+00	1.924E+00	2.342E+02
α_3	5.02E-04	5.50E-03	4.18E-03	1.50E-02	5.98E-03	1.299E+00	2.348E+02
α_4	1.38E-04	3.74E-03	2.46E-03	1.17E-02	1.20E-02	8.822E-01	2.352E+02
α_5	3.14E-07	1.38E-03	3.86E-04	6.16E-03	5.98E-03	3.267E-01	2.358E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9681904	0.9826739	0.9838120	0.9932571	0.9800000	2.742E+02	4.835E+00

α_2	8.73E-04	6.10E-03	4.96E-03	1.52E-02	0.00E+00	1.701E+00	2.774E+02
α_3	4.56E-04	4.77E-03	3.65E-03	1.29E-02	2.50E-03	1.332E+00	2.777E+02
α_4	1.66E-04	3.48E-03	2.39E-03	1.05E-02	7.50E-03	9.710E-01	2.781E+02
α_5	1.96E-05	2.14E-03	1.12E-03	7.70E-03	7.50E-03	5.961E-01	2.785E+02
α_6	6.90E-09	8.41E-04	1.29E-04	4.15E-03	2.50E-03	2.348E-01	2.788E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9736985	0.9845142	0.9852473	0.9928144	0.9828080	4.290E+02	6.747E+00
α_2	1.05E-03	5.15E-03	4.41E-03	1.18E-02	0.00E+00	2.243E+00	4.335E+02
α_3	5.51E-04	3.88E-03	3.16E-03	9.70E-03	1.07E-03	1.692E+00	4.340E+02
α_4	2.92E-04	3.06E-03	2.34E-03	8.28E-03	4.30E-03	1.333E+00	4.344E+02
α_5	9.47E-05	2.16E-03	1.46E-03	6.60E-03	6.45E-03	9.404E-01	4.348E+02
α_6	1.98E-06	1.01E-03	4.10E-04	4.07E-03	4.30E-03	4.416E-01	4.353E+02
α_7	5.92E-17	2.23E-04	1.12E-06	1.30E-03	1.07E-03	9.730E-02	4.356E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9752547	0.9854450	0.9861376	0.9932644	0.9849246	4.554E+02	6.726E+00
α_2	7.87E-04	4.37E-03	3.68E-03	1.03E-02	0.00E+00	2.018E+00	4.601E+02
α_3	3.30E-04	3.08E-03	2.40E-03	8.15E-03	4.71E-04	1.422E+00	4.607E+02
α_4	2.12E-04	2.64E-03	1.96E-03	7.36E-03	2.36E-03	1.218E+00	4.609E+02
α_5	1.17E-04	2.20E-03	1.53E-03	6.54E-03	4.71E-03	1.015E+00	4.611E+02
α_6	2.02E-05	1.43E-03	8.07E-04	4.97E-03	4.71E-03	6.622E-01	4.614E+02
α_7	1.75E-08	5.72E-04	1.11E-04	2.72E-03	2.36E-03	2.641E-01	4.618E+02
α_8	6.27E-14	2.73E-04	5.47E-06	1.55E-03	4.71E-04	1.259E-01	4.620E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.63E-01	9.75E-01	9.77E-01	9.81E-01	9.83E-01	9.85E-01	9.85E-01
α_2	3.65E-02	1.01E-02	9.98E-03	8.15E-03	6.10E-03	5.15E-03	4.37E-03
α_3		1.51E-02	7.15E-03	5.50E-03	4.77E-03	3.88E-03	3.08E-03
α_4			5.79E-03	3.74E-03	3.48E-03	3.06E-03	2.64E-03
α_5				1.38E-03	2.14E-03	2.16E-03	2.20E-03
α_6					8.41E-04	1.01E-03	1.43E-03
α_7						2.23E-04	5.72E-04
α_8							2.73E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.63E-01	9.75E-01	9.77E-01	9.81E-01	9.83E-01	9.85E-01	9.85E-01
Beta	3.65E-02	2.52E-02	2.29E-02	1.88E-02	1.73E-02	1.55E-02	1.46E-02
Gamma		6.00E-01	5.65E-01	5.66E-01	6.48E-01	6.68E-01	7.00E-01
Delta			4.48E-01	4.82E-01	5.75E-01	6.24E-01	6.98E-01
Epsilon				2.70E-01	4.61E-01	5.26E-01	6.29E-01
Mu					2.83E-01	3.64E-01	5.09E-01
Omega						1.81E-01	3.71E-01

Sigma							3.23E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	16.33	24.50	32.67	40.83	49.00	57.17	65.33
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		1.0000	0.5000	0.2500	0.1250	0.0625	0.0313
N₄			0.5000	0.5000	0.3750	0.2500	0.1563
N₅				0.2500	0.3750	0.3750	0.3125
N₆					0.1250	0.2500	0.3125
N₇						0.0625	0.1563
N₈							0.0313

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 7.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.269

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9490725	0.9868266	0.9940851	0.9999559	3.621E+01	4.834E-01	--
α_2	4.41E-05	1.32E-02	5.91E-03	5.09E-02	4.834E-01	3.621E+01	1.335

CCCG = 3, Gamma = 0.275

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9755222	0.9911889	0.9934051	0.9992804	1.379E+02	1.226E+00	--
α_2	2.77E-04	5.69E-03	3.92E-03	1.71E-02	9.769E-01	1.706E+02	0.804
α_3	5.00E-08	3.12E-03	5.43E-04	1.51E-02	2.487E-01	7.953E+01	1.729

CCCG = 4, Gamma = 0.277

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9742420	0.9889911	0.9906816	0.9979599	1.848E+02	2.057E+00	--
α_2	6.83E-04	6.19E-03	4.85E-03	1.63E-02	1.442E+00	2.314E+02	0.830
α_3	3.78E-06	3.01E-03	1.13E-03	1.24E-02	4.114E-01	1.364E+02	1.413
α_4	2.38E-09	1.81E-03	1.98E-04	9.28E-03	2.036E-01	1.124E+02	1.716

CCCG = 5, Gamma = 0.279

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9797739	0.9897566	0.9906500	0.9966870	3.559E+02	3.683E+00	--
α_2	1.12E-03	5.48E-03	4.70E-03	1.25E-02	2.243E+00	4.068E+02	0.895
α_3	1.43E-04	2.84E-03	1.96E-03	8.51E-03	9.912E-01	3.484E+02	1.047
α_4	1.05E-06	1.54E-03	5.22E-04	6.54E-03	3.765E-01	2.436E+02	1.500
α_5	3.30E-21	3.80E-04	2.17E-07	2.20E-03	7.237E-02	1.903E+02	1.922

CCCG = 6, Gamma = 0.280

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9807826	0.9899621	0.9907430	0.9964739	4.082E+02	4.139E+00	--
α_2	8.50E-04	4.42E-03	3.76E-03	1.03E-02	2.128E+00	4.792E+02	0.869
α_3	1.82E-04	2.64E-03	1.92E-03	7.57E-03	1.134E+00	4.277E+02	0.976
α_4	1.08E-05	1.66E-03	8.23E-04	6.14E-03	5.533E-01	3.330E+02	1.255
α_5	3.40E-09	8.74E-04	1.17E-04	4.39E-03	2.210E-01	2.526E+02	1.655
α_6	5.61E-16	4.40E-04	3.06E-06	2.55E-03	1.027E-01	2.335E+02	1.791

CCCG = 7, Gamma = 0.281

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9843043	0.9908735	0.9913337	0.9958714	6.983E+02	6.432E+00	--
α_2	9.26E-04	3.56E-03	3.16E-03	7.58E-03	2.840E+00	7.944E+02	0.883
α_3	3.58E-04	2.42E-03	1.97E-03	5.98E-03	1.746E+00	7.212E+02	0.974
α_4	1.03E-04	1.66E-03	1.19E-03	4.82E-03	1.084E+00	6.532E+02	1.076
α_5	5.62E-06	9.87E-04	4.78E-04	3.69E-03	5.376E-01	5.439E+02	1.293
α_6	3.86E-10	4.39E-04	4.43E-05	2.27E-03	1.979E-01	4.508E+02	1.561
α_7	1.47E-52	6.58E-05	6.59E-15	2.25E-04	2.656E-02	4.039E+02	1.743

CCCG = 8, Gamma = 0.281

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9850184	0.9913911	0.9918482	0.9962034	7.039E+02	6.112E+00	--
α_2	6.21E-04	2.87E-03	2.48E-03	6.45E-03	2.364E+00	8.215E+02	0.857
α_3	2.40E-04	2.02E-03	1.60E-03	5.24E-03	1.512E+00	7.469E+02	0.943
α_4	9.07E-05	1.55E-03	1.10E-03	4.54E-03	1.056E+00	6.815E+02	1.034
α_5	1.71E-05	1.13E-03	6.43E-04	3.89E-03	6.745E-01	5.969E+02	1.181
α_6	8.25E-08	6.14E-04	1.56E-04	2.78E-03	3.076E-01	5.009E+02	1.408
α_7	1.82E-15	2.61E-04	2.57E-06	1.50E-03	1.093E-01	4.194E+02	1.683
α_8	2.61E-18	1.69E-04	4.69E-07	9.85E-04	8.885E-02	5.256E+02	1.343

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.32E-02	5.69E-03	6.19E-03	5.48E-03	4.42E-03	3.56E-03	2.87E-03
α_3		3.12E-03	3.01E-03	2.84E-03	2.64E-03	2.42E-03	2.02E-03
α_4			1.81E-03	1.54E-03	1.66E-03	1.66E-03	1.55E-03
α_5				3.80E-04	8.74E-04	9.87E-04	1.13E-03
α_6					4.40E-04	4.39E-04	6.14E-04
α_7						6.58E-05	2.61E-04
α_8							1.69E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.32E-02	8.81E-03	1.10E-02	1.02E-02	1.00E-02	9.13E-03	8.61E-03
Gamma		3.54E-01	4.37E-01	4.65E-01	5.60E-01	6.10E-01	6.67E-01
Delta			3.75E-01	4.04E-01	5.29E-01	5.66E-01	6.48E-01
Epsilon				1.98E-01	4.42E-01	4.74E-01	5.84E-01
Mu					3.35E-01	3.38E-01	4.80E-01
Omega						1.30E-01	4.12E-01
Sigma							3.93E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.67	7.00	9.33	11.67	14.00	16.33	18.67
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 5.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.192

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8647680	0.9655734	0.9851112	0.9999207	1.262E+01	4.498E-01	--
α_2	7.93E-05	3.44E-02	1.49E-02	1.35E-01	4.498E-01	1.262E+01	1.335

CCCG = 3, Gamma = 0.196

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9200365	0.9713157	0.9785593	0.9978006	3.990E+01	1.178E+00	--
α_2	8.22E-04	1.85E-02	1.27E-02	5.62E-02	9.387E-01	4.975E+01	0.804
α_3	1.09E-07	1.02E-02	1.67E-03	4.99E-02	2.396E-01	2.333E+01	1.729

CCCG = 4, Gamma = 0.198

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9192830	0.9660102	0.9714187	0.9942191	5.395E+01	1.898E+00	--
α_2	1.64E-03	1.81E-02	1.38E-02	4.93E-02	1.285E+00	6.960E+01	0.830
α_3	8.77E-06	9.43E-03	3.40E-03	3.93E-02	3.927E-01	4.126E+01	1.413
α_4	2.50E-08	6.43E-03	8.70E-04	3.23E-02	2.207E-01	3.408E+01	1.716

CCCG = 5, Gamma = 0.199

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9391947	0.9693869	0.9720816	0.9903654	1.110E+02	3.506E+00	--
α_2	2.71E-03	1.52E-02	1.28E-02	3.58E-02	1.992E+00	1.293E+02	0.895
α_3	5.96E-04	9.61E-03	6.90E-03	2.79E-02	1.078E+00	1.111E+02	1.047
α_4	2.45E-06	4.64E-03	1.51E-03	1.99E-02	3.632E-01	7.793E+01	1.500
α_5	1.10E-20	1.19E-03	6.90E-07	6.89E-03	7.248E-02	6.103E+01	1.922

CCCG = 6, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9445321	0.9707249	0.9728876	0.9895261	1.392E+02	4.199E+00	--
α_2	1.99E-03	1.15E-02	9.66E-03	2.75E-02	1.941E+00	1.664E+02	0.869
α_3	8.52E-04	8.88E-03	6.82E-03	2.40E-02	1.332E+00	1.486E+02	0.976
α_4	5.70E-05	5.30E-03	2.86E-03	1.88E-02	6.181E-01	1.160E+02	1.255
α_5	1.80E-08	2.62E-03	3.90E-04	1.30E-02	2.313E-01	8.816E+01	1.655
α_6	8.61E-20	9.41E-04	8.89E-07	5.48E-03	7.684E-02	8.160E+01	1.791

CCCG = 7, Gamma = 0.201

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9524606	0.9724170	0.9738025	0.9876413	2.194E+02	6.223E+00	--
α_2	2.53E-03	1.03E-02	9.10E-03	2.24E-02	2.654E+00	2.540E+02	0.883
α_3	9.64E-04	7.07E-03	5.72E-03	1.78E-02	1.645E+00	2.311E+02	0.974
α_4	3.53E-04	5.29E-03	3.83E-03	1.52E-02	1.115E+00	2.095E+02	1.076
α_5	3.33E-05	3.44E-03	1.83E-03	1.23E-02	6.034E-01	1.747E+02	1.293
α_6	2.18E-10	1.23E-03	9.15E-05	6.51E-03	1.780E-01	1.450E+02	1.561
α_7	1.15E-50	2.10E-04	4.33E-14	7.44E-04	2.734E-02	1.300E+02	1.743

CCCG = 8, Gamma = 0.201

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9545588	0.9736217	0.9749450	0.9881647	2.305E+02	6.246E+00	--
α_2	2.10E-03	9.10E-03	7.94E-03	2.01E-02	2.504E+00	2.727E+02	0.857
α_3	6.09E-04	5.68E-03	4.42E-03	1.50E-02	1.419E+00	2.486E+02	0.943
α_4	2.48E-04	4.50E-03	3.16E-03	1.33E-02	1.027E+00	2.270E+02	1.034
α_5	7.58E-05	3.68E-03	2.21E-03	1.23E-02	7.337E-01	1.989E+02	1.181
α_6	2.37E-06	2.37E-03	8.58E-04	9.88E-03	3.975E-01	1.670E+02	1.408
α_7	5.51E-20	5.50E-04	5.29E-07	3.20E-03	7.703E-02	1.400E+02	1.683
α_8	4.63E-18	4.98E-04	1.25E-06	2.91E-03	8.749E-02	1.755E+02	1.343

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.66E-01	9.71E-01	9.66E-01	9.69E-01	9.71E-01	9.72E-01	9.74E-01
α_2	3.44E-02	1.85E-02	1.81E-02	1.52E-02	1.15E-02	1.03E-02	9.10E-03
α_3		1.02E-02	9.43E-03	9.61E-03	8.88E-03	7.07E-03	5.68E-03
α_4			6.43E-03	4.64E-03	5.30E-03	5.29E-03	4.50E-03
α_5				1.19E-03	2.62E-03	3.44E-03	3.68E-03
α_6					9.41E-04	1.23E-03	2.37E-03
α_7						2.10E-04	5.50E-04
α_8							4.98E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.66E-01	9.71E-01	9.66E-01	9.69E-01	9.71E-01	9.72E-01	9.74E-01
Beta	3.44E-02	2.87E-02	3.40E-02	3.06E-02	2.93E-02	2.76E-02	2.64E-02
Gamma		3.54E-01	4.67E-01	5.04E-01	6.06E-01	6.25E-01	6.55E-01
Delta			4.06E-01	3.77E-01	4.99E-01	5.90E-01	6.71E-01
Epsilon				2.04E-01	4.02E-01	4.80E-01	6.12E-01
Mu					2.64E-01	2.94E-01	4.82E-01
Omega						1.46E-01	3.06E-01
Sigma							4.75E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.33	5.00	6.67	8.33	10.00	11.67	13.33
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.038

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.6616741	0.9166847	0.9671370	0.9999287	4.182E+00	3.801E-01	--
α_2	7.13E-05	8.33E-02	3.29E-02	3.38E-01	3.801E-01	4.182E+00	1.335

CCCG = 3, Gamma = 0.039

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7907643	0.9284030	0.9487034	0.9964360	1.245E+01	9.600E-01	--
α_2	5.61E-04	3.68E-02	2.16E-02	1.25E-01	6.673E-01	1.744E+01	0.804
α_3	3.20E-06	3.48E-02	8.76E-03	1.59E-01	2.927E-01	8.130E+00	1.729

CCCG = 4, Gamma = 0.040

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8158715	0.9240157	0.9366382	0.9888407	2.030E+01	1.669E+00	--
α_2	2.09E-03	3.59E-02	2.58E-02	1.04E-01	1.039E+00	2.791E+01	0.830
α_3	2.03E-05	2.29E-02	8.32E-03	9.51E-02	3.887E-01	1.662E+01	1.413
α_4	2.04E-07	1.72E-02	2.92E-03	8.44E-02	2.414E-01	1.376E+01	1.716

CCCG = 5, Gamma = 0.040

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8808187	0.9393994	0.9444437	0.9807169	5.405E+01	3.487E+00	--
α_2	4.19E-03	2.68E-02	2.22E-02	6.51E-02	1.791E+00	6.503E+01	0.895
α_3	1.69E-03	2.11E-02	1.59E-02	5.87E-02	1.207E+00	5.588E+01	1.047
α_4	1.94E-05	1.09E-02	4.39E-03	4.38E-02	4.340E-01	3.942E+01	1.500
α_5	3.96E-26	1.77E-03	6.35E-08	9.80E-03	5.493E-02	3.105E+01	1.922

CCCG = 6, Gamma = 0.040

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8949426	0.9450852	0.9492216	0.9810778	6.720E+01	3.905E+00	--
α_2	1.51E-03	1.56E-02	1.20E-02	4.18E-02	1.335E+00	8.445E+01	0.869
α_3	2.47E-03	2.00E-02	1.60E-02	5.13E-02	1.531E+00	7.490E+01	0.976
α_4	2.35E-04	1.21E-02	7.23E-03	4.05E-02	7.191E-01	5.872E+01	1.255
α_5	8.07E-08	5.48E-03	9.43E-04	2.66E-02	2.467E-01	4.481E+01	1.655
α_6	1.94E-20	1.75E-03	1.06E-06	1.02E-02	7.279E-02	4.156E+01	1.791

CCCG = 7, Gamma = 0.040

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9155906	0.9515597	0.9540713	0.9789458	1.133E+02	5.770E+00	--
α_2	1.38E-03	1.11E-02	8.84E-03	2.84E-02	1.549E+00	1.383E+02	0.883
α_3	2.80E-03	1.57E-02	1.32E-02	3.70E-02	1.989E+00	1.249E+02	0.974
α_4	1.01E-03	1.12E-02	8.53E-03	3.06E-02	1.287E+00	1.135E+02	1.076
α_5	1.21E-04	7.24E-03	4.21E-03	2.47E-02	6.913E-01	9.484E+01	1.293
α_6	2.18E-08	2.94E-03	4.44E-04	1.45E-02	2.327E-01	7.890E+01	1.561
α_7	2.03E-64	2.98E-04	4.53E-17	7.53E-04	2.112E-02	7.084E+01	1.743

CCCG = 8, Gamma = 0.040

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9261863	0.9558056	0.9577094	0.9789211	1.517E+02	7.016E+00	--
α_2	1.06E-03	8.24E-03	6.60E-03	2.10E-02	1.583E+00	1.906E+02	0.857
α_3	2.02E-03	1.14E-02	9.57E-03	2.69E-02	1.986E+00	1.726E+02	0.943
α_4	1.47E-03	1.05E-02	8.53E-03	2.63E-02	1.672E+00	1.576E+02	1.034
α_5	3.85E-04	7.25E-03	5.07E-03	2.16E-02	1.011E+00	1.384E+02	1.181
α_6	3.71E-05	4.88E-03	2.49E-03	1.78E-02	5.709E-01	1.164E+02	1.408
α_7	4.25E-10	1.85E-03	1.45E-04	9.78E-03	1.809E-01	9.768E+01	1.683
α_8	1.47E-107	1.02E-04	3.07E-27	7.61E-05	1.245E-02	1.226E+02	1.343

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.17E-01	9.28E-01	9.24E-01	9.39E-01	9.45E-01	9.52E-01	9.56E-01
α_2	8.33E-02	3.68E-02	3.59E-02	2.68E-02	1.56E-02	1.11E-02	8.24E-03
α_3		3.48E-02	2.29E-02	2.11E-02	2.00E-02	1.57E-02	1.14E-02
α_4			1.72E-02	1.09E-02	1.21E-02	1.12E-02	1.05E-02
α_5				1.77E-03	5.48E-03	7.24E-03	7.25E-03
α_6					1.75E-03	2.94E-03	4.88E-03
α_7						2.98E-04	1.85E-03
α_8							1.02E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.17E-01	9.28E-01	9.24E-01	9.39E-01	9.45E-01	9.52E-01	9.56E-01
Beta	8.33E-02	7.16E-02	7.60E-02	6.06E-02	5.49E-02	4.84E-02	4.42E-02
Gamma		4.85E-01	5.28E-01	5.58E-01	7.17E-01	7.71E-01	8.14E-01
Delta			4.30E-01	3.74E-01	4.91E-01	5.80E-01	6.84E-01
Epsilon				1.40E-01	3.74E-01	4.83E-01	5.73E-01
Mu					2.42E-01	3.09E-01	4.85E-01
Omega						9.20E-02	2.85E-01
Sigma							5.21E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.67	1.00	1.33	1.67	2.00	2.33	2.67
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 7.5

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.346

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8368422	0.9357561	0.9480998	0.9923231	2.142E+01	1.471E+00	--
α_2	7.68E-03	6.42E-02	5.19E-02	1.63E-01	1.471E+00	2.142E+01	1.335

CCCG = 3, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9066251	0.9592845	0.9650794	0.9920998	4.954E+01	2.103E+00	--
α_2	2.65E-04	9.19E-03	5.84E-03	2.95E-02	8.104E-01	8.734E+01	0.804
α_3	2.91E-03	3.15E-02	2.43E-02	8.50E-02	1.292E+00	3.970E+01	1.729

CCCG = 4, Gamma = 0.327

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9398547	0.9711479	0.9741643	0.9921244	9.938E+01	2.953E+00	--
α_2	8.09E-04	8.68E-03	6.63E-03	2.35E-02	1.312E+00	1.499E+02	0.830
α_3	4.51E-04	1.05E-02	7.10E-03	3.20E-02	9.307E-01	8.793E+01	1.413
α_4	1.79E-04	9.70E-03	5.74E-03	3.27E-02	7.099E-01	7.246E+01	1.716

CCCG = 5, Gamma = 0.323

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9596377	0.9788795	0.9805002	0.9925829	1.903E+02	4.107E+00	--
α_2	9.46E-04	6.70E-03	5.45E-03	1.67E-02	1.684E+00	2.496E+02	0.895
α_3	4.28E-04	5.56E-03	4.12E-03	1.56E-02	1.193E+00	2.135E+02	1.047
α_4	2.17E-04	5.88E-03	3.88E-03	1.84E-02	8.816E-01	1.490E+02	1.500
α_5	1.15E-06	2.98E-03	9.15E-04	1.30E-02	3.487E-01	1.166E+02	1.922

CCCG = 6, Gamma = 0.320

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9663904	0.9816982	0.9829035	0.9928887	2.587E+02	4.822E+00	--
α_2	7.29E-04	5.04E-03	4.10E-03	1.25E-02	1.714E+00	3.387E+02	0.869
α_3	3.35E-04	4.07E-03	3.04E-03	1.13E-02	1.233E+00	3.020E+02	0.976
α_4	2.39E-04	4.35E-03	3.05E-03	1.29E-02	1.026E+00	2.348E+02	1.255
α_5	4.04E-05	3.52E-03	1.92E-03	1.24E-02	6.286E-01	1.782E+02	1.655
α_6	5.13E-09	1.34E-03	1.78E-04	6.71E-03	2.207E-01	1.650E+02	1.791

CCCG = 7, Gamma = 0.318

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9733202	0.9845909	0.9853874	0.9931415	3.958E+02	6.195E+00	--
α_2	8.23E-04	4.34E-03	3.68E-03	1.01E-02	2.105E+00	4.834E+02	0.883
α_3	3.21E-04	3.14E-03	2.43E-03	8.39E-03	1.383E+00	4.389E+02	0.974
α_4	2.63E-04	3.13E-03	2.35E-03	8.67E-03	1.247E+00	3.972E+02	1.076
α_5	1.06E-04	2.71E-03	1.80E-03	8.43E-03	8.999E-01	3.307E+02	1.293
α_6	3.35E-06	1.62E-03	6.63E-04	6.49E-03	4.456E-01	2.742E+02	1.561
α_7	1.33E-14	4.69E-04	6.18E-06	2.69E-03	1.154E-01	2.459E+02	1.743

CCCG = 8, Gamma = 0.317

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9758311	0.9857343	0.9864051	0.9933472	4.721E+02	6.832E+00	--
α_2	7.70E-04	3.80E-03	3.25E-03	8.70E-03	2.229E+00	5.846E+02	0.857
α_3	2.18E-04	2.42E-03	1.84E-03	6.63E-03	1.291E+00	5.317E+02	0.943
α_4	1.91E-04	2.47E-03	1.83E-03	6.92E-03	1.198E+00	4.849E+02	1.034
α_5	1.55E-04	2.53E-03	1.80E-03	7.37E-03	1.075E+00	4.245E+02	1.181
α_6	2.21E-05	1.79E-03	9.87E-04	6.30E-03	6.396E-01	3.563E+02	1.408
α_7	7.77E-08	9.73E-04	2.25E-04	4.50E-03	2.907E-01	2.985E+02	1.683
α_8	1.49E-15	2.89E-04	2.68E-06	1.67E-03	1.081E-01	3.743E+02	1.343

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.36E-01	9.59E-01	9.71E-01	9.79E-01	9.82E-01	9.85E-01	9.86E-01
α_2	6.42E-02	9.19E-03	8.68E-03	6.70E-03	5.04E-03	4.34E-03	3.80E-03
α_3		3.15E-02	1.05E-02	5.56E-03	4.07E-03	3.14E-03	2.42E-03
α_4			9.70E-03	5.88E-03	4.35E-03	3.13E-03	2.47E-03
α_5				2.98E-03	3.52E-03	2.71E-03	2.53E-03
α_6					1.34E-03	1.62E-03	1.79E-03
α_7						4.69E-04	9.73E-04
α_8							2.89E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.36E-01	9.59E-01	9.71E-01	9.79E-01	9.82E-01	9.85E-01	9.86E-01
Beta	6.42E-02	4.07E-02	2.89E-02	2.11E-02	1.83E-02	1.54E-02	1.43E-02
Gamma		7.74E-01	6.99E-01	6.83E-01	7.25E-01	7.19E-01	7.34E-01
Delta			4.81E-01	6.15E-01	6.94E-01	7.16E-01	7.69E-01
Epsilon				3.36E-01	5.27E-01	6.06E-01	6.94E-01
Mu					2.75E-01	4.35E-01	5.47E-01
Omega						2.24E-01	4.13E-01
Sigma							2.29E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.00	7.50	10.00	12.50	15.00	17.50	20.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		1.0000	0.5000	0.2500	0.1250	0.0625	0.0313

N₄			0.5000	0.5000	0.3750	0.2500	0.1563
N₅				0.2500	0.3750	0.3750	0.3125
N₆					0.1250	0.2500	0.3125
N₇						0.0625	0.1563
N₈							0.0313

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9772935	0.9941031	0.9973296	0.9999782	8.314E+01	4.932E-01	--
α_2	2.18E-05	5.90E-03	2.67E-03	2.27E-02	4.932E-01	8.314E+01	1.335

CCCG = 3, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9863831	0.9953502	0.9966952	0.9997245	2.268E+02	1.059E+00	--
α_2	4.26E-05	2.28E-03	1.34E-03	7.69E-03	7.137E-01	3.127E+02	0.804
α_3	8.55E-07	2.37E-03	7.19E-04	1.04E-02	3.458E-01	1.454E+02	1.729

CCCG = 4, Gamma = 0.158

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9896704	0.9955596	0.9962313	0.9991528	4.741E+02	2.115E+00	--
α_2	3.25E-04	2.62E-03	2.09E-03	6.75E-03	1.549E+00	5.888E+02	0.830
α_3	2.38E-08	7.63E-04	1.49E-04	3.63E-03	2.646E-01	3.466E+02	1.413
α_4	1.17E-07	1.05E-03	2.59E-04	4.81E-03	3.010E-01	2.854E+02	1.716

CCCG = 5, Gamma = 0.159

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9933681	0.9963170	0.9965432	0.9984933	1.440E+03	5.325E+00	--
α_2	7.35E-04	2.30E-03	2.10E-03	4.58E-03	3.632E+00	1.572E+03	0.895
α_3	9.88E-05	1.01E-03	7.72E-04	2.71E-03	1.354E+00	1.345E+03	1.047
α_4	2.99E-08	3.15E-04	7.52E-05	1.45E-03	2.961E-01	9.397E+02	1.500
α_5	1.72E-34	5.78E-05	6.37E-11	2.87E-04	4.243E-02	7.335E+02	1.922

CCCG = 6, Gamma = 0.160

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9930377	0.9962045	0.9964557	0.9985136	1.295E+03	4.936E+00	--
α_2	5.28E-04	1.99E-03	1.76E-03	4.20E-03	2.915E+00	1.465E+03	0.869
α_3	8.20E-05	9.61E-04	7.22E-04	2.66E-03	1.257E+00	1.306E+03	0.976
α_4	2.01E-06	4.95E-04	2.26E-04	1.90E-03	5.031E-01	1.017E+03	1.255
α_5	4.34E-15	1.50E-04	1.98E-06	8.59E-04	1.155E-01	7.708E+02	1.655
α_6	9.53E-13	2.04E-04	7.46E-06	1.13E-03	1.451E-01	7.122E+02	1.791

CCCG = 7, Gamma = 0.160

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9946177	0.9965938	0.9967099	0.9981737	2.825E+03	9.654E+00	--
α_2	6.05E-04	1.56E-03	1.46E-03	2.88E-03	4.851E+00	3.100E+03	0.883
α_3	2.55E-04	9.95E-04	8.79E-04	2.13E-03	2.800E+00	2.812E+03	0.974
α_4	5.55E-05	5.43E-04	4.20E-04	1.45E-03	1.384E+00	2.546E+03	1.076
α_5	8.18E-07	2.31E-04	1.03E-04	8.94E-04	4.902E-01	2.120E+03	1.293
α_6	1.55E-15	6.53E-05	8.27E-07	3.74E-04	1.146E-01	1.756E+03	1.561
α_7	4.90E-93	9.31E-06	9.90E-25	1.11E-05	1.464E-02	1.573E+03	1.743

CCCG = 8, Gamma = 0.161

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9943784	0.9966586	0.9968121	0.9984150	2.132E+03	7.148E+00	--
α_2	3.33E-04	1.23E-03	1.09E-03	2.58E-03	2.980E+00	2.423E+03	0.857
α_3	1.54E-04	8.89E-04	7.44E-04	2.12E-03	1.960E+00	2.202E+03	0.943
α_4	4.24E-05	5.80E-04	4.25E-04	1.65E-03	1.166E+00	2.009E+03	1.034
α_5	1.73E-06	3.05E-04	1.48E-04	1.14E-03	5.375E-01	1.759E+03	1.181
α_6	2.70E-11	1.22E-04	9.49E-06	6.47E-04	1.805E-01	1.476E+03	1.408
α_7	1.73E-35	3.35E-05	2.51E-11	1.64E-04	4.139E-02	1.235E+03	1.683
α_8	1.11E-08	1.83E-04	4.03E-05	8.51E-04	2.827E-01	1.548E+03	1.343

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
α_2	5.90E-03	2.28E-03	2.62E-03	2.30E-03	1.99E-03	1.56E-03	1.23E-03
α_3		2.37E-03	7.63E-04	1.01E-03	9.61E-04	9.95E-04	8.89E-04
α_4			1.05E-03	3.15E-04	4.95E-04	5.43E-04	5.80E-04
α_5				5.78E-05	1.50E-04	2.31E-04	3.05E-04
α_6					2.04E-04	6.53E-05	1.22E-04
α_7						9.31E-06	3.35E-05
α_8							1.83E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
Beta	5.90E-03	4.65E-03	4.44E-03	3.68E-03	3.80E-03	3.41E-03	3.34E-03
Gamma		5.10E-01	4.09E-01	3.74E-01	4.77E-01	5.41E-01	6.32E-01
Delta			5.80E-01	2.70E-01	4.69E-01	4.61E-01	5.79E-01
Epsilon				1.55E-01	4.17E-01	3.60E-01	5.26E-01
Mu					5.76E-01	2.44E-01	5.26E-01
Omega						1.25E-01	6.39E-01
Sigma							8.45E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.67	4.00	5.33	6.67	8.00	9.33	10.67
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.6.2 AFW-MDP-FH: AFW Motor-Driven Pumps Fail to Run Less Than One Hour

Generic CCF Parameters

System Group: Clean Water
System: Auxiliary Feedwater
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run < 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9293809	0.9818971	0.9920474	0.9999453	1.0000000	2.541E+01	4.685E-01
α_2	5.13E-05	1.81E-02	7.95E-03	7.06E-02	0.00E+00	4.685E-01	2.541E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9483145	0.9818372	0.9866969	0.9987453	1.0000000	6.098E+01	1.128E+00
α_2	4.60E-04	1.37E-02	8.95E-03	4.32E-02	0.00E+00	8.512E-01	6.126E+01
α_3	2.23E-07	4.46E-03	9.56E-04	2.09E-02	0.00E+00	2.768E-01	6.183E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9525994	0.9801860	0.9834318	0.9966772	1.0000000	9.368E+01	1.894E+00
α_2	1.14E-03	1.32E-02	9.97E-03	3.62E-02	0.00E+00	1.260E+00	9.431E+01
α_3	4.58E-06	4.21E-03	1.55E-03	1.74E-02	0.00E+00	4.024E-01	9.517E+01
α_4	1.68E-08	2.42E-03	3.61E-04	1.20E-02	0.00E+00	2.315E-01	9.534E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9650736	0.9826018	0.9842043	0.9946508	1.0000000	1.938E+02	3.432E+00
α_2	1.66E-03	9.75E-03	8.15E-03	2.33E-02	0.00E+00	1.924E+00	1.953E+02
α_3	3.08E-04	5.32E-03	3.77E-03	1.56E-02	0.00E+00	1.049E+00	1.962E+02
α_4	1.47E-06	1.94E-03	6.68E-04	8.17E-03	0.00E+00	3.822E-01	1.969E+02
α_5	3.38E-20	3.89E-04	3.63E-07	2.26E-03	0.00E+00	7.674E-02	1.972E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9677940	0.9834740	0.9848410	0.9944760	1.0000000	2.282E+02	3.835E+00
α_2	1.05E-03	7.33E-03	5.97E-03	1.83E-02	0.00E+00	1.701E+00	2.304E+02
α_3	4.10E-04	5.20E-03	3.87E-03	1.46E-02	0.00E+00	1.207E+00	2.308E+02

α_4	2.35E-05	2.57E-03	1.35E-03	9.25E-03	0.00E+00	5.960E-01	2.315E+02
α_5	3.73E-09	9.53E-04	1.27E-04	4.78E-03	0.00E+00	2.211E-01	2.318E+02
α_6	3.72E-15	4.73E-04	4.79E-06	2.73E-03	0.00E+00	1.098E-01	2.319E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9733872	0.9848971	0.9857364	0.9935299	1.0000000	3.748E+02	5.747E+00
α_2	1.21E-03	5.89E-03	5.05E-03	1.35E-02	0.00E+00	2.243E+00	3.783E+02
α_3	5.75E-04	4.28E-03	3.45E-03	1.08E-02	0.00E+00	1.630E+00	3.789E+02
α_4	1.77E-04	2.85E-03	2.04E-03	8.28E-03	0.00E+00	1.083E+00	3.795E+02
α_5	1.07E-05	1.49E-03	7.49E-04	5.46E-03	0.00E+00	5.654E-01	3.800E+02
α_6	2.76E-10	5.03E-04	4.65E-05	2.62E-03	0.00E+00	1.916E-01	3.804E+02
α_7	6.26E-41	9.14E-05	3.40E-12	4.01E-04	0.00E+00	3.480E-02	3.805E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9746696	0.9856411	0.9864433	0.9938665	1.0000000	3.930E+02	5.726E+00
α_2	9.13E-04	5.06E-03	4.26E-03	1.19E-02	0.00E+00	2.018E+00	3.967E+02
α_3	3.60E-04	3.49E-03	2.70E-03	9.30E-03	0.00E+00	1.391E+00	3.974E+02
α_4	1.58E-04	2.66E-03	1.89E-03	7.80E-03	0.00E+00	1.062E+00	3.977E+02
α_5	3.11E-05	1.76E-03	1.03E-03	5.98E-03	0.00E+00	7.026E-01	3.980E+02
α_6	3.44E-07	8.77E-04	2.69E-04	3.81E-03	0.00E+00	3.497E-01	3.984E+02
α_7	1.32E-15	2.70E-04	2.48E-06	1.56E-03	0.00E+00	1.078E-01	3.986E+02
α_8	2.76E-17	2.37E-04	1.01E-06	1.38E-03	0.00E+00	9.469E-02	3.987E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.81E-02	1.37E-02	1.32E-02	9.75E-03	7.33E-03	5.89E-03	5.06E-03
α_3		4.46E-03	4.21E-03	5.32E-03	5.20E-03	4.28E-03	3.49E-03
α_4			2.42E-03	1.94E-03	2.57E-03	2.85E-03	2.66E-03
α_5				3.89E-04	9.53E-04	1.49E-03	1.76E-03
α_6					4.73E-04	5.03E-04	8.77E-04
α_7						9.14E-05	2.70E-04
α_8							2.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.81E-02	1.82E-02	1.98E-02	1.74E-02	1.65E-02	1.51E-02	1.44E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9745504	0.9934361	0.9970785	0.9999783	7.316E+01	4.834E-01	--
α_2	2.17E-05	6.56E-03	2.92E-03	2.54E-02	4.834E-01	7.316E+01	0.615

CCCG = 3, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845317	0.9944409	0.9958464	0.9995473	2.192E+02	1.226E+00	--
α_2	2.24E-04	4.61E-03	3.18E-03	1.39E-02	9.769E-01	2.109E+02	0.623
α_3	1.51E-08	9.48E-04	1.64E-04	4.59E-03	2.487E-01	2.622E+02	0.503

CCCG = 4, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9841499	0.9932383	0.9942845	0.9987504	3.022E+02	2.057E+00	--
α_2	5.39E-04	4.89E-03	3.83E-03	1.29E-02	1.442E+00	2.932E+02	0.628
α_3	1.57E-06	1.26E-03	4.72E-04	5.17E-03	4.114E-01	3.269E+02	0.565
α_4	8.00E-10	6.10E-04	6.65E-05	3.13E-03	2.036E-01	3.333E+02	0.555

CCCG = 5, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9871279	0.9934898	0.9940616	0.9978981	5.621E+02	3.683E+00	--
α_2	8.47E-04	4.15E-03	3.55E-03	9.48E-03	2.243E+00	5.385E+02	0.657
α_3	8.09E-05	1.61E-03	1.11E-03	4.83E-03	9.912E-01	6.147E+02	0.577
α_4	4.11E-07	6.04E-04	2.04E-04	2.56E-03	3.765E-01	6.230E+02	0.570
α_5	1.29E-21	1.49E-04	8.48E-08	8.60E-04	7.237E-02	4.863E+02	0.731

CCCG = 6, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9869086	0.9931694	0.9937040	0.9976040	6.018E+02	4.139E+00	--
α_2	7.52E-04	3.91E-03	3.32E-03	9.09E-03	2.128E+00	5.416E+02	0.746
α_3	1.09E-04	1.58E-03	1.15E-03	4.54E-03	1.134E+00	7.147E+02	0.566
α_4	5.10E-06	7.81E-04	3.87E-04	2.89E-03	5.533E-01	7.075E+02	0.573
α_5	1.26E-09	3.25E-04	4.33E-05	1.63E-03	2.210E-01	6.808E+02	0.595
α_6	2.89E-16	2.27E-04	1.58E-06	1.32E-03	1.027E-01	4.522E+02	0.896

CCCG = 7, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9890264	0.9936242	0.9939474	0.9971186	1.002E+03	6.432E+00	--
α_2	8.65E-04	3.33E-03	2.95E-03	7.08E-03	2.840E+00	8.507E+02	0.807
α_3	2.19E-04	1.48E-03	1.21E-03	3.66E-03	1.746E+00	1.179E+03	0.583
α_4	5.76E-05	9.25E-04	6.61E-04	2.69E-03	1.084E+00	1.171E+03	0.587
α_5	2.56E-06	4.51E-04	2.18E-04	1.69E-03	5.376E-01	1.191E+03	0.578
α_6	1.43E-10	1.63E-04	1.64E-05	8.41E-04	1.979E-01	1.216E+03	0.566
α_7	6.97E-53	3.11E-05	3.12E-15	1.06E-04	2.656E-02	8.536E+02	0.807

CCCG = 8, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9889440	0.9936511	0.9939896	0.9972024	9.566E+02	6.112E+00	--
α_2	6.35E-04	2.94E-03	2.54E-03	6.60E-03	2.364E+00	8.028E+02	0.855
α_3	1.61E-04	1.35E-03	1.07E-03	3.51E-03	1.512E+00	1.116E+03	0.616
α_4	5.15E-05	8.79E-04	6.22E-04	2.58E-03	1.056E+00	1.200E+03	0.573
α_5	8.95E-06	5.91E-04	3.37E-04	2.04E-03	6.745E-01	1.140E+03	0.603
α_6	3.41E-08	2.54E-04	6.45E-05	1.15E-03	3.076E-01	1.210E+03	0.569
α_7	5.83E-16	8.33E-05	8.22E-07	4.80E-04	1.093E-01	1.312E+03	0.524
α_8	3.90E-18	2.52E-04	7.01E-07	1.47E-03	8.885E-02	3.521E+02	1.954

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.94E-01	9.93E-01	9.93E-01	9.93E-01	9.94E-01	9.94E-01
α_2	6.56E-03	4.61E-03	4.89E-03	4.15E-03	3.91E-03	3.33E-03	2.94E-03
α_3		9.48E-04	1.26E-03	1.61E-03	1.58E-03	1.48E-03	1.35E-03
α_4			6.10E-04	6.04E-04	7.81E-04	9.25E-04	8.79E-04
α_5				1.49E-04	3.25E-04	4.51E-04	5.91E-04
α_6					2.27E-04	1.63E-04	2.54E-04
α_7						3.11E-05	8.33E-05
α_8							2.52E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.94E-01	9.93E-01	9.93E-01	9.93E-01	9.94E-01	9.94E-01
Beta	6.56E-03	5.56E-03	6.76E-03	6.51E-03	6.83E-03	6.38E-03	6.35E-03
Gamma		1.70E-01	2.76E-01	3.63E-01	4.27E-01	4.78E-01	5.38E-01
Delta			3.27E-01	3.19E-01	4.57E-01	5.15E-01	6.04E-01
Epsilon				1.98E-01	4.14E-01	4.11E-01	5.73E-01
Mu					4.12E-01	3.01E-01	4.99E-01
Omega						1.61E-01	5.69E-01
Sigma							7.52E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8481133	0.9635862	0.9867865	0.9999716	1.006E+01	3.801E-01	--
α_2	2.84E-05	3.64E-02	1.32E-02	1.52E-01	3.801E-01	1.006E+01	0.615

CCCG = 3, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8848960	0.9613529	0.9729429	0.9981419	2.388E+01	9.600E-01	--
α_2	4.30E-04	2.85E-02	1.66E-02	9.74E-02	6.673E-01	2.271E+01	0.623
α_3	8.80E-07	1.01E-02	2.42E-03	4.65E-02	2.927E-01	2.867E+01	0.503

CCCG = 4, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8954147	0.9575609	0.9650857	0.9939256	3.766E+01	1.669E+00	--
α_2	1.59E-03	2.75E-02	1.97E-02	8.02E-02	1.039E+00	3.671E+01	0.628
α_3	8.03E-06	9.27E-03	3.30E-03	3.88E-02	3.887E-01	4.155E+01	0.565
α_4	6.50E-08	5.65E-03	9.31E-04	2.76E-02	2.414E-01	4.250E+01	0.555

CCCG = 5, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9274631	0.9634524	0.9666487	0.9885110	9.192E+01	3.487E+00	--
α_2	3.10E-03	1.99E-02	1.65E-02	4.85E-02	1.791E+00	8.819E+01	0.657
α_3	9.35E-04	1.18E-02	8.79E-03	3.29E-02	1.207E+00	1.012E+02	0.577
α_4	7.39E-06	4.18E-03	1.67E-03	1.69E-02	4.340E-01	1.033E+02	0.570
α_5	1.51E-26	6.79E-04	2.42E-08	3.74E-03	5.493E-02	8.087E+01	0.731

CCCG = 6, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9348519	0.9662055	0.9688638	0.9884712	1.116E+02	3.905E+00	--
α_2	1.31E-03	1.35E-02	1.04E-02	3.64E-02	1.335E+00	9.734E+01	0.746
α_3	1.44E-03	1.18E-02	9.39E-03	3.03E-02	1.531E+00	1.284E+02	0.566
α_4	1.08E-04	5.60E-03	3.33E-03	1.88E-02	7.191E-01	1.278E+02	0.573
α_5	2.92E-08	2.00E-03	3.41E-04	9.70E-03	2.467E-01	1.233E+02	0.595
α_6	9.76E-21	8.87E-04	5.34E-07	5.14E-03	7.279E-02	8.201E+01	0.896

CCCG = 7, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9467378	0.9696030	0.9712391	0.9868790	1.841E+02	5.770E+00	--
α_2	1.27E-03	1.02E-02	8.17E-03	2.62E-02	1.549E+00	1.499E+02	0.807
α_3	1.69E-03	9.49E-03	7.98E-03	2.25E-02	1.989E+00	2.075E+02	0.583
α_4	5.55E-04	6.19E-03	4.69E-03	1.69E-02	1.287E+00	2.067E+02	0.587
α_5	5.45E-05	3.27E-03	1.89E-03	1.12E-02	6.913E-01	2.108E+02	0.578
α_6	7.95E-09	1.08E-03	1.62E-04	5.33E-03	2.327E-01	2.156E+02	0.566
α_7	9.47E-65	1.39E-04	2.11E-17	3.51E-04	2.112E-02	1.514E+02	0.807

CCCG = 8, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9527843	0.9718581	0.9731115	0.9866513	2.423E+02	7.016E+00	--
α_2	1.07E-03	8.30E-03	6.66E-03	2.12E-02	1.583E+00	1.891E+02	0.855
α_3	1.33E-03	7.50E-03	6.30E-03	1.78E-02	1.986E+00	2.628E+02	0.616
α_4	8.20E-04	5.88E-03	4.77E-03	1.47E-02	1.672E+00	2.829E+02	0.573
α_5	1.98E-04	3.74E-03	2.61E-03	1.11E-02	1.011E+00	2.692E+02	0.603
α_6	1.51E-05	1.99E-03	1.01E-03	7.29E-03	5.709E-01	2.861E+02	0.569
α_7	1.33E-10	5.82E-04	4.55E-05	3.08E-03	1.809E-01	3.106E+02	0.524
α_8	2.16E-107	1.49E-04	4.53E-27	1.12E-04	1.245E-02	8.342E+01	1.954

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.64E-01	9.61E-01	9.58E-01	9.63E-01	9.66E-01	9.70E-01	9.72E-01
α_2	3.64E-02	2.85E-02	2.75E-02	1.99E-02	1.35E-02	1.02E-02	8.30E-03
α_3		1.01E-02	9.27E-03	1.18E-02	1.18E-02	9.49E-03	7.50E-03
α_4			5.65E-03	4.18E-03	5.60E-03	6.19E-03	5.88E-03
α_5				6.79E-04	2.00E-03	3.27E-03	3.74E-03
α_6					8.87E-04	1.08E-03	1.99E-03
α_7						1.39E-04	5.82E-04
α_8							1.49E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.64E-01	9.61E-01	9.58E-01	9.63E-01	9.66E-01	9.70E-01	9.72E-01
Beta	3.64E-02	3.86E-02	4.24E-02	3.65E-02	3.38E-02	3.04E-02	2.81E-02
Gamma		2.61E-01	3.52E-01	4.55E-01	6.00E-01	6.64E-01	7.05E-01
Delta			3.79E-01	2.92E-01	4.18E-01	5.29E-01	6.22E-01
Epsilon				1.40E-01	3.40E-01	4.20E-01	5.24E-01
Mu					3.08E-01	2.71E-01	4.21E-01
Omega						1.15E-01	2.69E-01
Sigma							2.04E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9557360	0.9886692	0.9950491	0.9999674	4.106E+01	4.706E-01	--
α_2	3.26E-05	1.13E-02	4.95E-03	4.43E-02	4.706E-01	4.106E+01	0.615

CCCG = 3, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9703886	0.9897177	0.9925615	0.9993289	1.061E+02	1.103E+00	--
α_2	2.29E-04	7.96E-03	5.06E-03	2.56E-02	8.104E-01	1.009E+02	0.623
α_3	1.94E-07	2.32E-03	5.43E-04	1.07E-02	2.921E-01	1.257E+02	0.503

CCCG = 4, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9756333	0.9897587	0.9914143	0.9982228	1.887E+02	1.953E+00	--
α_2	6.64E-04	7.13E-03	5.44E-03	1.94E-02	1.312E+00	1.828E+02	0.628
α_3	3.53E-06	2.11E-03	8.32E-04	8.52E-03	4.307E-01	2.040E+02	0.565
α_4	2.00E-09	1.01E-03	1.19E-04	5.13E-03	2.099E-01	2.082E+02	0.555

CCCG = 5, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9810821	0.9908632	0.9918066	0.9974205	3.369E+02	3.107E+00	--
α_2	7.35E-04	5.21E-03	4.23E-03	1.30E-02	1.684E+00	3.215E+02	0.657
α_3	1.13E-04	2.56E-03	1.74E-03	7.83E-03	9.426E-01	3.670E+02	0.577
α_4	7.69E-07	1.02E-03	3.52E-04	4.32E-03	3.816E-01	3.721E+02	0.570
α_5	1.36E-16	3.39E-04	1.86E-06	1.97E-03	9.865E-02	2.905E+02	0.731

CCCG = 6, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9824894	0.9910472	0.9918020	0.9970266	4.231E+02	3.822E+00	--
α_2	6.58E-04	4.55E-03	3.71E-03	1.13E-02	1.714E+00	3.751E+02	0.746
α_3	1.46E-04	2.23E-03	1.61E-03	6.45E-03	1.108E+00	4.949E+02	0.566
α_4	1.75E-05	1.33E-03	7.39E-04	4.63E-03	6.509E-01	4.900E+02	0.573
α_5	1.06E-08	5.37E-04	9.68E-05	2.59E-03	2.536E-01	4.716E+02	0.595
α_6	4.95E-17	3.05E-04	1.39E-06	1.78E-03	9.572E-02	3.133E+02	0.896

CCCG = 7, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9845609	0.9914641	0.9919964	0.9965496	6.034E+02	5.195E+00	--
α_2	7.83E-04	4.13E-03	3.50E-03	9.62E-03	2.105E+00	5.077E+02	0.807
α_3	1.76E-04	1.87E-03	1.43E-03	5.09E-03	1.320E+00	7.037E+02	0.583
α_4	7.25E-05	1.42E-03	9.87E-04	4.27E-03	9.967E-01	6.990E+02	0.587
α_5	3.73E-06	7.37E-04	3.50E-04	2.78E-03	5.249E-01	7.113E+02	0.578
α_6	2.00E-10	2.69E-04	2.63E-05	1.40E-03	1.956E-01	7.261E+02	0.566
α_7	2.96E-28	1.04E-04	2.35E-09	5.63E-04	5.291E-02	5.097E+02	0.807

CCCG = 8, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9848939	0.9914140	0.9918915	0.9963037	6.734E+02	5.832E+00	--
α_2	8.00E-04	3.95E-03	3.38E-03	9.03E-03	2.229E+00	5.625E+02	0.855
α_3	1.38E-04	1.61E-03	1.21E-03	4.44E-03	1.260E+00	7.827E+02	0.616
α_4	7.02E-05	1.24E-03	8.72E-04	3.65E-03	1.042E+00	8.417E+02	0.573
α_5	2.24E-05	9.53E-04	5.83E-04	3.14E-03	7.626E-01	7.994E+02	0.603
α_6	8.81E-08	3.85E-04	1.08E-04	1.71E-03	3.271E-01	8.485E+02	0.569
α_7	1.41E-13	1.46E-04	3.91E-06	8.20E-04	1.344E-01	9.203E+02	0.524
α_8	2.80E-20	3.11E-04	2.92E-07	1.81E-03	7.682E-02	2.470E+02	1.954

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01
α_2	1.13E-02	7.96E-03	7.13E-03	5.21E-03	4.55E-03	4.13E-03	3.95E-03
α_3		2.32E-03	2.11E-03	2.56E-03	2.23E-03	1.87E-03	1.61E-03
α_4			1.01E-03	1.02E-03	1.33E-03	1.42E-03	1.24E-03
α_5				3.39E-04	5.37E-04	7.37E-04	9.53E-04
α_6					3.05E-04	2.69E-04	3.85E-04
α_7						1.04E-04	1.46E-04
α_8							3.11E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01
Beta	1.13E-02	1.03E-02	1.02E-02	9.14E-03	8.95E-03	8.54E-03	8.59E-03
Gamma		2.25E-01	3.04E-01	4.30E-01	4.92E-01	5.16E-01	5.40E-01
Delta			3.23E-01	3.47E-01	4.93E-01	5.75E-01	6.54E-01
Epsilon				2.49E-01	3.88E-01	4.38E-01	5.92E-01
Mu					3.62E-01	3.36E-01	4.69E-01
Omega						2.78E-01	5.42E-01
Sigma							6.80E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.6.3 AFW-MDP-FHRH: AFW Motor-Driven Pumps Fail to Run Less Than or Greater Than One Hour

Generic CCF Parameters

System Group: Clean Water
 System: Auxiliary Feedwater
 Component Group: Pump
 Component Type: Motor Driven Pump
 Component Subtype: Centrifugal
 Failure Mode: Fail to Run < 1H, Fail to Run > 1H
 Date Range: 2006 through 2020
 Prior: Default 2015

Total Number of Independent Failure Events: 7.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9387663	0.9843204	0.9931392	0.9999526	1.0000000	2.941E+01	4.685E-01
α_2	4.43E-05	1.57E-02	6.86E-03	6.12E-02	0.00E+00	4.685E-01	2.941E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9514143	0.9829362	0.9875052	0.9988234	1.0000000	6.498E+01	1.128E+00
α_2	4.32E-04	1.29E-02	8.40E-03	4.06E-02	0.00E+00	8.512E-01	6.526E+01
α_3	2.09E-07	4.19E-03	8.97E-04	1.96E-02	0.00E+00	2.768E-01	6.583E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9544871	0.9809820	0.9841019	0.9968125	1.0000000	9.768E+01	1.894E+00
α_2	1.09E-03	1.27E-02	9.57E-03	3.48E-02	0.00E+00	1.260E+00	9.831E+01
α_3	4.40E-06	4.04E-03	1.49E-03	1.67E-02	0.00E+00	4.024E-01	9.917E+01
α_4	1.61E-08	2.32E-03	3.47E-04	1.15E-02	0.00E+00	2.315E-01	9.934E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9657633	0.9829476	0.9845193	0.9947582	1.0000000	1.978E+02	3.432E+00
α_2	1.63E-03	9.56E-03	7.99E-03	2.29E-02	0.00E+00	1.924E+00	1.993E+02
α_3	3.02E-04	5.21E-03	3.69E-03	1.53E-02	0.00E+00	1.049E+00	2.002E+02
α_4	1.44E-06	1.90E-03	6.55E-04	8.01E-03	0.00E+00	3.822E-01	2.009E+02
α_5	3.31E-20	3.81E-04	3.55E-07	2.22E-03	0.00E+00	7.674E-02	2.012E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9683367	0.9837541	0.9850986	0.9945699	1.0000000	2.322E+02	3.835E+00
α_2	1.03E-03	7.21E-03	5.87E-03	1.79E-02	0.00E+00	1.701E+00	2.344E+02

α_3	4.03E-04	5.11E-03	3.80E-03	1.43E-02	0.00E+00	1.207E+00	2.348E+02
α_4	2.31E-05	2.52E-03	1.33E-03	9.10E-03	0.00E+00	5.960E-01	2.355E+02
α_5	3.67E-09	9.37E-04	1.25E-04	4.70E-03	0.00E+00	2.211E-01	2.358E+02
α_6	3.66E-15	4.65E-04	4.71E-06	2.68E-03	0.00E+00	1.098E-01	2.359E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9736667	0.9850542	0.9858851	0.9935977	1.0000000	3.788E+02	5.747E+00
α_2	1.19E-03	5.83E-03	5.00E-03	1.33E-02	0.00E+00	2.243E+00	3.823E+02
α_3	5.69E-04	4.24E-03	3.42E-03	1.07E-02	0.00E+00	1.630E+00	3.829E+02
α_4	1.75E-04	2.82E-03	2.02E-03	8.19E-03	0.00E+00	1.083E+00	3.835E+02
α_5	1.06E-05	1.47E-03	7.41E-04	5.40E-03	0.00E+00	5.654E-01	3.840E+02
α_6	2.74E-10	4.98E-04	4.60E-05	2.60E-03	0.00E+00	1.916E-01	3.844E+02
α_7	6.20E-41	9.05E-05	3.37E-12	3.97E-04	0.00E+00	3.480E-02	3.845E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9749198	0.9857837	0.9865782	0.9939228	1.0000000	3.970E+02	5.726E+00
α_2	9.03E-04	5.01E-03	4.22E-03	1.18E-02	0.00E+00	2.018E+00	4.007E+02
α_3	3.57E-04	3.45E-03	2.67E-03	9.21E-03	0.00E+00	1.391E+00	4.014E+02
α_4	1.57E-04	2.64E-03	1.87E-03	7.72E-03	0.00E+00	1.062E+00	4.017E+02
α_5	3.08E-05	1.74E-03	1.02E-03	5.92E-03	0.00E+00	7.026E-01	4.020E+02
α_6	3.41E-07	8.68E-04	2.67E-04	3.78E-03	0.00E+00	3.497E-01	4.024E+02
α_7	1.31E-15	2.68E-04	2.46E-06	1.55E-03	0.00E+00	1.078E-01	4.026E+02
α_8	2.74E-17	2.35E-04	9.96E-07	1.37E-03	0.00E+00	9.469E-02	4.027E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.83E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.57E-02	1.29E-02	1.27E-02	9.56E-03	7.21E-03	5.83E-03	5.01E-03
α_3		4.19E-03	4.04E-03	5.21E-03	5.11E-03	4.24E-03	3.45E-03
α_4			2.32E-03	1.90E-03	2.52E-03	2.82E-03	2.64E-03
α_5				3.81E-04	9.37E-04	1.47E-03	1.74E-03
α_6					4.65E-04	4.98E-04	8.68E-04
α_7						9.05E-05	2.68E-04
α_8							2.35E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.83E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.57E-02	1.71E-02	1.90E-02	1.71E-02	1.62E-02	1.49E-02	1.42E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.00	7.00	7.00	7.00	7.00	7.00	7.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 1.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9675360	0.9916203	0.9962614	0.9999722	5.720E+01	4.834E-01	--
α_2	2.78E-05	8.38E-03	3.74E-03	3.25E-02	4.834E-01	5.720E+01	0.794

CCCG = 3, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9781864	0.9921516	0.9941287	0.9993596	1.549E+02	1.226E+00	--
α_2	3.15E-04	6.47E-03	4.46E-03	1.95E-02	9.769E-01	1.501E+02	0.877
α_3	2.21E-08	1.38E-03	2.40E-04	6.70E-03	2.487E-01	1.797E+02	0.736

CCCG = 4, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9767974	0.9900881	0.9916131	0.9981645	2.055E+02	2.057E+00	--
α_2	7.79E-04	7.06E-03	5.53E-03	1.86E-02	1.442E+00	2.029E+02	0.907
α_3	2.38E-06	1.90E-03	7.13E-04	7.81E-03	4.114E-01	2.162E+02	0.856
α_4	1.26E-09	9.57E-04	1.04E-04	4.91E-03	2.036E-01	2.126E+02	0.871

CCCG = 5, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9809702	0.9903646	0.9912059	0.9968845	3.786E+02	3.683E+00	--
α_2	1.24E-03	6.05E-03	5.18E-03	1.38E-02	2.243E+00	3.687E+02	0.959
α_3	1.25E-04	2.48E-03	1.72E-03	7.46E-03	9.912E-01	3.980E+02	0.892
α_4	6.24E-07	9.16E-04	3.09E-04	3.89E-03	3.765E-01	4.106E+02	0.866
α_5	1.64E-21	1.89E-04	1.08E-07	1.09E-03	7.237E-02	3.828E+02	0.929

CCCG = 6, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9811473	0.9901532	0.9909195	0.9965413	4.162E+02	4.139E+00	--
α_2	1.03E-03	5.35E-03	4.54E-03	1.24E-02	2.128E+00	3.960E+02	1.020
α_3	1.74E-04	2.52E-03	1.83E-03	7.22E-03	1.134E+00	4.488E+02	0.902
α_4	7.77E-06	1.19E-03	5.90E-04	4.40E-03	5.533E-01	4.647E+02	0.873
α_5	1.88E-09	4.83E-04	6.44E-05	2.42E-03	2.210E-01	4.575E+02	0.887
α_6	3.94E-16	3.09E-04	2.15E-06	1.79E-03	1.027E-01	3.322E+02	1.221

CCCG = 7, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9843283	0.9908875	0.9913470	0.9958778	6.994E+02	6.432E+00	--
α_2	1.14E-03	4.38E-03	3.88E-03	9.32E-03	2.840E+00	6.459E+02	1.062
α_3	3.46E-04	2.33E-03	1.90E-03	5.76E-03	1.746E+00	7.480E+02	0.919
α_4	8.85E-05	1.42E-03	1.02E-03	4.13E-03	1.084E+00	7.621E+02	0.903
α_5	3.99E-06	7.01E-04	3.40E-04	2.62E-03	5.376E-01	7.660E+02	0.899
α_6	2.18E-10	2.48E-04	2.51E-05	1.28E-03	1.979E-01	7.965E+02	0.865
α_7	8.00E-53	3.57E-05	3.58E-15	1.22E-04	2.656E-02	7.436E+02	0.927

CCCG = 8, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9846539	0.9911811	0.9916491	0.9961105	6.870E+02	6.112E+00	--
α_2	8.05E-04	3.72E-03	3.21E-03	8.36E-03	2.364E+00	6.334E+02	1.083
α_3	2.48E-04	2.08E-03	1.64E-03	5.40E-03	1.512E+00	7.255E+02	0.947
α_4	8.04E-05	1.37E-03	9.72E-04	4.03E-03	1.056E+00	7.688E+02	0.895
α_5	1.35E-05	8.90E-04	5.07E-04	3.07E-03	6.745E-01	7.568E+02	0.909
α_6	5.51E-08	4.10E-04	1.04E-04	1.86E-03	3.076E-01	7.496E+02	0.918
α_7	8.90E-16	1.27E-04	1.26E-06	7.34E-04	1.093E-01	8.587E+02	0.802
α_8	3.41E-18	2.21E-04	6.14E-07	1.29E-03	8.885E-02	4.019E+02	1.713

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.92E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	8.38E-03	6.47E-03	7.06E-03	6.05E-03	5.35E-03	4.38E-03	3.72E-03
α_3		1.38E-03	1.90E-03	2.48E-03	2.52E-03	2.33E-03	2.08E-03
α_4			9.57E-04	9.16E-04	1.19E-03	1.42E-03	1.37E-03
α_5				1.89E-04	4.83E-04	7.01E-04	8.90E-04
α_6					3.09E-04	2.48E-04	4.10E-04
α_7						3.57E-05	1.27E-04
α_8							2.21E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.92E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	8.38E-03	7.85E-03	9.91E-03	9.64E-03	9.85E-03	9.11E-03	8.82E-03
Gamma		1.76E-01	2.88E-01	3.72E-01	4.57E-01	5.20E-01	5.78E-01
Delta			3.35E-01	3.08E-01	4.40E-01	5.08E-01	5.92E-01
Epsilon				1.71E-01	4.00E-01	4.10E-01	5.46E-01
Mu					3.90E-01	2.88E-01	4.60E-01
Omega						1.26E-01	4.59E-01
Sigma							6.35E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.50	1.50	1.50	1.50	1.50	1.50	1.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8049536	0.9530005	0.9826288	0.9999626	7.707E+00	3.801E-01	--
α_2	3.74E-05	4.70E-02	1.74E-02	1.95E-01	3.801E-01	7.707E+00	0.794

CCCG = 3, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8377870	0.9450328	0.9610765	0.9973118	1.650E+01	9.600E-01	--
α_2	6.14E-04	4.02E-02	2.36E-02	1.36E-01	6.673E-01	1.594E+01	0.877
α_3	1.30E-06	1.48E-02	3.57E-03	6.81E-02	2.927E-01	1.949E+01	0.736

CCCG = 4, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8470213	0.9372960	0.9479921	0.9908852	2.495E+01	1.669E+00	--
α_2	2.33E-03	3.98E-02	2.87E-02	1.15E-01	1.039E+00	2.508E+01	0.907
α_3	1.23E-05	1.40E-02	5.04E-03	5.86E-02	3.887E-01	2.729E+01	0.856
α_4	1.03E-07	8.88E-03	1.47E-03	4.34E-02	2.414E-01	2.696E+01	0.871

CCCG = 5, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8926077	0.9455218	0.9501151	0.9827188	6.052E+01	3.487E+00	--
α_2	4.55E-03	2.91E-02	2.41E-02	7.05E-02	1.791E+00	5.985E+01	0.959
α_3	1.45E-03	1.82E-02	1.36E-02	5.06E-02	1.207E+00	6.510E+01	0.892
α_4	1.13E-05	6.35E-03	2.55E-03	2.56E-02	4.340E-01	6.786E+01	0.866
α_5	1.92E-26	8.64E-04	3.08E-08	4.76E-03	5.493E-02	6.356E+01	0.929

CCCG = 6, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9041995	0.9500137	0.9538179	0.9828164	7.421E+01	3.905E+00	--
α_2	1.80E-03	1.85E-02	1.43E-02	4.97E-02	1.335E+00	7.082E+01	1.020
α_3	2.31E-03	1.88E-02	1.50E-02	4.81E-02	1.531E+00	8.002E+01	0.902
α_4	1.65E-04	8.53E-03	5.08E-03	2.86E-02	7.191E-01	8.360E+01	0.873
α_5	4.36E-08	2.97E-03	5.09E-04	1.45E-02	2.467E-01	8.271E+01	0.887
α_6	1.33E-20	1.21E-03	7.29E-07	7.02E-03	7.279E-02	6.016E+01	1.221

CCCG = 7, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9217865	0.9551653	0.9575076	0.9805399	1.229E+02	5.770E+00	--
α_2	1.68E-03	1.35E-02	1.08E-02	3.45E-02	1.549E+00	1.135E+02	1.062
α_3	2.67E-03	1.50E-02	1.26E-02	3.53E-02	1.989E+00	1.309E+02	0.919
α_4	8.56E-04	9.51E-03	7.23E-03	2.60E-02	1.287E+00	1.340E+02	0.903
α_5	8.49E-05	5.09E-03	2.95E-03	1.73E-02	6.913E-01	1.352E+02	0.899
α_6	1.22E-08	1.65E-03	2.48E-04	8.15E-03	2.327E-01	1.410E+02	0.865
α_7	1.09E-64	1.60E-04	2.43E-17	4.03E-04	2.112E-02	1.318E+02	0.927

CCCG = 8, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9312746	0.9588880	0.9606706	0.9804121	1.636E+02	7.016E+00	--
α_2	1.36E-03	1.05E-02	8.44E-03	2.68E-02	1.583E+00	1.489E+02	1.083
α_3	2.05E-03	1.15E-02	9.71E-03	2.73E-02	1.986E+00	1.701E+02	0.947
α_4	1.28E-03	9.18E-03	7.45E-03	2.30E-02	1.672E+00	1.806E+02	0.895
α_5	2.99E-04	5.64E-03	3.94E-03	1.68E-02	1.011E+00	1.783E+02	0.909
α_6	2.44E-05	3.22E-03	1.64E-03	1.18E-02	5.709E-01	1.769E+02	0.918
α_7	2.04E-10	8.90E-04	6.97E-05	4.70E-03	1.809E-01	2.031E+02	0.802
α_8	1.89E-107	1.31E-04	3.97E-27	9.82E-05	1.245E-02	9.514E+01	1.713

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.53E-01	9.45E-01	9.37E-01	9.46E-01	9.50E-01	9.55E-01	9.59E-01
α_2	4.70E-02	4.02E-02	3.98E-02	2.91E-02	1.85E-02	1.35E-02	1.05E-02
α_3		1.48E-02	1.40E-02	1.82E-02	1.88E-02	1.50E-02	1.15E-02
α_4			8.88E-03	6.35E-03	8.53E-03	9.51E-03	9.18E-03
α_5				8.64E-04	2.97E-03	5.09E-03	5.64E-03
α_6					1.21E-03	1.65E-03	3.22E-03
α_7						1.60E-04	8.90E-04
α_8							1.31E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.53E-01	9.45E-01	9.37E-01	9.46E-01	9.50E-01	9.55E-01	9.59E-01
Beta	4.70E-02	5.50E-02	6.27E-02	5.45E-02	5.00E-02	4.48E-02	4.11E-02
Gamma		2.69E-01	3.66E-01	4.67E-01	6.30E-01	7.00E-01	7.44E-01
Delta			3.87E-01	2.84E-01	4.04E-01	5.23E-01	6.23E-01
Epsilon				1.20E-01	3.29E-01	4.20E-01	5.18E-01
Mu					2.89E-01	2.62E-01	4.29E-01
Omega						8.86E-02	2.41E-01
Sigma							1.28E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 3.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9480037	0.9866782	0.9941633	0.9999616	3.485E+01	4.706E-01	--
α_2	3.84E-05	1.33E-02	5.84E-03	5.20E-02	4.706E-01	3.485E+01	0.794

CCCG = 3, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9596179	0.9859508	0.9898135	0.9990798	7.737E+01	1.103E+00	--
α_2	3.11E-04	1.08E-02	6.86E-03	3.46E-02	8.104E-01	7.433E+01	0.877
α_3	2.74E-07	3.26E-03	7.66E-04	1.51E-02	2.921E-01	8.921E+01	0.736

CCCG = 4, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9649566	0.9852415	0.9876084	0.9974311	1.304E+02	1.953E+00	--
α_2	9.42E-04	1.01E-02	7.71E-03	2.74E-02	1.312E+00	1.288E+02	0.907
α_3	5.25E-06	3.12E-03	1.24E-03	1.26E-02	4.307E-01	1.374E+02	0.856
α_4	3.09E-09	1.55E-03	1.83E-04	7.89E-03	2.099E-01	1.353E+02	0.871

CCCG = 5, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9723089	0.9866042	0.9879764	0.9962097	2.288E+02	3.107E+00	--
α_2	1.06E-03	7.52E-03	6.11E-03	1.88E-02	1.684E+00	2.223E+02	0.959
α_3	1.73E-04	3.91E-03	2.65E-03	1.19E-02	9.426E-01	2.400E+02	0.892
α_4	1.15E-06	1.54E-03	5.29E-04	6.49E-03	3.816E-01	2.478E+02	0.866
α_5	1.71E-16	4.27E-04	2.34E-06	2.48E-03	9.865E-02	2.310E+02	0.929

CCCG = 6, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9747973	0.9870964	0.9881761	0.9957066	2.924E+02	3.822E+00	--
α_2	8.93E-04	6.17E-03	5.03E-03	1.53E-02	1.714E+00	2.762E+02	1.020
α_3	2.31E-04	3.53E-03	2.55E-03	1.02E-02	1.108E+00	3.130E+02	0.902
α_4	2.65E-05	2.00E-03	1.12E-03	7.00E-03	6.509E-01	3.241E+02	0.873
α_5	1.57E-08	7.94E-04	1.43E-04	3.83E-03	2.536E-01	3.193E+02	0.887
α_6	6.69E-17	4.13E-04	1.87E-06	2.40E-03	9.572E-02	2.319E+02	1.221

CCCG = 7, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9779948	0.9878200	0.9885741	0.9950695	4.213E+02	5.195E+00	--
α_2	1.03E-03	5.40E-03	4.58E-03	1.26E-02	2.105E+00	3.874E+02	1.062
α_3	2.75E-04	2.93E-03	2.24E-03	7.97E-03	1.320E+00	4.488E+02	0.919
α_4	1.11E-04	2.18E-03	1.51E-03	6.52E-03	9.967E-01	4.572E+02	0.903
α_5	5.77E-06	1.14E-03	5.42E-04	4.30E-03	5.249E-01	4.597E+02	0.899
α_6	3.04E-10	4.09E-04	4.00E-05	2.12E-03	1.956E-01	4.781E+02	0.865
α_7	3.38E-28	1.19E-04	2.69E-09	6.43E-04	5.291E-02	4.464E+02	0.927

CCCG = 8, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9790860	0.9881012	0.9887587	0.9948711	4.843E+02	5.832E+00	--
α_2	1.01E-03	4.98E-03	4.26E-03	1.14E-02	2.229E+00	4.457E+02	1.083
α_3	2.11E-04	2.46E-03	1.85E-03	6.79E-03	1.260E+00	5.110E+02	0.947
α_4	1.09E-04	1.92E-03	1.35E-03	5.67E-03	1.042E+00	5.414E+02	0.895
α_5	3.35E-05	1.43E-03	8.74E-04	4.71E-03	7.626E-01	5.329E+02	0.909
α_6	1.42E-07	6.19E-04	1.73E-04	2.75E-03	3.271E-01	5.280E+02	0.918
α_7	2.15E-13	2.22E-04	5.95E-06	1.25E-03	1.344E-01	6.049E+02	0.802
α_8	2.45E-20	2.71E-04	2.55E-07	1.58E-03	7.682E-02	2.831E+02	1.713

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.86E-01	9.85E-01	9.87E-01	9.87E-01	9.88E-01	9.88E-01
α_2	1.33E-02	1.08E-02	1.01E-02	7.52E-03	6.17E-03	5.40E-03	4.98E-03
α_3		3.26E-03	3.12E-03	3.91E-03	3.53E-03	2.93E-03	2.46E-03
α_4			1.55E-03	1.54E-03	2.00E-03	2.18E-03	1.92E-03
α_5				4.27E-04	7.94E-04	1.14E-03	1.43E-03
α_6					4.13E-04	4.09E-04	6.19E-04
α_7						1.19E-04	2.22E-04
α_8							2.71E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.86E-01	9.85E-01	9.87E-01	9.87E-01	9.88E-01	9.88E-01
Beta	1.33E-02	1.40E-02	1.48E-02	1.34E-02	1.29E-02	1.22E-02	1.19E-02
Gamma		2.32E-01	3.17E-01	4.39E-01	5.22E-01	5.56E-01	5.82E-01
Delta			3.32E-01	3.34E-01	4.76E-01	5.67E-01	6.45E-01
Epsilon				2.17E-01	3.76E-01	4.34E-01	5.70E-01
Mu					3.42E-01	3.16E-01	4.38E-01
Omega						2.25E-01	4.43E-01
Sigma							5.50E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.50	3.50	3.50	3.50	3.50	3.50	3.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9862714	0.9964382	0.9983920	0.9999869	1.380E+02	4.932E-01	--
α_2	1.31E-05	3.56E-03	1.61E-03	1.37E-02	4.932E-01	1.380E+02	0.794

CCCG = 3, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9896419	0.9964650	0.9974893	0.9997908	2.987E+02	1.059E+00	--
α_2	4.70E-05	2.51E-03	1.48E-03	8.48E-03	7.137E-01	2.833E+02	0.877
α_3	3.67E-07	1.02E-03	3.09E-04	4.46E-03	3.458E-01	3.380E+02	0.736

CCCG = 4, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9909262	0.9961003	0.9966908	0.9992563	5.401E+02	2.115E+00	--
α_2	3.58E-04	2.89E-03	2.30E-03	7.45E-03	1.549E+00	5.338E+02	0.907
α_3	1.46E-08	4.66E-04	9.12E-05	2.22E-03	2.646E-01	5.671E+02	0.856
α_4	5.96E-08	5.40E-04	1.32E-04	2.47E-03	3.010E-01	5.572E+02	0.871

CCCG = 5, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9936062	0.9964493	0.9966675	0.9985475	1.494E+03	5.325E+00	--
α_2	7.91E-04	2.48E-03	2.26E-03	4.93E-03	3.632E+00	1.461E+03	0.959
α_3	8.44E-05	8.60E-04	6.60E-04	2.32E-03	1.354E+00	1.574E+03	0.892
α_4	1.73E-08	1.83E-04	4.36E-05	8.38E-04	2.961E-01	1.622E+03	0.866
α_5	8.36E-35	2.81E-05	3.09E-11	1.39E-04	4.243E-02	1.511E+03	0.929

CCCG = 6, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9930249	0.9961975	0.9964492	0.9985108	1.293E+03	4.936E+00	--
α_2	6.23E-04	2.34E-03	2.08E-03	4.95E-03	2.915E+00	1.242E+03	1.020
α_3	7.62E-05	8.94E-04	6.71E-04	2.47E-03	1.257E+00	1.405E+03	0.902
α_4	1.41E-06	3.46E-04	1.58E-04	1.33E-03	5.031E-01	1.454E+03	0.873
α_5	2.34E-15	8.07E-05	1.06E-06	4.63E-04	1.155E-01	1.431E+03	0.887
α_6	6.53E-13	1.40E-04	5.12E-06	7.74E-04	1.451E-01	1.039E+03	1.221

CCCG = 7, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944903	0.9965131	0.9966319	0.9981304	2.759E+03	9.654E+00	--
α_2	7.30E-04	1.89E-03	1.76E-03	3.48E-03	4.851E+00	2.568E+03	1.062
α_3	2.41E-04	9.42E-04	8.32E-04	2.02E-03	2.800E+00	2.970E+03	0.919
α_4	4.67E-05	4.57E-04	3.53E-04	1.22E-03	1.384E+00	3.025E+03	0.903
α_5	5.71E-07	1.61E-04	7.21E-05	6.24E-04	4.902E-01	3.040E+03	0.899
α_6	8.63E-16	3.63E-05	4.60E-07	2.08E-04	1.146E-01	3.159E+03	0.865
α_7	2.61E-93	4.96E-06	5.28E-25	5.90E-06	1.464E-02	2.949E+03	0.927

CCCG = 8, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940645	0.9964719	0.9966339	0.9983263	2.019E+03	7.148E+00	--
α_2	4.23E-04	1.56E-03	1.39E-03	3.28E-03	2.980E+00	1.907E+03	1.083
α_3	1.55E-04	8.97E-04	7.50E-04	2.14E-03	1.960E+00	2.182E+03	0.947
α_4	3.69E-05	5.04E-04	3.70E-04	1.43E-03	1.166E+00	2.312E+03	0.895
α_5	1.34E-06	2.36E-04	1.14E-04	8.84E-04	5.375E-01	2.275E+03	0.909
α_6	1.77E-11	8.01E-05	6.22E-06	4.24E-04	1.805E-01	2.253E+03	0.918
α_7	8.30E-36	1.60E-05	1.20E-11	7.84E-05	4.139E-02	2.580E+03	0.802
α_8	1.43E-08	2.34E-04	5.16E-05	1.09E-03	2.827E-01	1.207E+03	1.713

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.96E-01
α_2	3.56E-03	2.51E-03	2.89E-03	2.48E-03	2.34E-03	1.89E-03	1.56E-03
α_3		1.02E-03	4.66E-04	8.60E-04	8.94E-04	9.42E-04	8.97E-04
α_4			5.40E-04	1.83E-04	3.46E-04	4.57E-04	5.04E-04
α_5				2.81E-05	8.07E-05	1.61E-04	2.36E-04
α_6					1.40E-04	3.63E-05	8.01E-05
α_7						4.96E-06	1.60E-05
α_8							2.34E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.96E-01
Beta	3.56E-03	3.53E-03	3.90E-03	3.55E-03	3.80E-03	3.49E-03	3.53E-03
Gamma		2.89E-01	2.58E-01	3.01E-01	3.84E-01	4.59E-01	5.58E-01
Delta			5.37E-01	1.97E-01	3.88E-01	4.12E-01	5.44E-01
Epsilon				1.33E-01	3.89E-01	3.07E-01	5.29E-01
Mu					6.34E-01	2.04E-01	5.83E-01
Omega						1.20E-01	7.57E-01
Sigma							9.36E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.6.4 AFW-MDP-RH: AFW Motor-Driven Pumps Fail to Run Greater Than One Hour

Generic CCF Parameters

System Group: Clean Water
System: Auxiliary Feedwater
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run > 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9319869	0.9825706	0.9923504	0.9999473	1.0000000	2.641E+01	4.685E-01
α_2	4.94E-05	1.74E-02	7.65E-03	6.80E-02	0.00E+00	4.685E-01	2.641E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9491259	0.9821250	0.9869099	0.9987658	1.0000000	6.198E+01	1.128E+00
α_2	4.53E-04	1.35E-02	8.81E-03	4.25E-02	0.00E+00	8.512E-01	6.226E+01
α_3	2.19E-07	4.39E-03	9.41E-04	2.06E-02	0.00E+00	2.768E-01	6.283E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9530858	0.9803911	0.9836046	0.9967121	1.0000000	9.468E+01	1.894E+00
α_2	1.13E-03	1.30E-02	9.87E-03	3.58E-02	0.00E+00	1.260E+00	9.531E+01
α_3	4.53E-06	4.17E-03	1.53E-03	1.73E-02	0.00E+00	4.024E-01	9.617E+01
α_4	1.66E-08	2.40E-03	3.58E-04	1.19E-02	0.00E+00	2.315E-01	9.634E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9652486	0.9826895	0.9842843	0.9946781	1.0000000	1.948E+02	3.432E+00
α_2	1.65E-03	9.70E-03	8.11E-03	2.32E-02	0.00E+00	1.924E+00	1.963E+02
α_3	3.06E-04	5.29E-03	3.75E-03	1.55E-02	0.00E+00	1.049E+00	1.972E+02
α_4	1.47E-06	1.93E-03	6.65E-04	8.13E-03	0.00E+00	3.822E-01	1.979E+02
α_5	3.36E-20	3.87E-04	3.61E-07	2.25E-03	0.00E+00	7.674E-02	1.982E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9679315	0.9835450	0.9849062	0.9944998	1.0000000	2.292E+02	3.835E+00
α_2	1.05E-03	7.30E-03	5.95E-03	1.82E-02	0.00E+00	1.701E+00	2.314E+02
α_3	4.09E-04	5.18E-03	3.85E-03	1.45E-02	0.00E+00	1.207E+00	2.318E+02

α_4	2.34E-05	2.56E-03	1.34E-03	9.21E-03	0.00E+00	5.960E-01	2.325E+02
α_5	3.71E-09	9.49E-04	1.27E-04	4.76E-03	0.00E+00	2.211E-01	2.328E+02
α_6	3.71E-15	4.71E-04	4.77E-06	2.72E-03	0.00E+00	1.098E-01	2.329E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9734614	0.9849367	0.9857739	0.9935469	1.0000000	3.758E+02	5.747E+00
α_2	1.20E-03	5.88E-03	5.04E-03	1.34E-02	0.00E+00	2.243E+00	3.793E+02
α_3	5.73E-04	4.27E-03	3.44E-03	1.08E-02	0.00E+00	1.630E+00	3.799E+02
α_4	1.77E-04	2.84E-03	2.03E-03	8.26E-03	0.00E+00	1.083E+00	3.805E+02
α_5	1.07E-05	1.48E-03	7.47E-04	5.44E-03	0.00E+00	5.654E-01	3.810E+02
α_6	2.76E-10	5.02E-04	4.64E-05	2.62E-03	0.00E+00	1.916E-01	3.814E+02
α_7	6.25E-41	9.12E-05	3.39E-12	4.00E-04	0.00E+00	3.480E-02	3.815E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9747326	0.9856770	0.9864773	0.9938818	1.0000000	3.940E+02	5.726E+00
α_2	9.10E-04	5.05E-03	4.25E-03	1.19E-02	0.00E+00	2.018E+00	3.977E+02
α_3	3.59E-04	3.48E-03	2.69E-03	9.28E-03	0.00E+00	1.391E+00	3.984E+02
α_4	1.58E-04	2.66E-03	1.89E-03	7.78E-03	0.00E+00	1.062E+00	3.987E+02
α_5	3.10E-05	1.76E-03	1.03E-03	5.97E-03	0.00E+00	7.026E-01	3.990E+02
α_6	3.44E-07	8.75E-04	2.69E-04	3.80E-03	0.00E+00	3.497E-01	3.994E+02
α_7	1.32E-15	2.70E-04	2.48E-06	1.56E-03	0.00E+00	1.078E-01	3.996E+02
α_8	2.76E-17	2.37E-04	1.00E-06	1.38E-03	0.00E+00	9.469E-02	3.997E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.82E-01	9.80E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.74E-02	1.35E-02	1.30E-02	9.70E-03	7.30E-03	5.88E-03	5.05E-03
α_3		4.39E-03	4.17E-03	5.29E-03	5.18E-03	4.27E-03	3.48E-03
α_4			2.40E-03	1.93E-03	2.56E-03	2.84E-03	2.66E-03
α_5				3.87E-04	9.49E-04	1.48E-03	1.76E-03
α_6					4.71E-04	5.02E-04	8.75E-04
α_7						9.12E-05	2.70E-04
α_8							2.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.82E-01	9.80E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.74E-02	1.79E-02	1.96E-02	1.73E-02	1.65E-02	1.51E-02	1.43E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9455418	0.9859075	0.9936646	0.9999528	3.382E+01	4.834E-01	--
α_2	4.72E-05	1.41E-02	6.34E-03	5.45E-02	4.834E-01	3.382E+01	1.307

CCCG = 3, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9638309	0.9869530	0.9902123	0.9989305	9.271E+01	1.226E+00	--
α_2	5.18E-04	1.06E-02	7.33E-03	3.19E-02	9.769E-01	9.114E+01	1.427
α_3	3.91E-08	2.44E-03	4.25E-04	1.18E-02	2.487E-01	1.016E+02	1.291

CCCG = 4, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9605365	0.9830896	0.9856590	0.9968540	1.196E+02	2.057E+00	--
α_2	1.29E-03	1.16E-02	9.12E-03	3.05E-02	1.442E+00	1.227E+02	1.486
α_3	4.30E-06	3.42E-03	1.29E-03	1.41E-02	4.114E-01	1.197E+02	1.535
α_4	2.46E-09	1.87E-03	2.05E-04	9.61E-03	2.036E-01	1.086E+02	1.696

CCCG = 5, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9686992	0.9841158	0.9854864	0.9948487	2.282E+02	3.683E+00	--
α_2	1.98E-03	9.65E-03	8.28E-03	2.20E-02	2.243E+00	2.302E+02	1.526
α_3	2.23E-04	4.42E-03	3.06E-03	1.32E-02	9.912E-01	2.234E+02	1.581
α_4	1.07E-06	1.57E-03	5.32E-04	6.67E-03	3.765E-01	2.390E+02	1.482
α_5	2.13E-21	2.46E-04	1.40E-07	1.42E-03	7.237E-02	2.945E+02	1.204

CCCG = 6, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9700659	0.9843340	0.9855397	0.9944830	2.601E+02	4.139E+00	--
α_2	1.47E-03	7.63E-03	6.49E-03	1.77E-02	2.128E+00	2.766E+02	1.453
α_3	3.29E-04	4.76E-03	3.46E-03	1.36E-02	1.134E+00	2.373E+02	1.698
α_4	1.34E-05	2.04E-03	1.01E-03	7.56E-03	5.533E-01	2.703E+02	1.495
α_5	3.09E-09	7.94E-04	1.06E-04	3.98E-03	2.210E-01	2.782E+02	1.455
α_6	5.60E-16	4.39E-04	3.06E-06	2.55E-03	1.027E-01	2.338E+02	1.731

CCCG = 7, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9756129	0.9857991	0.9865081	0.9935644	4.465E+02	6.432E+00	--
α_2	1.52E-03	5.85E-03	5.19E-03	1.24E-02	2.840E+00	4.826E+02	1.417
α_3	6.26E-04	4.21E-03	3.45E-03	1.04E-02	1.746E+00	4.127E+02	1.660
α_4	1.52E-04	2.44E-03	1.75E-03	7.09E-03	1.084E+00	4.433E+02	1.548
α_5	7.03E-06	1.24E-03	5.98E-04	4.62E-03	5.376E-01	4.347E+02	1.581
α_6	3.70E-10	4.21E-04	4.26E-05	2.18E-03	1.979E-01	4.693E+02	1.465
α_7	9.14E-53	4.08E-05	4.09E-15	1.39E-04	2.656E-02	6.509E+02	1.057

CCCG = 8, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9766846	0.9865835	0.9872891	0.9940728	4.495E+02	6.112E+00	--
α_2	1.03E-03	4.73E-03	4.09E-03	1.06E-02	2.364E+00	4.971E+02	1.377
α_3	4.26E-04	3.58E-03	2.83E-03	9.28E-03	1.512E+00	4.212E+02	1.627
α_4	1.43E-04	2.43E-03	1.72E-03	7.14E-03	1.056E+00	4.332E+02	1.584
α_5	2.23E-05	1.47E-03	8.38E-04	5.07E-03	6.745E-01	4.578E+02	1.500
α_6	1.05E-07	7.83E-04	1.99E-04	3.55E-03	3.076E-01	3.926E+02	1.750
α_7	1.51E-15	2.16E-04	2.13E-06	1.25E-03	1.093E-01	5.055E+02	1.360
α_8	3.16E-18	2.05E-04	5.69E-07	1.19E-03	8.885E-02	4.338E+02	1.585

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.87E-01	9.83E-01	9.84E-01	9.84E-01	9.86E-01	9.87E-01
α_2	1.41E-02	1.06E-02	1.16E-02	9.65E-03	7.63E-03	5.85E-03	4.73E-03
α_3		2.44E-03	3.42E-03	4.42E-03	4.76E-03	4.21E-03	3.58E-03
α_4			1.87E-03	1.57E-03	2.04E-03	2.44E-03	2.43E-03
α_5				2.46E-04	7.94E-04	1.24E-03	1.47E-03
α_6					4.39E-04	4.21E-04	7.83E-04
α_7						4.08E-05	2.16E-04
α_8							2.05E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.87E-01	9.83E-01	9.84E-01	9.84E-01	9.86E-01	9.87E-01
Beta	1.41E-02	1.30E-02	1.69E-02	1.59E-02	1.57E-02	1.42E-02	1.34E-02
Gamma		1.87E-01	3.13E-01	3.93E-01	5.13E-01	5.88E-01	6.47E-01
Delta			3.53E-01	2.92E-01	4.08E-01	4.95E-01	5.88E-01
Epsilon				1.35E-01	3.76E-01	4.10E-01	5.24E-01
Mu					3.56E-01	2.72E-01	4.50E-01
Omega						8.83E-02	3.50E-01
Sigma							4.86E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.50	0.50	0.50	0.50	0.50	0.50	0.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 2.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.625

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9116831	0.9772751	0.9899141	0.9999334	2.024E+01	4.706E-01	--
α_2	6.66E-05	2.27E-02	1.01E-02	8.83E-02	4.706E-01	2.024E+01	1.307

CCCG = 3, Gamma = 0.625

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9323925	0.9763624	0.9827626	0.9984378	4.554E+01	1.103E+00	--
α_2	5.18E-04	1.78E-02	1.14E-02	5.70E-02	8.104E-01	4.465E+01	1.427
α_3	4.92E-07	5.81E-03	1.37E-03	2.68E-02	2.921E-01	4.996E+01	1.291

CCCG = 4, Gamma = 0.625

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9401120	0.9746575	0.9786450	0.9955569	7.510E+01	1.953E+00	--
α_2	1.56E-03	1.67E-02	1.28E-02	4.50E-02	1.312E+00	7.747E+01	1.486
α_3	9.53E-06	5.65E-03	2.24E-03	2.28E-02	4.307E-01	7.582E+01	1.535
α_4	6.08E-09	3.04E-03	3.61E-04	1.55E-02	2.099E-01	6.882E+01	1.696

CCCG = 5, Gamma = 0.625

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9542812	0.9778082	0.9800439	0.9936917	1.369E+02	3.107E+00	--
α_2	1.70E-03	1.20E-02	9.79E-03	3.00E-02	1.684E+00	1.384E+02	1.526
α_3	3.09E-04	6.97E-03	4.74E-03	2.13E-02	9.426E-01	1.343E+02	1.581
α_4	1.99E-06	2.65E-03	9.11E-04	1.12E-02	3.816E-01	1.439E+02	1.482
α_5	2.22E-16	5.56E-04	3.05E-06	3.23E-03	9.865E-02	1.775E+02	1.204

CCCG = 6, Gamma = 0.625

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9594538	0.9791822	0.9808978	0.9930474	1.798E+02	3.822E+00	--
α_2	1.28E-03	8.82E-03	7.20E-03	2.19E-02	1.714E+00	1.927E+02	1.453
α_3	4.38E-04	6.66E-03	4.82E-03	1.92E-02	1.108E+00	1.652E+02	1.698
α_4	4.56E-05	3.45E-03	1.92E-03	1.20E-02	6.509E-01	1.882E+02	1.495
α_5	2.59E-08	1.31E-03	2.36E-04	6.30E-03	2.536E-01	1.939E+02	1.455
α_6	9.52E-17	5.87E-04	2.67E-06	3.42E-03	9.572E-02	1.631E+02	1.731

CCCG = 7, Gamma = 0.625

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9655316	0.9808798	0.9820477	0.9922386	2.665E+02	5.195E+00	--
α_2	1.37E-03	7.23E-03	6.14E-03	1.68E-02	2.105E+00	2.890E+02	1.417
α_3	4.99E-04	5.31E-03	4.06E-03	1.44E-02	1.320E+00	2.473E+02	1.660
α_4	1.91E-04	3.74E-03	2.59E-03	1.12E-02	9.967E-01	2.655E+02	1.548
α_5	1.02E-05	2.01E-03	9.56E-04	7.58E-03	5.249E-01	2.606E+02	1.581
α_6	5.16E-10	6.95E-04	6.80E-05	3.60E-03	1.956E-01	2.814E+02	1.465
α_7	3.87E-28	1.36E-04	3.07E-09	7.35E-04	5.291E-02	3.904E+02	1.057

CCCG = 8, Gamma = 0.625

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9681540	0.9818475	0.9828383	0.9921571	3.154E+02	5.832E+00	--
α_2	1.29E-03	6.34E-03	5.43E-03	1.45E-02	2.229E+00	3.495E+02	1.377
α_3	3.64E-04	4.23E-03	3.19E-03	1.17E-02	1.260E+00	2.964E+02	1.627
α_4	1.94E-04	3.41E-03	2.41E-03	1.00E-02	1.042E+00	3.047E+02	1.584
α_5	5.55E-05	2.36E-03	1.45E-03	7.79E-03	7.626E-01	3.221E+02	1.500
α_6	2.71E-07	1.18E-03	3.30E-04	5.26E-03	3.271E-01	2.764E+02	1.750
α_7	3.66E-13	3.78E-04	1.01E-05	2.12E-03	1.344E-01	3.559E+02	1.360
α_8	2.27E-20	2.51E-04	2.36E-07	1.46E-03	7.682E-02	3.055E+02	1.585

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.77E-01	9.76E-01	9.75E-01	9.78E-01	9.79E-01	9.81E-01	9.82E-01
α_2	2.27E-02	1.78E-02	1.67E-02	1.20E-02	8.82E-03	7.23E-03	6.34E-03
α_3		5.81E-03	5.65E-03	6.97E-03	6.66E-03	5.31E-03	4.23E-03
α_4			3.04E-03	2.65E-03	3.45E-03	3.74E-03	3.41E-03
α_5				5.56E-04	1.31E-03	2.01E-03	2.36E-03
α_6					5.87E-04	6.95E-04	1.18E-03
α_7						1.36E-04	3.78E-04
α_8							2.51E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.77E-01	9.76E-01	9.75E-01	9.78E-01	9.79E-01	9.81E-01	9.82E-01
Beta	2.27E-02	2.36E-02	2.53E-02	2.22E-02	2.08E-02	1.91E-02	1.82E-02
Gamma		2.46E-01	3.43E-01	4.58E-01	5.76E-01	6.22E-01	6.51E-01
Delta			3.50E-01	3.15E-01	4.45E-01	5.53E-01	6.42E-01
Epsilon				1.74E-01	3.55E-01	4.32E-01	5.50E-01
Mu					3.10E-01	2.92E-01	4.34E-01
Omega						1.63E-01	3.47E-01
Sigma							4.00E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.50	2.50	2.50	2.50	2.50	2.50	2.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9774380	0.9941407	0.9973468	0.9999784	8.368E+01	4.932E-01	--
α_2	2.16E-05	5.86E-03	2.65E-03	2.26E-02	4.932E-01	8.368E+01	1.307

CCCG = 3, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9827831	0.9941173	0.9958158	0.9996510	1.790E+02	1.059E+00	--
α_2	7.66E-05	4.09E-03	2.42E-03	1.38E-02	7.137E-01	1.738E+02	1.427
α_3	6.45E-07	1.79E-03	5.43E-04	7.82E-03	3.458E-01	1.925E+02	1.291

CCCG = 4, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9846053	0.9933760	0.9943742	0.9987345	3.171E+02	2.115E+00	--
α_2	5.88E-04	4.74E-03	3.77E-03	1.22E-02	1.549E+00	3.254E+02	1.486
α_3	2.61E-08	8.36E-04	1.64E-04	3.98E-03	2.646E-01	3.162E+02	1.535
α_4	1.16E-07	1.05E-03	2.58E-04	4.80E-03	3.010E-01	2.862E+02	1.696

CCCG = 5, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9895265	0.9941797	0.9945357	0.9976170	9.095E+02	5.325E+00	--
α_2	1.26E-03	3.95E-03	3.59E-03	7.84E-03	3.632E+00	9.166E+02	1.526
α_3	1.50E-04	1.52E-03	1.17E-03	4.11E-03	1.354E+00	8.867E+02	1.581
α_4	2.97E-08	3.12E-04	7.46E-05	1.44E-03	2.961E-01	9.473E+02	1.482
α_5	1.08E-34	3.64E-05	4.01E-11	1.80E-04	4.243E-02	1.166E+03	1.204

CCCG = 6, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9891064	0.9940573	0.9944491	0.9976706	8.256E+02	4.936E+00	--
α_2	8.88E-04	3.34E-03	2.97E-03	7.05E-03	2.915E+00	8.705E+02	1.453
α_3	1.44E-04	1.68E-03	1.26E-03	4.65E-03	1.257E+00	7.460E+02	1.698
α_4	2.41E-06	5.93E-04	2.71E-04	2.27E-03	5.031E-01	8.482E+02	1.495
α_5	3.83E-15	1.32E-04	1.75E-06	7.59E-04	1.155E-01	8.723E+02	1.455
α_6	9.26E-13	1.98E-04	7.25E-06	1.10E-03	1.451E-01	7.329E+02	1.731

CCCG = 7, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9915465	0.9946477	0.9948294	0.9971286	1.794E+03	9.654E+00	--
α_2	9.75E-04	2.52E-03	2.35E-03	4.64E-03	4.851E+00	1.923E+03	1.417
α_3	4.36E-04	1.70E-03	1.50E-03	3.64E-03	2.800E+00	1.643E+03	1.660
α_4	8.01E-05	7.84E-04	6.06E-04	2.10E-03	1.384E+00	1.763E+03	1.548
α_5	1.00E-06	2.84E-04	1.27E-04	1.10E-03	4.902E-01	1.728E+03	1.581
α_6	1.46E-15	6.15E-05	7.79E-07	3.53E-04	1.146E-01	1.865E+03	1.465
α_7	2.98E-93	5.66E-06	6.02E-25	6.73E-06	1.464E-02	2.585E+03	1.057

CCCG = 8, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9912515	0.9947974	0.9950355	0.9975306	1.367E+03	7.148E+00	--
α_2	5.38E-04	1.98E-03	1.77E-03	4.17E-03	2.980E+00	1.500E+03	1.377
α_3	2.67E-04	1.54E-03	1.29E-03	3.68E-03	1.960E+00	1.270E+03	1.627
α_4	6.53E-05	8.92E-04	6.54E-04	2.53E-03	1.166E+00	1.305E+03	1.584
α_5	2.21E-06	3.90E-04	1.89E-04	1.46E-03	5.375E-01	1.379E+03	1.500
α_6	3.38E-11	1.53E-04	1.18E-05	8.07E-04	1.805E-01	1.182E+03	1.750
α_7	1.41E-35	2.72E-05	2.04E-11	1.33E-04	4.139E-02	1.521E+03	1.360
α_8	1.32E-08	2.17E-04	4.78E-05	1.01E-03	2.827E-01	1.305E+03	1.585

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.94E-01	9.93E-01	9.94E-01	9.94E-01	9.95E-01	9.95E-01
α_2	5.86E-03	4.09E-03	4.74E-03	3.95E-03	3.34E-03	2.52E-03	1.98E-03
α_3		1.79E-03	8.36E-04	1.52E-03	1.68E-03	1.70E-03	1.54E-03
α_4			1.05E-03	3.12E-04	5.93E-04	7.84E-04	8.92E-04
α_5				3.64E-05	1.32E-04	2.84E-04	3.90E-04
α_6					1.98E-04	6.15E-05	1.53E-04
α_7						5.66E-06	2.72E-05
α_8							2.17E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.94E-01	9.93E-01	9.94E-01	9.94E-01	9.95E-01	9.95E-01
Beta	5.86E-03	5.88E-03	6.62E-03	5.82E-03	5.94E-03	5.35E-03	5.20E-03
Gamma		3.05E-01	2.85E-01	3.22E-01	4.38E-01	5.30E-01	6.19E-01
Delta			5.57E-01	1.86E-01	3.54E-01	4.00E-01	5.21E-01
Epsilon				1.04E-01	3.58E-01	3.09E-01	4.68E-01
Mu					5.99E-01	1.91E-01	5.04E-01
Omega						8.44E-02	6.15E-01
Sigma							8.88E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.7 Auxiliary Feedwater Pump Volutes

2.1.7.1 AFW-PMP-FR: AFW Pump Volutes Fail to Run

Generic CCF Parameters

System Group: Clean Water
System: Auxiliary Feedwater
Component Group: Pump
Component Type: Engine Driven Pump, Motor Driven Pump, Turbine Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run < 1H, Fail to Run > 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 9.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9434630	0.9855309	0.9936793	0.9999562	1.0000000	3.191E+01	4.685E-01
α_2	4.08E-05	1.45E-02	6.32E-03	5.65E-02	0.00E+00	4.685E-01	3.191E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9531698	0.9835580	0.9879649	0.9988675	1.0000000	6.748E+01	1.128E+00
α_2	4.16E-04	1.24E-02	8.09E-03	3.91E-02	0.00E+00	8.512E-01	6.776E+01
α_3	2.02E-07	4.03E-03	8.64E-04	1.89E-02	0.00E+00	2.768E-01	6.833E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9555925	0.9814478	0.9844938	0.9968916	1.0000000	1.002E+02	1.894E+00
α_2	1.07E-03	1.23E-02	9.33E-03	3.39E-02	0.00E+00	1.260E+00	1.008E+02
α_3	4.29E-06	3.94E-03	1.45E-03	1.63E-02	0.00E+00	4.024E-01	1.017E+02
α_4	1.57E-08	2.27E-03	3.38E-04	1.12E-02	0.00E+00	2.315E-01	1.018E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9661808	0.9831568	0.9847098	0.9948232	1.0000000	2.003E+02	3.432E+00
α_2	1.61E-03	9.44E-03	7.89E-03	2.26E-02	0.00E+00	1.924E+00	2.018E+02
α_3	2.98E-04	5.15E-03	3.65E-03	1.51E-02	0.00E+00	1.049E+00	2.027E+02
α_4	1.43E-06	1.88E-03	6.47E-04	7.91E-03	0.00E+00	3.822E-01	2.034E+02
α_5	3.27E-20	3.77E-04	3.51E-07	2.19E-03	0.00E+00	7.674E-02	2.037E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9686667	0.9839243	0.9852552	0.9946321	1.0000000	2.347E+02	3.835E+00

α_2	1.02E-03	7.13E-03	5.81E-03	1.78E-02	0.00E+00	1.701E+00	2.369E+02
α_3	3.99E-04	5.06E-03	3.76E-03	1.42E-02	0.00E+00	1.207E+00	2.373E+02
α_4	2.29E-05	2.50E-03	1.31E-03	9.00E-03	0.00E+00	5.960E-01	2.380E+02
α_5	3.63E-09	9.27E-04	1.24E-04	4.65E-03	0.00E+00	2.211E-01	2.383E+02
α_6	3.62E-15	4.60E-04	4.66E-06	2.65E-03	0.00E+00	1.098E-01	2.384E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9738309	0.9851508	0.9859764	0.9936393	1.0000000	3.813E+02	5.747E+00
α_2	1.19E-03	5.80E-03	4.97E-03	1.32E-02	0.00E+00	2.243E+00	3.848E+02
α_3	5.65E-04	4.21E-03	3.39E-03	1.06E-02	0.00E+00	1.630E+00	3.854E+02
α_4	1.74E-04	2.80E-03	2.00E-03	8.14E-03	0.00E+00	1.083E+00	3.860E+02
α_5	1.06E-05	1.46E-03	7.37E-04	5.37E-03	0.00E+00	5.654E-01	3.865E+02
α_6	2.72E-10	4.95E-04	4.57E-05	2.58E-03	0.00E+00	1.916E-01	3.869E+02
α_7	6.16E-41	8.99E-05	3.34E-12	3.94E-04	0.00E+00	3.480E-02	3.870E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9750738	0.9858714	0.9866611	0.9939612	1.0000000	3.995E+02	5.726E+00
α_2	8.98E-04	4.98E-03	4.19E-03	1.18E-02	0.00E+00	2.018E+00	4.032E+02
α_3	3.54E-04	3.43E-03	2.66E-03	9.15E-03	0.00E+00	1.391E+00	4.039E+02
α_4	1.56E-04	2.62E-03	1.86E-03	7.68E-03	0.00E+00	1.062E+00	4.042E+02
α_5	3.06E-05	1.73E-03	1.01E-03	5.89E-03	0.00E+00	7.026E-01	4.045E+02
α_6	3.39E-07	8.63E-04	2.65E-04	3.75E-03	0.00E+00	3.497E-01	4.049E+02
α_7	1.30E-15	2.66E-04	2.44E-06	1.54E-03	0.00E+00	1.078E-01	4.051E+02
α_8	2.72E-17	2.34E-04	9.90E-07	1.36E-03	0.00E+00	9.469E-02	4.052E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.84E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.45E-02	1.24E-02	1.23E-02	9.44E-03	7.13E-03	5.80E-03	4.98E-03
α_3		4.03E-03	3.94E-03	5.15E-03	5.06E-03	4.21E-03	3.43E-03
α_4			2.27E-03	1.88E-03	2.50E-03	2.80E-03	2.62E-03
α_5				3.77E-04	9.27E-04	1.46E-03	1.73E-03
α_6					4.60E-04	4.95E-04	8.63E-04
α_7						8.99E-05	2.66E-04
α_8							2.34E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.84E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.45E-02	1.64E-02	1.86E-02	1.68E-02	1.61E-02	1.48E-02	1.41E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	9.50	9.50	9.50	9.50	9.50	9.50	9.50
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.211

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8569227	0.9657313	0.9876107	0.9999734	1.071E+01	3.801E-01	--
α_2	2.66E-05	3.43E-02	1.24E-02	1.43E-01	3.801E-01	1.071E+01	0.669

CCCG = 3, Gamma = 0.211

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8767676	0.9585597	0.9709310	0.9980019	2.221E+01	9.600E-01	--
α_2	4.62E-04	3.06E-02	1.78E-02	1.04E-01	6.673E-01	2.113E+01	0.714
α_3	9.44E-07	1.08E-02	2.59E-03	4.99E-02	2.927E-01	2.674E+01	0.576

CCCG = 4, Gamma = 0.211

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8804778	0.9513516	0.9598776	0.9930040	3.264E+01	1.669E+00	--
α_2	1.81E-03	3.13E-02	2.24E-02	9.09E-02	1.039E+00	3.220E+01	0.743
α_3	9.29E-06	1.07E-02	3.81E-03	4.47E-02	3.887E-01	3.598E+01	0.679
α_4	7.73E-08	6.70E-03	1.11E-03	3.28E-02	2.414E-01	3.580E+01	0.685

CCCG = 5, Gamma = 0.211

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137488	0.9564273	0.9601845	0.9862542	7.654E+01	3.487E+00	--
α_2	3.71E-03	2.38E-02	1.97E-02	5.78E-02	1.791E+00	7.355E+01	0.798
α_3	1.13E-03	1.42E-02	1.06E-02	3.95E-02	1.207E+00	8.392E+01	0.706
α_4	8.73E-06	4.94E-03	1.97E-03	1.99E-02	4.340E-01	8.740E+01	0.684
α_5	1.51E-26	6.81E-04	2.42E-08	3.75E-03	5.493E-02	8.063E+01	0.745

CCCG = 6, Gamma = 0.211

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9222616	0.9595783	0.9627157	0.9861672	9.269E+01	3.905E+00	--
α_2	1.53E-03	1.57E-02	1.21E-02	4.23E-02	1.335E+00	8.343E+01	0.880
α_3	1.80E-03	1.47E-02	1.17E-02	3.77E-02	1.531E+00	1.027E+02	0.715
α_4	1.28E-04	6.64E-03	3.95E-03	2.23E-02	7.191E-01	1.075E+02	0.689
α_5	3.42E-08	2.34E-03	4.00E-04	1.14E-02	2.467E-01	1.053E+02	0.706
α_6	1.11E-20	1.01E-03	6.07E-07	5.84E-03	7.279E-02	7.223E+01	1.031

CCCG = 7, Gamma = 0.211

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9362061	0.9635249	0.9654639	0.9842188	1.524E+02	5.770E+00	--
α_2	1.44E-03	1.16E-02	9.26E-03	2.97E-02	1.549E+00	1.321E+02	0.921
α_3	2.13E-03	1.20E-02	1.01E-02	2.83E-02	1.989E+00	1.640E+02	0.742
α_4	6.75E-04	7.52E-03	5.71E-03	2.05E-02	1.287E+00	1.699E+02	0.719
α_5	6.63E-05	3.98E-03	2.30E-03	1.36E-02	6.913E-01	1.732E+02	0.708
α_6	9.54E-09	1.29E-03	1.95E-04	6.39E-03	2.327E-01	1.798E+02	0.684
α_7	8.47E-65	1.25E-04	1.89E-17	3.14E-04	2.112E-02	1.692E+02	0.728

CCCG = 8, Gamma = 0.211

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9438026	0.9664539	0.9679315	0.9840585	2.021E+02	7.016E+00	--
α_2	1.17E-03	9.06E-03	7.26E-03	2.31E-02	1.583E+00	1.732E+02	0.938
α_3	1.67E-03	9.41E-03	7.91E-03	2.23E-02	1.986E+00	2.090E+02	0.777
α_4	1.02E-03	7.29E-03	5.92E-03	1.83E-02	1.672E+00	2.277E+02	0.715
α_5	2.36E-04	4.46E-03	3.12E-03	1.33E-02	1.011E+00	2.254E+02	0.724
α_6	1.89E-05	2.50E-03	1.27E-03	9.16E-03	5.709E-01	2.276E+02	0.719
α_7	1.59E-10	6.94E-04	5.43E-05	3.67E-03	1.809E-01	2.603E+02	0.630
α_8	1.86E-107	1.29E-04	3.90E-27	9.65E-05	1.245E-02	9.687E+01	1.693

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.66E-01	9.59E-01	9.51E-01	9.56E-01	9.60E-01	9.64E-01	9.66E-01
α_2	3.43E-02	3.06E-02	3.13E-02	2.38E-02	1.57E-02	1.16E-02	9.06E-03
α_3		1.08E-02	1.07E-02	1.42E-02	1.47E-02	1.20E-02	9.41E-03
α_4			6.70E-03	4.94E-03	6.64E-03	7.52E-03	7.29E-03
α_5				6.81E-04	2.34E-03	3.98E-03	4.46E-03
α_6					1.01E-03	1.29E-03	2.50E-03
α_7						1.25E-04	6.94E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.66E-01	9.59E-01	9.51E-01	9.56E-01	9.60E-01	9.64E-01	9.66E-01
Beta	3.43E-02	4.14E-02	4.86E-02	4.36E-02	4.04E-02	3.65E-02	3.35E-02
Gamma		2.61E-01	3.57E-01	4.54E-01	6.10E-01	6.82E-01	7.30E-01
Delta			3.85E-01	2.84E-01	4.05E-01	5.19E-01	6.16E-01
Epsilon				1.21E-01	3.35E-01	4.18E-01	5.17E-01
Mu					3.01E-01	2.63E-01	4.27E-01
Omega						8.80E-02	2.47E-01
Sigma							1.56E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 6.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.684

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9603632	0.9898589	0.9955761	0.9999709	4.593E+01	4.706E-01	--
α_2	2.91E-05	1.01E-02	4.42E-03	3.96E-02	4.706E-01	4.593E+01	0.669

CCCG = 3, Gamma = 0.684

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9687857	0.9891580	0.9921540	0.9992920	1.006E+02	1.103E+00	--
α_2	2.42E-04	8.40E-03	5.33E-03	2.70E-02	8.104E-01	9.567E+01	0.714
α_3	2.05E-07	2.44E-03	5.72E-04	1.13E-02	2.921E-01	1.193E+02	0.576

CCCG = 4, Gamma = 0.684

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9722771	0.9883407	0.9902208	0.9979748	1.655E+02	1.953E+00	--
α_2	7.51E-04	8.05E-03	6.15E-03	2.19E-02	1.312E+00	1.616E+02	0.743
α_3	4.06E-06	2.42E-03	9.55E-04	9.78E-03	4.307E-01	1.778E+02	0.679
α_4	2.36E-09	1.19E-03	1.40E-04	6.05E-03	2.099E-01	1.764E+02	0.685

CCCG = 5, Gamma = 0.684

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9777305	0.9892379	0.9903457	0.9969591	2.856E+02	3.107E+00	--
α_2	8.71E-04	6.17E-03	5.01E-03	1.54E-02	1.684E+00	2.713E+02	0.798
α_3	1.35E-04	3.06E-03	2.07E-03	9.34E-03	9.426E-01	3.075E+02	0.706
α_4	9.00E-07	1.20E-03	4.12E-04	5.06E-03	3.816E-01	3.179E+02	0.684
α_5	1.35E-16	3.37E-04	1.85E-06	1.96E-03	9.865E-02	2.922E+02	0.745

CCCG = 6, Gamma = 0.684

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9793424	0.9894322	0.9903204	0.9964876	3.579E+02	3.822E+00	--
α_2	7.62E-04	5.26E-03	4.29E-03	1.31E-02	1.714E+00	3.238E+02	0.880
α_3	1.81E-04	2.77E-03	2.00E-03	7.99E-03	1.108E+00	3.993E+02	0.715
α_4	2.07E-05	1.57E-03	8.72E-04	5.47E-03	6.509E-01	4.151E+02	0.689
α_5	1.24E-08	6.26E-04	1.13E-04	3.02E-03	2.536E-01	4.052E+02	0.706
α_6	5.59E-17	3.45E-04	1.57E-06	2.01E-03	9.572E-02	2.776E+02	1.031

CCCG = 7, Gamma = 0.684

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9818661	0.9899695	0.9905932	0.9959431	5.127E+02	5.195E+00	--
α_2	8.83E-04	4.65E-03	3.95E-03	1.08E-02	2.105E+00	4.502E+02	0.921
α_3	2.20E-04	2.35E-03	1.79E-03	6.38E-03	1.320E+00	5.604E+02	0.742
α_4	8.77E-05	1.72E-03	1.19E-03	5.16E-03	9.967E-01	5.783E+02	0.719
α_5	4.51E-06	8.92E-04	4.24E-04	3.37E-03	5.249E-01	5.878E+02	0.708
α_6	2.39E-10	3.21E-04	3.14E-05	1.66E-03	1.956E-01	6.087E+02	0.684
α_7	2.64E-28	9.24E-05	2.09E-09	5.01E-04	5.291E-02	5.725E+02	0.728

CCCG = 8, Gamma = 0.684

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9826443	0.9901316	0.9906791	0.9957495	5.851E+02	5.832E+00	--
α_2	8.69E-04	4.28E-03	3.67E-03	9.80E-03	2.229E+00	5.181E+02	0.938
α_3	1.72E-04	2.01E-03	1.51E-03	5.54E-03	1.260E+00	6.269E+02	0.777
α_4	8.67E-05	1.53E-03	1.08E-03	4.50E-03	1.042E+00	6.818E+02	0.715
α_5	2.65E-05	1.13E-03	6.92E-04	3.73E-03	7.626E-01	6.733E+02	0.724
α_6	1.10E-07	4.82E-04	1.34E-04	2.14E-03	3.271E-01	6.787E+02	0.719
α_7	1.68E-13	1.73E-04	4.64E-06	9.73E-04	1.344E-01	7.753E+02	0.630
α_8	2.40E-20	2.66E-04	2.50E-07	1.55E-03	7.682E-02	2.883E+02	1.693

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.89E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01
α_2	1.01E-02	8.40E-03	8.05E-03	6.17E-03	5.26E-03	4.65E-03	4.28E-03
α_3		2.44E-03	2.42E-03	3.06E-03	2.77E-03	2.35E-03	2.01E-03
α_4			1.19E-03	1.20E-03	1.57E-03	1.72E-03	1.53E-03
α_5				3.37E-04	6.26E-04	8.92E-04	1.13E-03
α_6					3.45E-04	3.21E-04	4.82E-04
α_7						9.24E-05	1.73E-04
α_8							2.66E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.89E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01
Beta	1.01E-02	1.08E-02	1.17E-02	1.08E-02	1.06E-02	1.00E-02	9.87E-03
Gamma		2.25E-01	3.09E-01	4.27E-01	5.02E-01	5.36E-01	5.66E-01
Delta			3.30E-01	3.35E-01	4.78E-01	5.63E-01	6.41E-01
Epsilon				2.20E-01	3.83E-01	4.31E-01	5.74E-01
Mu					3.55E-01	3.17E-01	4.49E-01
Omega						2.23E-01	4.77E-01
Sigma							6.06E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.50	6.50	6.50	6.50	6.50	6.50	6.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9884291	0.9969988	0.9986460	0.9999890	1.638E+02	4.932E-01	--
α_2	1.10E-05	3.00E-03	1.35E-03	1.16E-02	4.932E-01	1.638E+02	0.669

CCCG = 3, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9916583	0.9971542	0.9979796	0.9998317	3.712E+02	1.059E+00	--
α_2	3.82E-05	2.05E-03	1.21E-03	6.91E-03	7.137E-01	3.481E+02	0.714
α_3	2.87E-07	8.00E-04	2.42E-04	3.49E-03	3.458E-01	4.321E+02	0.576

CCCG = 4, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9926355	0.9968360	0.9973157	0.9993968	6.662E+02	2.115E+00	--
α_2	2.93E-04	2.37E-03	1.89E-03	6.10E-03	1.549E+00	6.522E+02	0.743
α_3	1.15E-08	3.70E-04	7.23E-05	1.76E-03	2.646E-01	7.150E+02	0.679
α_4	4.69E-08	4.25E-04	1.04E-04	1.94E-03	3.010E-01	7.086E+02	0.685

CCCG = 5, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9947563	0.9970886	0.9972677	0.9988093	1.824E+03	5.325E+00	--
α_2	6.58E-04	2.06E-03	1.88E-03	4.10E-03	3.632E+00	1.756E+03	0.798
α_3	6.69E-05	6.81E-04	5.23E-04	1.84E-03	1.354E+00	1.987E+03	0.706
α_4	1.37E-08	1.44E-04	3.44E-05	6.63E-04	2.961E-01	2.052E+03	0.684
α_5	6.70E-35	2.25E-05	2.48E-11	1.12E-04	4.243E-02	1.885E+03	0.745

CCCG = 6, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941563	0.9968149	0.9970260	0.9987529	1.545E+03	4.936E+00	--
α_2	5.38E-04	2.02E-03	1.80E-03	4.27E-03	2.915E+00	1.439E+03	0.880
α_3	6.04E-05	7.09E-04	5.32E-04	1.96E-03	1.257E+00	1.773E+03	0.715
α_4	1.11E-06	2.73E-04	1.25E-04	1.05E-03	5.031E-01	1.842E+03	0.689
α_5	1.86E-15	6.43E-05	8.48E-07	3.69E-04	1.155E-01	1.796E+03	0.706
α_6	5.52E-13	1.18E-04	4.32E-06	6.53E-04	1.451E-01	1.230E+03	1.031

CCCG = 7, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9953861	0.9970804	0.9971800	0.9984348	3.297E+03	9.654E+00	--
α_2	6.33E-04	1.64E-03	1.52E-03	3.02E-03	4.851E+00	2.961E+03	0.921
α_3	1.95E-04	7.60E-04	6.72E-04	1.63E-03	2.800E+00	3.681E+03	0.742
α_4	3.72E-05	3.64E-04	2.81E-04	9.75E-04	1.384E+00	3.798E+03	0.719
α_5	4.50E-07	1.27E-04	5.68E-05	4.92E-04	4.902E-01	3.858E+03	0.708
α_6	6.82E-16	2.87E-05	3.64E-07	1.65E-04	1.146E-01	3.993E+03	0.684
α_7	2.05E-93	3.90E-06	4.15E-25	4.63E-06	1.464E-02	3.755E+03	0.728

CCCG = 8, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9949770	0.9970147	0.9971519	0.9985841	2.387E+03	7.148E+00	--
α_2	3.66E-04	1.35E-03	1.20E-03	2.84E-03	2.980E+00	2.202E+03	0.938
α_3	1.28E-04	7.36E-04	6.16E-04	1.76E-03	1.960E+00	2.660E+03	0.777
α_4	2.95E-05	4.03E-04	2.95E-04	1.14E-03	1.166E+00	2.893E+03	0.715
α_5	1.07E-06	1.88E-04	9.10E-05	7.04E-04	5.375E-01	2.856E+03	0.724
α_6	1.39E-11	6.27E-05	4.87E-06	3.32E-04	1.805E-01	2.878E+03	0.719
α_7	6.51E-36	1.26E-05	9.42E-12	6.16E-05	4.139E-02	3.286E+03	0.630
α_8	1.41E-08	2.31E-04	5.10E-05	1.08E-03	2.827E-01	1.222E+03	1.693

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	3.00E-03	2.05E-03	2.37E-03	2.06E-03	2.02E-03	1.64E-03	1.35E-03
α_3		8.00E-04	3.70E-04	6.81E-04	7.09E-04	7.60E-04	7.36E-04
α_4			4.25E-04	1.44E-04	2.73E-04	3.64E-04	4.03E-04
α_5				2.25E-05	6.43E-05	1.27E-04	1.88E-04
α_6					1.18E-04	2.87E-05	6.27E-05
α_7						3.90E-06	1.26E-05
α_8							2.31E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	3.00E-03	2.85E-03	3.16E-03	2.91E-03	3.19E-03	2.92E-03	2.99E-03
Gamma		2.81E-01	2.51E-01	2.91E-01	3.65E-01	4.40E-01	5.47E-01
Delta			5.34E-01	1.97E-01	3.91E-01	4.08E-01	5.49E-01
Epsilon				1.35E-01	4.00E-01	3.05E-01	5.51E-01
Mu					6.47E-01	2.04E-01	6.20E-01
Omega						1.20E-01	7.95E-01
Sigma							9.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.8 Service Water Motor-Driven Pumps

2.1.8.1 SWN-MDP-FS: Normally Running Service Water Motor-Driven Pumps Fail to Start

Generic CCF Parameters

System Group: Raw Water
System: Normally Operating Service Water
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Start
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 26.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9625429	0.9904346	0.9958503	0.9999709	1.0000000	4.851E+01	4.685E-01
α_2	2.68E-05	9.57E-03	4.15E-03	3.75E-02	0.00E+00	4.685E-01	4.851E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9622357	0.9867612	0.9903283	0.9990859	1.0000000	8.408E+01	1.128E+00
α_2	3.34E-04	9.99E-03	6.51E-03	3.15E-02	0.00E+00	8.512E-01	8.436E+01
α_3	1.62E-07	3.25E-03	6.95E-04	1.52E-02	0.00E+00	2.768E-01	8.493E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9617640	0.9840429	0.9866750	0.9973311	1.0000000	1.168E+02	1.894E+00
α_2	9.17E-04	1.06E-02	8.02E-03	2.92E-02	0.00E+00	1.260E+00	1.174E+02
α_3	3.68E-06	3.39E-03	1.25E-03	1.40E-02	0.00E+00	4.024E-01	1.183E+02
α_4	1.35E-08	1.95E-03	2.91E-04	9.66E-03	0.00E+00	2.315E-01	1.184E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9687139	0.9844255	0.9858698	0.9952165	1.0000000	2.169E+02	3.432E+00
α_2	1.49E-03	8.73E-03	7.30E-03	2.09E-02	0.00E+00	1.924E+00	2.184E+02
α_3	2.76E-04	4.76E-03	3.37E-03	1.40E-02	0.00E+00	1.049E+00	2.193E+02
α_4	1.32E-06	1.73E-03	5.98E-04	7.32E-03	0.00E+00	3.822E-01	2.200E+02
α_5	3.02E-20	3.48E-04	3.24E-07	2.02E-03	0.00E+00	7.674E-02	2.203E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
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α_1	0.9706943	0.9849702	0.9862170	0.9949842	1.0000000	2.513E+02	3.835E+00
α_2	9.56E-04	6.67E-03	5.43E-03	1.66E-02	0.00E+00	1.701E+00	2.535E+02
α_3	3.73E-04	4.73E-03	3.52E-03	1.32E-02	0.00E+00	1.207E+00	2.539E+02
α_4	2.14E-05	2.34E-03	1.23E-03	8.42E-03	0.00E+00	5.960E-01	2.546E+02
α_5	3.39E-09	8.66E-04	1.16E-04	4.35E-03	0.00E+00	2.211E-01	2.549E+02
α_6	3.38E-15	4.30E-04	4.36E-06	2.48E-03	0.00E+00	1.098E-01	2.550E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9749032	0.9857614	0.9865541	0.9939056	1.0000000	3.979E+02	5.747E+00
α_2	1.14E-03	5.56E-03	4.76E-03	1.27E-02	0.00E+00	2.243E+00	4.014E+02
α_3	5.42E-04	4.04E-03	3.25E-03	1.02E-02	0.00E+00	1.630E+00	4.020E+02
α_4	1.67E-04	2.68E-03	1.92E-03	7.80E-03	0.00E+00	1.083E+00	4.026E+02
α_5	1.01E-05	1.40E-03	7.06E-04	5.15E-03	0.00E+00	5.654E-01	4.031E+02
α_6	2.61E-10	4.75E-04	4.38E-05	2.47E-03	0.00E+00	1.916E-01	4.035E+02
α_7	5.91E-41	8.62E-05	3.21E-12	3.78E-04	0.00E+00	3.480E-02	4.036E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9760551	0.9864274	0.9871869	0.9942044	1.0000000	4.161E+02	5.726E+00
α_2	8.62E-04	4.78E-03	4.03E-03	1.13E-02	0.00E+00	2.018E+00	4.198E+02
α_3	3.40E-04	3.30E-03	2.55E-03	8.79E-03	0.00E+00	1.391E+00	4.205E+02
α_4	1.50E-04	2.52E-03	1.79E-03	7.37E-03	0.00E+00	1.062E+00	4.208E+02
α_5	2.94E-05	1.67E-03	9.73E-04	5.66E-03	0.00E+00	7.026E-01	4.211E+02
α_6	3.25E-07	8.29E-04	2.54E-04	3.61E-03	0.00E+00	3.497E-01	4.215E+02
α_7	1.25E-15	2.56E-04	2.35E-06	1.48E-03	0.00E+00	1.078E-01	4.217E+02
α_8	2.61E-17	2.24E-04	9.51E-07	1.31E-03	0.00E+00	9.469E-02	4.218E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.87E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
α_2	9.57E-03	9.99E-03	1.06E-02	8.73E-03	6.67E-03	5.56E-03	4.78E-03
α_3		3.25E-03	3.39E-03	4.76E-03	4.73E-03	4.04E-03	3.30E-03
α_4			1.95E-03	1.73E-03	2.34E-03	2.68E-03	2.52E-03
α_5				3.48E-04	8.66E-04	1.40E-03	1.67E-03
α_6					4.30E-04	4.75E-04	8.29E-04
α_7						8.62E-05	2.56E-04
α_8							2.24E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.87E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
Beta	9.57E-03	1.32E-02	1.60E-02	1.56E-02	1.50E-02	1.42E-02	1.36E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01

Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	26.10	26.10	26.10	26.10	26.10	26.10	26.10
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 8.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.307

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9741592	0.9933349	0.9970331	0.9999779	7.204E+01	4.834E-01	--
α_2	2.21E-05	6.67E-03	2.97E-03	2.58E-02	4.834E-01	7.204E+01	0.721

CCCG = 3, Gamma = 0.307

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9784974	0.9922640	0.9942131	0.9993688	1.572E+02	1.226E+00	--
α_2	2.93E-04	6.03E-03	4.16E-03	1.82E-02	9.769E-01	1.611E+02	0.857
α_3	2.73E-08	1.71E-03	2.96E-04	8.28E-03	2.487E-01	1.454E+02	0.954

CCCG = 4, Gamma = 0.307

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9763831	0.9899103	0.9914622	0.9981313	2.018E+02	2.057E+00	--
α_2	7.62E-04	6.91E-03	5.41E-03	1.82E-02	1.442E+00	2.073E+02	0.919
α_3	2.62E-06	2.09E-03	7.84E-04	8.58E-03	4.114E-01	1.967E+02	0.974
α_4	1.44E-09	1.10E-03	1.19E-04	5.62E-03	2.036E-01	1.857E+02	1.033

CCCG = 5, Gamma = 0.307

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9800747	0.9899095	0.9907898	0.9967367	3.613E+02	3.683E+00	--
α_2	1.23E-03	6.01E-03	5.16E-03	1.37E-02	2.243E+00	3.709E+02	0.971
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.529E+02	1.024
α_4	7.38E-07	1.08E-03	3.66E-04	4.59E-03	3.765E-01	3.474E+02	1.042
α_5	1.69E-21	1.95E-04	1.11E-07	1.13E-03	7.237E-02	3.704E+02	0.978

CCCG = 6, Gamma = 0.307

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9810120	0.9900823	0.9908540	0.9965163	4.132E+02	4.139E+00	--
α_2	9.20E-04	4.78E-03	4.07E-03	1.11E-02	2.128E+00	4.427E+02	0.927
α_3	1.98E-04	2.87E-03	2.08E-03	8.20E-03	1.134E+00	3.945E+02	1.043
α_4	9.12E-06	1.40E-03	6.92E-04	5.17E-03	5.533E-01	3.960E+02	1.040
α_5	2.12E-09	5.45E-04	7.28E-05	2.74E-03	2.210E-01	4.050E+02	1.018
α_6	4.16E-16	3.26E-04	2.27E-06	1.89E-03	1.027E-01	3.146E+02	1.310

CCCG = 7, Gamma = 0.307

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9841748	0.9907980	0.9912619	0.9958372	6.926E+02	6.432E+00	--
α_2	9.67E-04	3.72E-03	3.29E-03	7.92E-03	2.840E+00	7.610E+02	0.911
α_3	3.98E-04	2.68E-03	2.20E-03	6.64E-03	1.746E+00	6.486E+02	1.069
α_4	1.02E-04	1.64E-03	1.17E-03	4.77E-03	1.084E+00	6.607E+02	1.051
α_5	4.61E-06	8.10E-04	3.93E-04	3.03E-03	5.376E-01	6.628E+02	1.049
α_6	2.72E-10	3.10E-04	3.12E-05	1.60E-03	1.979E-01	6.391E+02	1.088
α_7	9.21E-53	4.11E-05	4.12E-15	1.41E-04	2.656E-02	6.458E+02	1.077

CCCG = 8, Gamma = 0.307

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9848931	0.9913190	0.9917797	0.9961715	6.980E+02	6.112E+00	--
α_2	6.48E-04	3.00E-03	2.59E-03	6.74E-03	2.364E+00	7.867E+02	0.881
α_3	2.69E-04	2.26E-03	1.79E-03	5.87E-03	1.512E+00	6.674E+02	1.039
α_4	9.61E-05	1.64E-03	1.16E-03	4.82E-03	1.056E+00	6.429E+02	1.080
α_5	1.51E-05	9.98E-04	5.68E-04	3.44E-03	6.745E-01	6.752E+02	1.029
α_6	6.20E-08	4.61E-04	1.17E-04	2.09E-03	3.076E-01	6.669E+02	1.042
α_7	1.30E-15	1.86E-04	1.84E-06	1.07E-03	1.093E-01	5.875E+02	1.183
α_8	2.16E-18	1.40E-04	3.88E-07	8.15E-04	8.885E-02	6.351E+02	1.094

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.92E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	6.67E-03	6.03E-03	6.91E-03	6.01E-03	4.78E-03	3.72E-03	3.00E-03
α_3		1.71E-03	2.09E-03	2.80E-03	2.87E-03	2.68E-03	2.26E-03
α_4			1.10E-03	1.08E-03	1.40E-03	1.64E-03	1.64E-03
α_5				1.95E-04	5.45E-04	8.10E-04	9.98E-04
α_6					3.26E-04	3.10E-04	4.61E-04
α_7						4.11E-05	1.86E-04
α_8							1.40E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.92E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	6.67E-03	7.74E-03	1.01E-02	1.01E-02	9.92E-03	9.20E-03	8.68E-03
Gamma		2.21E-01	3.15E-01	4.04E-01	5.18E-01	5.96E-01	6.55E-01
Delta			3.44E-01	3.13E-01	4.42E-01	5.10E-01	6.02E-01
Epsilon				1.53E-01	3.84E-01	4.15E-01	5.21E-01
Mu					3.74E-01	3.02E-01	4.41E-01
Omega						1.17E-01	4.14E-01
Sigma							4.29E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.00	8.00	8.00	8.00	8.00	8.00	8.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 7.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.268

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9390762	0.9846279	0.9935325	0.9999657	2.881E+01	4.498E-01	--
α_2	3.43E-05	1.54E-02	6.47E-03	6.09E-02	4.498E-01	2.881E+01	0.721

CCCG = 3, Gamma = 0.268

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9324585	0.9758282	0.9819782	0.9981542	4.757E+01	1.178E+00	--
α_2	8.36E-04	1.88E-02	1.29E-02	5.71E-02	9.387E-01	4.892E+01	0.857
α_3	5.63E-08	5.35E-03	8.66E-04	2.62E-02	2.396E-01	4.458E+01	0.954

CCCG = 4, Gamma = 0.268

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9279831	0.9697259	0.9745764	0.9948644	6.081E+01	1.898E+00	--
α_2	1.81E-03	2.00E-02	1.52E-02	5.43E-02	1.285E+00	6.309E+01	0.919
α_3	5.98E-06	6.46E-03	2.32E-03	2.70E-02	3.927E-01	6.039E+01	0.974
α_4	1.49E-08	3.85E-03	5.17E-04	1.93E-02	2.207E-01	5.709E+01	1.033

CCCG = 5, Gamma = 0.268

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9403344	0.9699672	0.9726138	0.9905508	1.132E+02	3.506E+00	--
α_2	2.98E-03	1.67E-02	1.40E-02	3.93E-02	1.992E+00	1.176E+02	0.971
α_3	5.89E-04	9.50E-03	6.82E-03	2.76E-02	1.078E+00	1.123E+02	1.024
α_4	1.71E-06	3.26E-03	1.06E-03	1.40E-02	3.632E-01	1.111E+02	1.042
α_5	5.64E-21	6.10E-04	3.54E-07	3.53E-03	7.248E-02	1.187E+02	0.978

CCCG = 6, Gamma = 0.268

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9448934	0.9709175	0.9730668	0.9895959	1.402E+02	4.199E+00	--
α_2	2.17E-03	1.26E-02	1.05E-02	2.99E-02	1.941E+00	1.526E+02	0.927
α_3	9.30E-04	9.69E-03	7.44E-03	2.62E-02	1.332E+00	1.361E+02	1.043
α_4	4.82E-05	4.49E-03	2.42E-03	1.59E-02	6.181E-01	1.372E+02	1.040
α_5	1.13E-08	1.64E-03	2.44E-04	8.14E-03	2.313E-01	1.406E+02	1.018
α_6	6.42E-20	7.03E-04	6.63E-07	4.09E-03	7.684E-02	1.093E+02	1.310

CCCG = 7, Gamma = 0.268

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9518261	0.9720458	0.9734488	0.9874733	2.164E+02	6.223E+00	--
α_2	2.67E-03	1.09E-02	9.58E-03	2.36E-02	2.654E+00	2.411E+02	0.911
α_3	1.08E-03	7.93E-03	6.41E-03	2.00E-02	1.645E+00	2.059E+02	1.069
α_4	3.52E-04	5.28E-03	3.82E-03	1.52E-02	1.115E+00	2.100E+02	1.051
α_5	2.76E-05	2.85E-03	1.51E-03	1.02E-02	6.034E-01	2.110E+02	1.049
α_6	1.55E-10	8.73E-04	6.51E-05	4.63E-03	1.780E-01	2.038E+02	1.088
α_7	7.23E-51	1.33E-04	2.73E-14	4.69E-04	2.734E-02	2.060E+02	1.077

CCCG = 8, Gamma = 0.268

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9538656	0.9732161	0.9745586	0.9879810	2.269E+02	6.246E+00	--
α_2	2.22E-03	9.61E-03	8.39E-03	2.12E-02	2.504E+00	2.579E+02	0.881
α_3	6.90E-04	6.43E-03	5.01E-03	1.70E-02	1.419E+00	2.193E+02	1.039
α_4	2.66E-04	4.83E-03	3.39E-03	1.43E-02	1.027E+00	2.115E+02	1.080
α_5	6.78E-05	3.29E-03	1.97E-03	1.10E-02	7.337E-01	2.223E+02	1.029
α_6	1.80E-06	1.81E-03	6.52E-04	7.51E-03	3.975E-01	2.198E+02	1.042
α_7	3.98E-20	3.97E-04	3.81E-07	2.31E-03	7.703E-02	1.939E+02	1.183
α_8	3.88E-18	4.17E-04	1.04E-06	2.44E-03	8.749E-02	2.096E+02	1.094

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.76E-01	9.70E-01	9.70E-01	9.71E-01	9.72E-01	9.73E-01
α_2	1.54E-02	1.88E-02	2.00E-02	1.67E-02	1.26E-02	1.09E-02	9.61E-03
α_3		5.35E-03	6.46E-03	9.50E-03	9.69E-03	7.93E-03	6.43E-03
α_4			3.85E-03	3.26E-03	4.49E-03	5.28E-03	4.83E-03
α_5				6.10E-04	1.64E-03	2.85E-03	3.29E-03
α_6					7.03E-04	8.73E-04	1.81E-03
α_7						1.33E-04	3.97E-04
α_8							4.17E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.76E-01	9.70E-01	9.70E-01	9.71E-01	9.72E-01	9.73E-01
Beta	1.54E-02	2.42E-02	3.03E-02	3.00E-02	2.91E-02	2.80E-02	2.68E-02
Gamma		2.21E-01	3.41E-01	4.45E-01	5.68E-01	6.10E-01	6.41E-01
Delta			3.73E-01	2.89E-01	4.13E-01	5.35E-01	6.26E-01
Epsilon				1.58E-01	3.43E-01	4.22E-01	5.50E-01
Mu					3.00E-01	2.61E-01	4.43E-01
Omega						1.32E-01	3.11E-01
Sigma							5.12E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.00	7.00	7.00	7.00	7.00	7.00	7.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 7.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.272

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9580980	0.9892766	0.9953184	0.9999692	4.341E+01	4.706E-01	--
α_2	3.08E-05	1.07E-02	4.68E-03	4.19E-02	4.706E-01	4.341E+01	0.721

CCCG = 3, Gamma = 0.272

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9597211	0.9859870	0.9898400	0.9990822	7.757E+01	1.103E+00	--
α_2	2.88E-04	1.00E-02	6.36E-03	3.21E-02	8.104E-01	8.021E+01	0.857
α_3	3.38E-07	4.01E-03	9.43E-04	1.85E-02	2.921E-01	7.254E+01	0.954

CCCG = 4, Gamma = 0.272

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9640427	0.9848540	0.9872813	0.9973629	1.270E+02	1.953E+00	--
α_2	9.26E-04	9.92E-03	7.58E-03	2.69E-02	1.312E+00	1.310E+02	0.919
α_3	5.80E-06	3.45E-03	1.36E-03	1.39E-02	4.307E-01	1.245E+02	0.974
α_4	3.55E-09	1.78E-03	2.11E-04	9.07E-03	2.099E-01	1.176E+02	1.033

CCCG = 5, Gamma = 0.272

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9707242	0.9858335	0.9872825	0.9959900	2.162E+02	3.107E+00	--
α_2	1.06E-03	7.49E-03	6.09E-03	1.87E-02	1.684E+00	2.232E+02	0.971
α_3	1.95E-04	4.42E-03	3.00E-03	1.35E-02	9.426E-01	2.124E+02	1.024
α_4	1.37E-06	1.82E-03	6.26E-04	7.68E-03	3.816E-01	2.093E+02	1.042
α_5	1.76E-16	4.42E-04	2.42E-06	2.57E-03	9.865E-02	2.233E+02	0.978

CCCG = 6, Gamma = 0.272

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9741104	0.9867431	0.9878516	0.9955883	2.845E+02	3.822E+00	--
α_2	8.02E-04	5.54E-03	4.52E-03	1.38E-02	1.714E+00	3.078E+02	0.927
α_3	2.64E-04	4.02E-03	2.91E-03	1.16E-02	1.108E+00	2.742E+02	1.043
α_4	3.12E-05	2.36E-03	1.32E-03	8.23E-03	6.509E-01	2.753E+02	1.040
α_5	1.78E-08	8.99E-04	1.62E-04	4.33E-03	2.536E-01	2.818E+02	1.018
α_6	7.09E-17	4.37E-04	1.99E-06	2.55E-03	9.572E-02	2.189E+02	1.310

CCCG = 7, Gamma = 0.272

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9775051	0.9875479	0.9883184	0.9949588	4.120E+02	5.195E+00	--
α_2	8.72E-04	4.59E-03	3.90E-03	1.07E-02	2.105E+00	4.562E+02	0.911
α_3	3.18E-04	3.38E-03	2.58E-03	9.19E-03	1.320E+00	3.889E+02	1.069
α_4	1.28E-04	2.51E-03	1.74E-03	7.52E-03	9.967E-01	3.960E+02	1.051
α_5	6.67E-06	1.32E-03	6.27E-04	4.98E-03	5.249E-01	3.974E+02	1.049
α_6	3.79E-10	5.10E-04	4.99E-05	2.64E-03	1.956E-01	3.834E+02	1.088
α_7	3.90E-28	1.37E-04	3.09E-09	7.41E-04	5.291E-02	3.874E+02	1.077

CCCG = 8, Gamma = 0.272

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9792646	0.9882032	0.9888552	0.9949152	4.885E+02	5.832E+00	--
α_2	8.15E-04	4.02E-03	3.44E-03	9.20E-03	2.229E+00	5.526E+02	0.881
α_3	2.30E-04	2.68E-03	2.02E-03	7.39E-03	1.260E+00	4.691E+02	1.039
α_4	1.31E-04	2.30E-03	1.62E-03	6.79E-03	1.042E+00	4.518E+02	1.080
α_5	3.77E-05	1.60E-03	9.82E-04	5.29E-03	7.626E-01	4.745E+02	1.029
α_6	1.59E-07	6.97E-04	1.95E-04	3.10E-03	3.271E-01	4.688E+02	1.042
α_7	3.15E-13	3.25E-04	8.72E-06	1.83E-03	1.344E-01	4.131E+02	1.183
α_8	1.55E-20	1.72E-04	1.61E-07	9.99E-04	7.682E-02	4.466E+02	1.094

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.86E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01	9.88E-01
α_2	1.07E-02	1.00E-02	9.92E-03	7.49E-03	5.54E-03	4.59E-03	4.02E-03
α_3		4.01E-03	3.45E-03	4.42E-03	4.02E-03	3.38E-03	2.68E-03
α_4			1.78E-03	1.82E-03	2.36E-03	2.51E-03	2.30E-03
α_5				4.42E-04	8.99E-04	1.32E-03	1.60E-03
α_6					4.37E-04	5.10E-04	6.97E-04
α_7						1.37E-04	3.25E-04
α_8							1.72E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.86E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01	9.88E-01
Beta	1.07E-02	1.40E-02	1.51E-02	1.42E-02	1.33E-02	1.25E-02	1.18E-02
Gamma		2.86E-01	3.45E-01	4.72E-01	5.82E-01	6.31E-01	6.59E-01
Delta			3.41E-01	3.39E-01	4.79E-01	5.70E-01	6.56E-01
Epsilon				1.95E-01	3.62E-01	4.39E-01	5.49E-01
Mu					3.27E-01	3.29E-01	4.27E-01
Omega						2.11E-01	4.16E-01
Sigma							3.46E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.10	7.10	7.10	7.10	7.10	7.10	7.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.153

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9878603	0.9968510	0.9985791	0.9999884	1.561E+02	4.932E-01	--
α_2	1.16E-05	3.15E-03	1.42E-03	1.21E-02	4.932E-01	1.561E+02	0.721

CCCG = 3, Gamma = 0.153

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9890497	0.9962625	0.9973451	0.9997787	2.824E+02	1.059E+00	--
α_2	4.54E-05	2.43E-03	1.43E-03	8.20E-03	7.137E-01	2.932E+02	0.857
α_3	4.71E-07	1.31E-03	3.96E-04	5.71E-03	3.458E-01	2.638E+02	0.954

CCCG = 4, Gamma = 0.153

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9905147	0.9959232	0.9965403	0.9992224	5.166E+02	2.115E+00	--
α_2	3.61E-04	2.91E-03	2.32E-03	7.50E-03	1.549E+00	5.301E+02	0.919
α_3	1.65E-08	5.27E-04	1.03E-04	2.51E-03	2.646E-01	5.017E+02	0.974
α_4	7.03E-08	6.36E-04	1.56E-04	2.91E-03	3.010E-01	4.730E+02	1.033

CCCG = 5, Gamma = 0.153

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9932665	0.9962605	0.9964902	0.9984702	1.419E+03	5.325E+00	--
α_2	7.99E-04	2.51E-03	2.28E-03	4.98E-03	3.632E+00	1.446E+03	0.971
α_3	9.67E-05	9.85E-04	7.56E-04	2.65E-03	1.354E+00	1.373E+03	1.024
α_4	2.08E-08	2.19E-04	5.23E-05	1.01E-03	2.961E-01	1.351E+03	1.042
α_5	8.77E-35	2.95E-05	3.25E-11	1.46E-04	4.243E-02	1.439E+03	0.978

CCCG = 6, Gamma = 0.153

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9930134	0.9961913	0.9964434	0.9985084	1.291E+03	4.936E+00	--
α_2	5.65E-04	2.13E-03	1.89E-03	4.49E-03	2.915E+00	1.369E+03	0.927
α_3	8.79E-05	1.03E-03	7.74E-04	2.85E-03	1.257E+00	1.219E+03	1.043
α_4	1.67E-06	4.11E-04	1.88E-04	1.58E-03	5.031E-01	1.222E+03	1.040
α_5	2.68E-15	9.24E-05	1.22E-06	5.30E-04	1.155E-01	1.250E+03	1.018
α_6	6.99E-13	1.49E-04	5.47E-06	8.28E-04	1.451E-01	9.705E+02	1.310

CCCG = 7, Gamma = 0.153

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9945008	0.9965197	0.9966383	0.9981339	2.764E+03	9.654E+00	--
α_2	6.25E-04	1.61E-03	1.51E-03	2.98E-03	4.851E+00	2.999E+03	0.911
α_3	2.80E-04	1.09E-03	9.68E-04	2.34E-03	2.800E+00	2.555E+03	1.069
α_4	5.43E-05	5.32E-04	4.11E-04	1.42E-03	1.384E+00	2.601E+03	1.051
α_5	6.65E-07	1.88E-04	8.40E-05	7.27E-04	4.902E-01	2.608E+03	1.049
α_6	1.08E-15	4.56E-05	5.78E-07	2.62E-04	1.146E-01	2.514E+03	1.088
α_7	3.03E-93	5.76E-06	6.13E-25	6.85E-06	1.464E-02	2.540E+03	1.077

CCCG = 8, Gamma = 0.153

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9942998	0.9966119	0.9967675	0.9983928	2.103E+03	7.148E+00	--
α_2	3.44E-04	1.27E-03	1.13E-03	2.66E-03	2.980E+00	2.349E+03	0.881
α_3	1.70E-04	9.83E-04	8.22E-04	2.35E-03	1.960E+00	1.992E+03	1.039
α_4	4.44E-05	6.07E-04	4.45E-04	1.72E-03	1.166E+00	1.918E+03	1.080
α_5	1.51E-06	2.67E-04	1.29E-04	9.99E-04	5.375E-01	2.014E+03	1.029
α_6	2.01E-11	9.08E-05	7.04E-06	4.80E-04	1.805E-01	1.988E+03	1.042
α_7	1.22E-35	2.36E-05	1.77E-11	1.16E-04	4.139E-02	1.751E+03	1.183
α_8	9.11E-09	1.49E-04	3.29E-05	6.96E-04	2.827E-01	1.893E+03	1.094

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
α_2	3.15E-03	2.43E-03	2.91E-03	2.51E-03	2.13E-03	1.61E-03	1.27E-03
α_3		1.31E-03	5.27E-04	9.85E-04	1.03E-03	1.09E-03	9.83E-04
α_4			6.36E-04	2.19E-04	4.11E-04	5.32E-04	6.07E-04
α_5				2.95E-05	9.24E-05	1.88E-04	2.67E-04
α_6					1.49E-04	4.56E-05	9.08E-05
α_7						5.76E-06	2.36E-05
α_8							1.49E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
Beta	3.15E-03	3.74E-03	4.08E-03	3.74E-03	3.81E-03	3.48E-03	3.39E-03
Gamma		3.50E-01	2.85E-01	3.30E-01	4.42E-01	5.36E-01	6.26E-01
Delta			5.47E-01	2.02E-01	3.88E-01	4.13E-01	5.37E-01
Epsilon				1.19E-01	3.70E-01	3.10E-01	4.66E-01
Mu					6.18E-01	2.15E-01	4.97E-01
Omega						1.12E-01	6.56E-01
Sigma							8.63E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.8.2 SWN-MDP-FR: Normally Running Service Water Motor-Driven Pumps Fail to Run

Generic CCF Parameters

System Group: Raw Water
System: Normally Operating Service Water
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 45.0

Total Number of Common-Cause Failure Events: 3

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9225386	0.9679469	0.9733310	0.9949219	0.9600000	5.441E+01	1.802E+00
α_2	5.08E-03	3.21E-02	2.67E-02	7.75E-02	4.00E-02	1.802E+00	5.441E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9406563	0.9710653	0.9739256	0.9917010	0.9591837	1.050E+02	3.128E+00
α_2	2.78E-03	1.71E-02	1.42E-02	4.13E-02	2.04E-02	1.851E+00	1.063E+02
α_3	1.05E-03	1.18E-02	8.96E-03	3.23E-02	2.04E-02	1.277E+00	1.068E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9475878	0.9720276	0.9740110	0.9896962	0.9612403	1.527E+02	4.394E+00
α_2	3.71E-03	1.60E-02	1.40E-02	3.51E-02	1.94E-02	2.510E+00	1.546E+02
α_3	5.26E-04	7.34E-03	5.38E-03	2.08E-02	1.16E-02	1.152E+00	1.559E+02
α_4	9.52E-05	4.66E-03	2.79E-03	1.56E-02	7.75E-03	7.315E-01	1.563E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9598133	0.9765375	0.9776904	0.9893300	0.9624413	2.677E+02	6.432E+00
α_2	3.70E-03	1.23E-02	1.11E-02	2.48E-02	1.80E-02	3.362E+00	2.708E+02
α_3	1.02E-03	6.56E-03	5.41E-03	1.61E-02	9.39E-03	1.799E+00	2.723E+02
α_4	1.53E-04	3.45E-03	2.34E-03	1.05E-02	7.04E-03	9.447E-01	2.732E+02
α_5	2.70E-07	1.19E-03	3.32E-04	5.30E-03	3.13E-03	3.267E-01	2.738E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9624754	0.9774725	0.9784508	0.9891390	0.9635468	3.169E+02	7.304E+00
α_2	2.94E-03	1.00E-02	9.03E-03	2.05E-02	1.63E-02	3.248E+00	3.210E+02

α_3	1.18E-03	6.37E-03	5.39E-03	1.49E-02	9.03E-03	2.066E+00	3.221E+02
α_4	2.48E-04	3.52E-03	2.57E-03	1.01E-02	5.75E-03	1.143E+00	3.231E+02
α_5	1.93E-05	1.89E-03	1.01E-03	6.74E-03	4.11E-03	6.117E-01	3.236E+02
α_6	5.93E-09	7.24E-04	1.11E-04	3.57E-03	1.31E-03	2.348E-01	3.240E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9688973	0.9802466	0.9808972	0.9893686	0.9647484	4.783E+02	9.638E+00
α_2	2.60E-03	7.84E-03	7.18E-03	1.53E-02	1.43E-02	3.825E+00	4.841E+02
α_3	1.30E-03	5.39E-03	4.73E-03	1.17E-02	9.06E-03	2.630E+00	4.853E+02
α_4	4.59E-04	3.37E-03	2.72E-03	8.51E-03	5.10E-03	1.645E+00	4.863E+02
α_5	1.04E-04	2.04E-03	1.41E-03	6.11E-03	3.89E-03	9.951E-01	4.869E+02
α_6	1.88E-06	9.13E-04	3.73E-04	3.65E-03	2.30E-03	4.455E-01	4.875E+02
α_7	5.29E-17	1.99E-04	1.00E-06	1.16E-03	5.66E-04	9.730E-02	4.878E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9700396	0.9808443	0.9814538	0.9895601	0.9660645	5.113E+02	9.985E+00
α_2	2.16E-03	6.86E-03	6.24E-03	1.37E-02	1.24E-02	3.574E+00	5.177E+02
α_3	1.12E-03	4.84E-03	4.22E-03	1.07E-02	9.00E-03	2.520E+00	5.188E+02
α_4	4.57E-04	3.24E-03	2.63E-03	8.10E-03	4.98E-03	1.687E+00	5.196E+02
α_5	1.50E-04	2.18E-03	1.58E-03	6.23E-03	3.44E-03	1.134E+00	5.201E+02
α_6	2.02E-05	1.30E-03	7.45E-04	4.48E-03	2.62E-03	6.788E-01	5.206E+02
α_7	1.62E-08	5.09E-04	9.98E-05	2.42E-03	1.25E-03	2.651E-01	5.210E+02
α_8	5.55E-14	2.42E-04	4.85E-06	1.37E-03	2.49E-04	1.259E-01	5.211E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.71E-01	9.72E-01	9.77E-01	9.77E-01	9.80E-01	9.81E-01
α_2	3.21E-02	1.71E-02	1.60E-02	1.23E-02	1.00E-02	7.84E-03	6.86E-03
α_3		1.18E-02	7.34E-03	6.56E-03	6.37E-03	5.39E-03	4.84E-03
α_4			4.66E-03	3.45E-03	3.52E-03	3.37E-03	3.24E-03
α_5				1.19E-03	1.89E-03	2.04E-03	2.18E-03
α_6					7.24E-04	9.13E-04	1.30E-03
α_7						1.99E-04	5.09E-04
α_8							2.42E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.71E-01	9.72E-01	9.77E-01	9.77E-01	9.80E-01	9.81E-01
Beta	3.21E-02	2.89E-02	2.80E-02	2.35E-02	2.25E-02	1.98E-02	1.92E-02
Gamma		4.08E-01	4.29E-01	4.77E-01	5.55E-01	6.03E-01	6.42E-01
Delta			3.88E-01	4.14E-01	4.91E-01	5.48E-01	6.07E-01
Epsilon				2.57E-01	4.26E-01	4.83E-01	5.66E-01
Mu					2.77E-01	3.53E-01	4.85E-01
Omega						1.79E-01	3.65E-01
Sigma							3.22E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	30.00	45.00	60.00	75.00	90.00	105.00	120.00
N₁	2.0000	2.0000	2.0000	1.8750	1.6875	1.4766	1.2656
N₂	1.3333	1.0000	1.2500	1.4375	1.5469	1.5820	1.5557
N₃		1.0000	0.7500	0.7500	0.8594	1.0000	1.1299
N₄			0.5000	0.5625	0.5469	0.5625	0.6250
N₅				0.2500	0.3906	0.4297	0.4316
N₆					0.1250	0.2539	0.3291
N₇						0.0625	0.1572
N₈							0.0313

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 10.2

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.204

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9694746	0.9921224	0.9964877	0.9999739	6.088E+01	4.834E-01	--
α_2	2.61E-05	7.88E-03	3.51E-03	3.05E-02	4.834E-01	6.088E+01	0.833

CCCG = 3, Gamma = 0.208

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9809594	0.9931527	0.9948804	0.9994418	1.778E+02	1.226E+00	--
α_2	2.53E-04	5.21E-03	3.59E-03	1.57E-02	9.769E-01	1.864E+02	0.753
α_3	2.61E-08	1.63E-03	2.83E-04	7.92E-03	2.487E-01	1.521E+02	0.927

CCCG = 4, Gamma = 0.211

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9802984	0.9915892	0.9928867	0.9984440	2.425E+02	2.057E+00	--
α_2	6.23E-04	5.65E-03	4.42E-03	1.49E-02	1.442E+00	2.538E+02	0.774
α_3	2.28E-06	1.82E-03	6.85E-04	7.50E-03	4.114E-01	2.252E+02	0.876
α_4	1.23E-09	9.37E-04	1.02E-04	4.81E-03	2.036E-01	2.171E+02	0.909

CCCG = 5, Gamma = 0.213

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9835062	0.9916525	0.9923832	0.9973026	4.375E+02	3.683E+00	--
α_2	1.03E-03	5.02E-03	4.30E-03	1.15E-02	2.243E+00	4.445E+02	0.831
α_3	1.06E-04	2.11E-03	1.46E-03	6.34E-03	9.912E-01	4.685E+02	0.791
α_4	6.64E-07	9.74E-04	3.29E-04	4.13E-03	3.765E-01	3.863E+02	0.960
α_5	2.10E-21	2.42E-04	1.38E-07	1.40E-03	7.237E-02	2.992E+02	1.241

CCCG = 6, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9835186	0.9913954	0.9920666	0.9969793	4.769E+02	4.139E+00	--
α_2	8.71E-04	4.53E-03	3.85E-03	1.05E-02	2.128E+00	4.676E+02	0.904
α_3	1.46E-04	2.12E-03	1.54E-03	6.08E-03	1.134E+00	5.328E+02	0.796
α_4	7.32E-06	1.12E-03	5.56E-04	4.15E-03	5.533E-01	4.930E+02	0.861
α_5	2.11E-09	5.42E-04	7.23E-05	2.72E-03	2.210E-01	4.075E+02	1.042
α_6	3.66E-16	2.87E-04	2.00E-06	1.67E-03	1.027E-01	3.574E+02	1.188

CCCG = 7, Gamma = 0.216

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9864901	0.9921473	0.9925442	0.9964493	8.127E+02	6.432E+00	--
α_2	9.34E-04	3.59E-03	3.18E-03	7.65E-03	2.840E+00	7.878E+02	0.900
α_3	3.05E-04	2.05E-03	1.68E-03	5.08E-03	1.746E+00	8.486E+02	0.837
α_4	7.61E-05	1.22E-03	8.74E-04	3.56E-03	1.084E+00	8.860E+02	0.802
α_5	3.71E-06	6.52E-04	3.16E-04	2.44E-03	5.376E-01	8.243E+02	0.862
α_6	2.51E-10	2.86E-04	2.89E-05	1.48E-03	1.979E-01	6.911E+02	1.029
α_7	1.06E-52	4.74E-05	4.75E-15	1.62E-04	2.656E-02	5.604E+02	1.269

CCCG = 8, Gamma = 0.217

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9863294	0.9921462	0.9925638	0.9965374	7.721E+02	6.112E+00	--
α_2	6.73E-04	3.11E-03	2.69E-03	6.99E-03	2.364E+00	7.579E+02	0.940
α_3	2.35E-04	1.98E-03	1.56E-03	5.13E-03	1.512E+00	7.635E+02	0.934
α_4	7.34E-05	1.25E-03	8.87E-04	3.68E-03	1.056E+00	8.426E+02	0.847
α_5	1.22E-05	8.03E-04	4.57E-04	2.77E-03	6.745E-01	8.394E+02	0.850
α_6	5.35E-08	3.98E-04	1.01E-04	1.81E-03	3.076E-01	7.726E+02	0.924
α_7	1.23E-15	1.75E-04	1.73E-06	1.01E-03	1.093E-01	6.235E+02	1.146
α_8	2.16E-18	1.40E-04	3.89E-07	8.17E-04	8.885E-02	6.339E+02	1.127

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.93E-01	9.92E-01	9.92E-01	9.91E-01	9.92E-01	9.92E-01
α_2	7.88E-03	5.21E-03	5.65E-03	5.02E-03	4.53E-03	3.59E-03	3.11E-03
α_3		1.63E-03	1.82E-03	2.11E-03	2.12E-03	2.05E-03	1.98E-03
α_4			9.37E-04	9.74E-04	1.12E-03	1.22E-03	1.25E-03
α_5				2.42E-04	5.42E-04	6.52E-04	8.03E-04
α_6					2.87E-04	2.86E-04	3.98E-04
α_7						4.74E-05	1.75E-04
α_8							1.40E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.93E-01	9.92E-01	9.92E-01	9.91E-01	9.92E-01	9.92E-01
Beta	7.88E-03	6.85E-03	8.41E-03	8.35E-03	8.60E-03	7.85E-03	7.85E-03
Gamma		2.38E-01	3.28E-01	3.99E-01	4.73E-01	5.43E-01	6.04E-01
Delta			3.39E-01	3.65E-01	4.79E-01	5.18E-01	5.83E-01
Epsilon				1.99E-01	4.25E-01	4.46E-01	5.48E-01
Mu					3.46E-01	3.39E-01	4.70E-01
Omega						1.42E-01	4.42E-01
Sigma							4.44E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.80	10.20	13.60	17.00	20.40	23.80	27.20
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 15.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.302

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9385729	0.9845000	0.9934775	0.9999654	2.857E+01	4.498E-01	--
α_2	3.46E-05	1.55E-02	6.52E-03	6.14E-02	4.498E-01	2.857E+01	0.833

CCCG = 3, Gamma = 0.308

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9487884	0.9817277	0.9864217	0.9986121	6.331E+01	1.178E+00	--
α_2	6.15E-04	1.39E-02	9.48E-03	4.23E-02	9.387E-01	6.656E+01	0.753
α_3	4.59E-08	4.37E-03	7.06E-04	2.14E-02	2.396E-01	5.464E+01	0.927

CCCG = 4, Gamma = 0.312

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9491612	0.9787166	0.9821828	0.9964120	8.730E+01	1.898E+00	--
α_2	1.24E-03	1.38E-02	1.05E-02	3.75E-02	1.285E+00	9.214E+01	0.774
α_3	4.39E-06	4.75E-03	1.70E-03	1.99E-02	3.927E-01	8.220E+01	0.876
α_4	1.07E-08	2.77E-03	3.71E-04	1.39E-02	2.207E-01	7.931E+01	0.909

CCCG = 5, Gamma = 0.315

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9562703	0.9780545	0.9800192	0.9931229	1.562E+02	3.506E+00	--
α_2	2.20E-03	1.23E-02	1.04E-02	2.91E-02	1.992E+00	1.596E+02	0.831
α_3	3.92E-04	6.35E-03	4.55E-03	1.85E-02	1.078E+00	1.687E+02	0.791
α_4	1.36E-06	2.60E-03	8.41E-04	1.11E-02	3.632E-01	1.395E+02	0.960
α_5	6.19E-21	6.70E-04	3.88E-07	3.88E-03	7.248E-02	1.082E+02	1.241

CCCG = 6, Gamma = 0.317

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9580211	0.9778991	0.9795551	0.9921183	1.858E+02	4.199E+00	--
α_2	1.82E-03	1.05E-02	8.83E-03	2.51E-02	1.941E+00	1.821E+02	0.904
α_3	6.09E-04	6.37E-03	4.88E-03	1.72E-02	1.332E+00	2.079E+02	0.796
α_4	3.43E-05	3.20E-03	1.72E-03	1.14E-02	6.181E-01	1.928E+02	0.861
α_5	9.93E-09	1.45E-03	2.15E-04	7.17E-03	2.313E-01	1.596E+02	1.042
α_6	5.00E-20	5.48E-04	5.17E-07	3.19E-03	7.684E-02	1.400E+02	1.188

CCCG = 7, Gamma = 0.319

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9627563	0.9784289	0.9795255	0.9903560	2.823E+02	6.223E+00	--
α_2	2.33E-03	9.55E-03	8.40E-03	2.07E-02	2.654E+00	2.754E+02	0.900
α_3	7.50E-04	5.50E-03	4.45E-03	1.39E-02	1.645E+00	2.974E+02	0.837
α_4	2.38E-04	3.57E-03	2.59E-03	1.03E-02	1.115E+00	3.109E+02	0.802
α_5	2.01E-05	2.08E-03	1.10E-03	7.46E-03	6.034E-01	2.895E+02	0.862
α_6	1.30E-10	7.32E-04	5.46E-05	3.89E-03	1.780E-01	2.429E+02	1.029
α_7	7.56E-51	1.39E-04	2.85E-14	4.90E-04	2.734E-02	1.971E+02	1.269

CCCG = 8, Gamma = 0.321

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9624031	0.9782046	0.9793081	0.9902372	2.803E+02	6.246E+00	--
α_2	2.07E-03	8.96E-03	7.81E-03	1.97E-02	2.504E+00	2.771E+02	0.940
α_3	5.41E-04	5.04E-03	3.93E-03	1.34E-02	1.419E+00	2.799E+02	0.934
α_4	1.82E-04	3.31E-03	2.32E-03	9.81E-03	1.027E+00	3.092E+02	0.847
α_5	4.89E-05	2.38E-03	1.42E-03	7.94E-03	7.337E-01	3.082E+02	0.850
α_6	1.39E-06	1.40E-03	5.05E-04	5.82E-03	3.975E-01	2.838E+02	0.924
α_7	3.36E-20	3.36E-04	3.23E-07	1.95E-03	7.703E-02	2.292E+02	1.146
α_8	3.48E-18	3.75E-04	9.38E-07	2.19E-03	8.749E-02	2.331E+02	1.127

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.82E-01	9.79E-01	9.78E-01	9.78E-01	9.78E-01	9.78E-01
α_2	1.55E-02	1.39E-02	1.38E-02	1.23E-02	1.05E-02	9.55E-03	8.96E-03
α_3		4.37E-03	4.75E-03	6.35E-03	6.37E-03	5.50E-03	5.04E-03
α_4			2.77E-03	2.60E-03	3.20E-03	3.57E-03	3.31E-03
α_5				6.70E-04	1.45E-03	2.08E-03	2.38E-03
α_6					5.48E-04	7.32E-04	1.40E-03
α_7						1.39E-04	3.36E-04
α_8							3.75E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.82E-01	9.79E-01	9.78E-01	9.78E-01	9.78E-01	9.78E-01
Beta	1.55E-02	1.83E-02	2.13E-02	2.19E-02	2.21E-02	2.16E-02	2.18E-02
Gamma		2.39E-01	3.54E-01	4.38E-01	5.23E-01	5.58E-01	5.89E-01
Delta			3.69E-01	3.40E-01	4.49E-01	5.43E-01	6.07E-01
Epsilon				2.05E-01	3.84E-01	4.52E-01	5.75E-01
Mu					2.75E-01	2.95E-01	4.70E-01
Omega						1.59E-01	3.37E-01
Sigma							5.28E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	10.07	15.10	20.13	25.17	30.20	35.23	40.27
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 4.1

Total Number of Common-Cause Failure Events: 3

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7089782	0.8757709	0.8938748	0.9803243	1.208E+01	1.713E+00	--
α_2	1.97E-02	1.24E-01	1.06E-01	2.91E-01	1.713E+00	1.208E+01	0.833

CCCG = 3, Gamma = 0.165

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7721415	0.8867186	0.8965708	0.9675047	2.317E+01	2.960E+00	--
α_2	8.39E-03	5.80E-02	4.80E-02	1.42E-01	1.667E+00	2.709E+01	0.753
α_3	5.22E-03	5.53E-02	4.31E-02	1.47E-01	1.293E+00	2.209E+01	0.927

CCCG = 4, Gamma = 0.155

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8053253	0.8945947	0.9012363	0.9611193	3.538E+01	4.169E+00	--
α_2	1.17E-02	5.42E-02	4.73E-02	1.20E-01	2.289E+00	3.991E+01	0.774
α_3	2.18E-03	3.05E-02	2.26E-02	8.60E-02	1.139E+00	3.617E+01	0.876
α_4	4.50E-04	2.06E-02	1.26E-02	6.81E-02	7.414E-01	3.518E+01	0.909

CCCG = 5, Gamma = 0.147

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8659779	0.9202882	0.9237218	0.9628602	7.489E+01	6.487E+00	--
α_2	1.14E-02	3.84E-02	3.48E-02	7.78E-02	3.229E+00	8.079E+01	0.831
α_3	3.89E-03	2.22E-02	1.87E-02	5.24E-02	1.957E+00	8.634E+01	0.791
α_4	7.06E-04	1.37E-02	9.57E-03	4.08E-02	9.965E-01	7.172E+01	0.960
α_5	6.80E-07	5.42E-03	1.37E-03	2.46E-02	3.049E-01	5.598E+01	1.241

CCCG = 6, Gamma = 0.140

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8761465	0.9243883	0.9272819	0.9627407	9.014E+01	7.373E+00	--
α_2	8.11E-03	3.03E-02	2.71E-02	6.36E-02	2.882E+00	9.213E+01	0.904
α_3	4.90E-03	2.21E-02	1.93E-02	4.92E-02	2.390E+00	1.056E+02	0.796
α_4	1.11E-03	1.27E-02	9.60E-03	3.48E-02	1.266E+00	9.857E+01	0.861
α_5	9.45E-05	7.73E-03	4.27E-03	2.71E-02	6.373E-01	8.183E+01	1.042
α_6	2.40E-09	2.74E-03	2.78E-04	1.42E-02	1.978E-01	7.212E+01	1.188

CCCG = 7, Gamma = 0.135

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9041626	0.9384740	0.9403305	0.9664443	1.474E+02	9.661E+00	--
α_2	5.92E-03	2.07E-02	1.86E-02	4.26E-02	3.131E+00	1.481E+02	0.900
α_3	5.04E-03	1.84E-02	1.64E-02	3.83E-02	2.989E+00	1.597E+02	0.837
α_4	1.76E-03	1.09E-02	9.04E-03	2.64E-02	1.850E+00	1.679E+02	0.802
α_5	4.80E-04	7.10E-03	5.16E-03	2.04E-02	1.121E+00	1.567E+02	0.862
α_6	1.26E-05	3.68E-03	1.64E-03	1.42E-02	4.866E-01	1.318E+02	1.029
α_7	1.55E-18	7.80E-04	1.41E-06	4.55E-03	8.362E-02	1.071E+02	1.269

CCCG = 8, Gamma = 0.131

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9125799	0.9422912	0.9437965	0.9668624	1.841E+02	1.128E+01	--
α_2	4.72E-03	1.65E-02	1.49E-02	3.40E-02	3.139E+00	1.868E+02	0.940
α_3	4.63E-03	1.63E-02	1.46E-02	3.36E-02	3.116E+00	1.880E+02	0.934
α_4	2.30E-03	1.09E-02	9.39E-03	2.46E-02	2.297E+00	2.085E+02	0.847
α_5	7.59E-04	6.87E-03	5.38E-03	1.81E-02	1.443E+00	2.084E+02	0.850
α_6	1.82E-04	4.66E-03	3.10E-03	1.45E-02	9.000E-01	1.922E+02	0.924
α_7	6.54E-07	2.17E-03	6.37E-04	9.54E-03	3.381E-01	1.554E+02	1.146
α_8	6.23E-33	2.76E-04	4.76E-10	1.39E-03	4.370E-02	1.583E+02	1.127

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	8.76E-01	8.87E-01	8.95E-01	9.20E-01	9.24E-01	9.38E-01	9.42E-01
α_2	1.24E-01	5.80E-02	5.42E-02	3.84E-02	3.03E-02	2.07E-02	1.65E-02
α_3		5.53E-02	3.05E-02	2.22E-02	2.21E-02	1.84E-02	1.63E-02
α_4			2.06E-02	1.37E-02	1.27E-02	1.09E-02	1.09E-02
α_5				5.42E-03	7.73E-03	7.10E-03	6.87E-03
α_6					2.74E-03	3.68E-03	4.66E-03
α_7						7.80E-04	2.17E-03
α_8							2.76E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	8.76E-01	8.87E-01	8.95E-01	9.20E-01	9.24E-01	9.38E-01	9.42E-01
Beta	1.24E-01	1.13E-01	1.05E-01	7.97E-02	7.56E-02	6.15E-02	5.77E-02
Gamma		4.88E-01	4.85E-01	5.18E-01	5.99E-01	6.64E-01	7.14E-01
Delta			4.03E-01	4.63E-01	5.11E-01	5.50E-01	6.04E-01
Epsilon				2.83E-01	4.52E-01	5.15E-01	5.62E-01
Mu					2.61E-01	3.86E-01	5.08E-01
Omega						1.75E-01	3.44E-01
Sigma							1.13E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.73	4.10	5.47	6.83	8.20	9.57	10.93
N_1	2.0000	2.0000	2.0000	1.8750	1.6875	1.4766	1.2656
N_2	1.3333	1.0000	1.2500	1.4375	1.5469	1.5820	1.5557
N_3		1.0000	0.7500	0.7500	0.8594	1.0000	1.1299

N₄			0.5000	0.5625	0.5469	0.5625	0.6250
N₅				0.2500	0.3906	0.4297	0.4316
N₆					0.1250	0.2539	0.3291
N₇						0.0625	0.1572
N₈							0.0313

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 12.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.240

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9529761	0.9879589	0.9947336	0.9999653	3.861E+01	4.706E-01	--
α_2	3.47E-05	1.20E-02	5.27E-03	4.70E-02	4.706E-01	3.861E+01	0.833

CCCG = 3, Gamma = 0.245

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9659044	0.9881512	0.9914202	0.9992255	9.194E+01	1.103E+00	--
α_2	2.36E-04	8.21E-03	5.21E-03	2.64E-02	8.104E-01	9.790E+01	0.753
α_3	3.06E-07	3.64E-03	8.55E-04	1.68E-02	2.921E-01	7.997E+01	0.927

CCCG = 4, Gamma = 0.248

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9711639	0.9878700	0.9898244	0.9978923	1.590E+02	1.953E+00	--
α_2	7.25E-04	7.78E-03	5.94E-03	2.11E-02	1.312E+00	1.673E+02	0.774
α_3	4.85E-06	2.89E-03	1.14E-03	1.17E-02	4.307E-01	1.487E+02	0.876
α_4	2.91E-09	1.46E-03	1.73E-04	7.44E-03	2.099E-01	1.434E+02	0.909

CCCG = 5, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9764444	0.9886136	0.9897843	0.9967816	2.697E+02	3.107E+00	--
α_2	8.54E-04	6.05E-03	4.92E-03	1.51E-02	1.684E+00	2.766E+02	0.831
α_3	1.42E-04	3.22E-03	2.18E-03	9.84E-03	9.426E-01	2.916E+02	0.791
α_4	1.19E-06	1.58E-03	5.45E-04	6.69E-03	3.816E-01	2.405E+02	0.960
α_5	2.12E-16	5.29E-04	2.90E-06	3.08E-03	9.865E-02	1.864E+02	1.241

CCCG = 6, Gamma = 0.252

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9783279	0.9889112	0.9898422	0.9963135	3.409E+02	3.822E+00	--
α_2	7.38E-04	5.10E-03	4.16E-03	1.27E-02	1.714E+00	3.343E+02	0.904
α_3	1.90E-04	2.90E-03	2.09E-03	8.37E-03	1.108E+00	3.808E+02	0.796
α_4	2.43E-05	1.84E-03	1.03E-03	6.44E-03	6.509E-01	3.524E+02	0.861
α_5	1.72E-08	8.69E-04	1.57E-04	4.19E-03	2.536E-01	2.914E+02	1.042
α_6	6.07E-17	3.74E-04	1.70E-06	2.18E-03	9.572E-02	2.557E+02	1.188

CCCG = 7, Gamma = 0.254

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9813601	0.9896887	0.9903295	0.9958290	4.986E+02	5.195E+00	--
α_2	8.20E-04	4.32E-03	3.67E-03	1.01E-02	2.105E+00	4.849E+02	0.900
α_3	2.36E-04	2.52E-03	1.92E-03	6.85E-03	1.320E+00	5.225E+02	0.837
α_4	9.29E-05	1.82E-03	1.26E-03	5.47E-03	9.967E-01	5.455E+02	0.802
α_5	5.22E-06	1.03E-03	4.91E-04	3.90E-03	5.249E-01	5.076E+02	0.862
α_6	3.41E-10	4.59E-04	4.49E-05	2.38E-03	1.956E-01	4.257E+02	1.029
α_7	4.37E-28	1.53E-04	3.47E-09	8.32E-04	5.291E-02	3.452E+02	1.269

CCCG = 8, Gamma = 0.255

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9817049	0.9895958	0.9901724	0.9955178	5.547E+02	5.832E+00	--
α_2	8.27E-04	4.08E-03	3.49E-03	9.33E-03	2.229E+00	5.445E+02	0.940
α_3	1.97E-04	2.29E-03	1.72E-03	6.32E-03	1.260E+00	5.489E+02	0.934
α_4	9.76E-05	1.72E-03	1.21E-03	5.07E-03	1.042E+00	6.056E+02	0.847
α_5	2.96E-05	1.26E-03	7.72E-04	4.16E-03	7.626E-01	6.033E+02	0.850
α_6	1.35E-07	5.89E-04	1.64E-04	2.62E-03	3.271E-01	5.554E+02	0.924
α_7	2.90E-13	3.00E-04	8.03E-06	1.68E-03	1.344E-01	4.483E+02	1.146
α_8	1.52E-20	1.68E-04	1.58E-07	9.78E-04	7.682E-02	4.558E+02	1.127

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01
α_2	1.20E-02	8.21E-03	7.78E-03	6.05E-03	5.10E-03	4.32E-03	4.08E-03
α_3		3.64E-03	2.89E-03	3.22E-03	2.90E-03	2.52E-03	2.29E-03
α_4			1.46E-03	1.58E-03	1.84E-03	1.82E-03	1.72E-03
α_5				5.29E-04	8.69E-04	1.03E-03	1.26E-03
α_6					3.74E-04	4.59E-04	5.89E-04
α_7						1.53E-04	3.00E-04
α_8							1.68E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01
Beta	1.20E-02	1.18E-02	1.21E-02	1.14E-02	1.11E-02	1.03E-02	1.04E-02
Gamma		3.07E-01	3.59E-01	4.69E-01	5.40E-01	5.81E-01	6.08E-01
Delta			3.36E-01	3.96E-01	5.16E-01	5.79E-01	6.38E-01
Epsilon				2.50E-01	4.03E-01	4.74E-01	5.75E-01
Mu					3.01E-01	3.72E-01	4.56E-01
Omega						2.50E-01	4.43E-01
Sigma							3.60E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.00	12.00	16.00	20.00	24.00	28.00	32.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 3.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.072

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9857830	0.9963113	0.9983344	0.9999864	1.332E+02	4.932E-01	--
α_2	1.36E-05	3.69E-03	1.67E-03	1.42E-02	4.932E-01	1.332E+02	0.833

CCCG = 3, Gamma = 0.073

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9900052	0.9965892	0.9975777	0.9997981	3.096E+02	1.059E+00	--
α_2	3.99E-05	2.14E-03	1.26E-03	7.22E-03	7.137E-01	3.332E+02	0.753
α_3	4.58E-07	1.27E-03	3.85E-04	5.56E-03	3.458E-01	2.712E+02	0.927

CCCG = 4, Gamma = 0.074

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9918983	0.9965188	0.9970463	0.9993362	6.053E+02	2.115E+00	--
α_2	3.03E-04	2.45E-03	1.95E-03	6.30E-03	1.549E+00	6.310E+02	0.774
α_3	1.48E-08	4.73E-04	9.25E-05	2.25E-03	2.646E-01	5.589E+02	0.876
α_4	6.18E-08	5.59E-04	1.37E-04	2.55E-03	3.010E-01	5.381E+02	0.909

CCCG = 5, Gamma = 0.075

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9943437	0.9968593	0.9970524	0.9987155	1.690E+03	5.325E+00	--
α_2	6.83E-04	2.14E-03	1.95E-03	4.26E-03	3.632E+00	1.692E+03	0.831
α_3	7.46E-05	7.60E-04	5.83E-04	2.05E-03	1.354E+00	1.781E+03	0.791
α_4	1.91E-08	2.02E-04	4.82E-05	9.27E-04	2.961E-01	1.467E+03	0.960
α_5	1.11E-34	3.73E-05	4.11E-11	1.85E-04	4.243E-02	1.136E+03	1.241

CCCG = 6, Gamma = 0.076

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9937235	0.9965788	0.9968054	0.9986603	1.438E+03	4.936E+00	--
α_2	5.50E-04	2.07E-03	1.84E-03	4.37E-03	2.915E+00	1.407E+03	0.904
α_3	6.69E-05	7.84E-04	5.89E-04	2.17E-03	1.257E+00	1.601E+03	0.796
α_4	1.38E-06	3.40E-04	1.55E-04	1.30E-03	5.031E-01	1.481E+03	0.861
α_5	2.73E-15	9.44E-05	1.25E-06	5.41E-04	1.155E-01	1.224E+03	1.042
α_6	6.32E-13	1.35E-04	4.95E-06	7.49E-04	1.451E-01	1.073E+03	1.188

CCCG = 7, Gamma = 0.076

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9951695	0.9969432	0.9970475	0.9983612	3.149E+03	9.654E+00	--
α_2	6.17E-04	1.59E-03	1.49E-03	2.94E-03	4.851E+00	3.041E+03	0.900
α_3	2.19E-04	8.55E-04	7.56E-04	1.83E-03	2.800E+00	3.273E+03	0.837
α_4	4.14E-05	4.05E-04	3.13E-04	1.08E-03	1.384E+00	3.416E+03	0.802
α_5	5.46E-07	1.54E-04	6.90E-05	5.97E-04	4.902E-01	3.177E+03	0.862
α_6	1.02E-15	4.30E-05	5.45E-07	2.47E-04	1.146E-01	2.663E+03	1.029
α_7	3.57E-93	6.78E-06	7.22E-25	8.06E-06	1.464E-02	2.159E+03	1.269

CCCG = 8, Gamma = 0.076

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9946492	0.9968197	0.9969658	0.9984915	2.240E+03	7.148E+00	--
α_2	3.65E-04	1.35E-03	1.20E-03	2.83E-03	2.980E+00	2.208E+03	0.940
α_3	1.53E-04	8.81E-04	7.37E-04	2.10E-03	1.960E+00	2.223E+03	0.934
α_4	3.47E-05	4.75E-04	3.48E-04	1.35E-03	1.166E+00	2.452E+03	0.847
α_5	1.25E-06	2.20E-04	1.06E-04	8.24E-04	5.375E-01	2.443E+03	0.850
α_6	1.77E-11	8.03E-05	6.23E-06	4.25E-04	1.805E-01	2.248E+03	0.924
α_7	1.18E-35	2.28E-05	1.71E-11	1.12E-04	4.139E-02	1.813E+03	1.146
α_8	9.35E-09	1.53E-04	3.38E-05	7.15E-04	2.827E-01	1.844E+03	1.127

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	3.69E-03	2.14E-03	2.45E-03	2.14E-03	2.07E-03	1.59E-03	1.35E-03
α_3		1.27E-03	4.73E-04	7.60E-04	7.84E-04	8.55E-04	8.81E-04
α_4			5.59E-04	2.02E-04	3.40E-04	4.05E-04	4.75E-04
α_5				3.73E-05	9.44E-05	1.54E-04	2.20E-04
α_6					1.35E-04	4.30E-05	8.03E-05
α_7						6.78E-06	2.28E-05
α_8							1.53E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	3.69E-03	3.41E-03	3.48E-03	3.14E-03	3.42E-03	3.06E-03	3.18E-03
Gamma		3.73E-01	2.97E-01	3.18E-01	3.96E-01	4.79E-01	5.76E-01
Delta			5.42E-01	2.39E-01	4.21E-01	4.16E-01	5.19E-01
Epsilon				1.56E-01	4.03E-01	3.35E-01	5.01E-01
Mu					5.89E-01	2.44E-01	5.38E-01
Omega						1.36E-01	6.87E-01
Sigma							8.70E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.40	3.60	4.80	6.00	7.20	8.40	9.60
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.8.3 SSW-MDP-FS: Standby Service Water Motor-Driven Pumps Fail to Start

Generic CCF Parameters

System Group: Raw Water
 System: Standby Service Water
 Component Group: Pump
 Component Type: Motor Driven Pump
 Component Subtype: Centrifugal
 Failure Mode: Fail to Start
 Date Range: 2006 through 2020
 Prior: Default 2015

Total Number of Independent Failure Events: 109.0

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9656911	0.9906008	0.9951861	0.9999300	0.9973182	6.004E+01	5.697E-01
α_2	7.12E-05	9.40E-03	4.81E-03	3.43E-02	2.68E-03	5.697E-01	6.004E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9674143	0.9876108	0.9902942	0.9986462	0.9946220	1.141E+02	1.432E+00
α_2	7.22E-04	9.99E-03	7.34E-03	2.83E-02	5.38E-03	1.155E+00	1.144E+02
α_3	1.19E-07	2.40E-03	5.11E-04	1.12E-02	0.00E+00	2.768E-01	1.153E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9671762	0.9850816	0.9869669	0.9965536	0.9919112	1.651E+02	2.501E+00
α_2	1.82E-03	1.11E-02	9.26E-03	2.69E-02	8.09E-03	1.867E+00	1.658E+02
α_3	2.60E-06	2.40E-03	8.80E-04	9.95E-03	0.00E+00	4.024E-01	1.672E+02
α_4	9.56E-09	1.38E-03	2.05E-04	6.84E-03	0.00E+00	2.315E-01	1.674E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9718397	0.9851419	0.9862489	0.9946551	0.9909709	2.836E+02	4.277E+00
α_2	2.31E-03	9.33E-03	8.22E-03	2.01E-02	8.14E-03	2.686E+00	2.852E+02
α_3	2.71E-04	3.93E-03	2.86E-03	1.13E-02	8.90E-04	1.132E+00	2.868E+02
α_4	1.01E-06	1.33E-03	4.57E-04	5.60E-03	0.00E+00	3.822E-01	2.875E+02
α_5	2.31E-20	2.67E-04	2.48E-07	1.55E-03	0.00E+00	7.674E-02	2.878E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9735205	0.9855114	0.9864476	0.9942942	0.9901160	3.362E+02	4.943E+00
α_2	1.86E-03	7.70E-03	6.77E-03	1.68E-02	8.27E-03	2.629E+00	3.385E+02
α_3	4.07E-04	4.03E-03	3.11E-03	1.08E-02	1.49E-03	1.374E+00	3.398E+02

α_4	1.81E-05	1.79E-03	9.53E-04	6.39E-03	1.24E-04	6.098E-01	3.406E+02
α_5	2.54E-09	6.48E-04	8.66E-05	3.25E-03	0.00E+00	2.211E-01	3.409E+02
α_6	2.53E-15	3.22E-04	3.26E-06	1.86E-03	0.00E+00	1.098E-01	3.411E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9764294	0.9859555	0.9865861	0.9933217	0.9893627	5.010E+02	7.136E+00
α_2	1.97E-03	6.58E-03	5.94E-03	1.34E-02	8.41E-03	3.342E+00	5.048E+02
α_3	6.07E-04	3.70E-03	3.07E-03	8.93E-03	1.91E-03	1.878E+00	5.062E+02
α_4	1.49E-04	2.21E-03	1.60E-03	6.35E-03	3.01E-04	1.122E+00	5.070E+02
α_5	8.23E-06	1.12E-03	5.65E-04	4.10E-03	1.77E-05	5.677E-01	5.075E+02
α_6	2.07E-10	3.77E-04	3.48E-05	1.96E-03	0.00E+00	1.916E-01	5.079E+02
α_7	4.69E-41	6.85E-05	2.55E-12	3.00E-04	0.00E+00	3.480E-02	5.081E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9773620	0.9864001	0.9869890	0.9934256	0.9887054	5.373E+02	7.408E+00
α_2	1.79E-03	6.04E-03	5.45E-03	1.23E-02	8.54E-03	3.290E+00	5.414E+02
α_3	4.58E-04	3.15E-03	2.57E-03	7.85E-03	2.20E-03	1.718E+00	5.430E+02
α_4	1.45E-04	2.09E-03	1.52E-03	5.97E-03	4.99E-04	1.136E+00	5.436E+02
α_5	2.40E-05	1.31E-03	7.68E-04	4.42E-03	5.70E-05	7.111E-01	5.440E+02
α_6	2.54E-07	6.43E-04	1.97E-04	2.79E-03	2.59E-06	3.501E-01	5.444E+02
α_7	9.68E-16	1.98E-04	1.82E-06	1.14E-03	0.00E+00	1.078E-01	5.446E+02
α_8	2.02E-17	1.74E-04	7.36E-07	1.01E-03	0.00E+00	9.469E-02	5.446E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.88E-01	9.85E-01	9.85E-01	9.86E-01	9.86E-01	9.86E-01
α_2	9.40E-03	9.99E-03	1.11E-02	9.33E-03	7.70E-03	6.58E-03	6.04E-03
α_3		2.40E-03	2.40E-03	3.93E-03	4.03E-03	3.70E-03	3.15E-03
α_4			1.38E-03	1.33E-03	1.79E-03	2.21E-03	2.09E-03
α_5				2.67E-04	6.48E-04	1.12E-03	1.31E-03
α_6					3.22E-04	3.77E-04	6.43E-04
α_7						6.85E-05	1.98E-04
α_8							1.74E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.88E-01	9.85E-01	9.85E-01	9.86E-01	9.86E-01	9.86E-01
Beta	9.40E-03	1.24E-02	1.49E-02	1.49E-02	1.45E-02	1.40E-02	1.36E-02
Gamma		1.93E-01	2.53E-01	3.72E-01	4.68E-01	5.32E-01	5.56E-01
Delta			3.65E-01	2.88E-01	4.06E-01	5.05E-01	5.83E-01
Epsilon				1.67E-01	3.52E-01	4.14E-01	5.27E-01
Mu					3.32E-01	2.85E-01	4.37E-01
Omega						1.54E-01	3.66E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	36.33	54.50	72.67	90.83	109.00	127.17	145.33
N₁	1.2976	1.6429	1.7857	1.9345	2.0060	2.0127	1.9645
N₂	0.1012	0.3036	0.6071	0.7619	0.9276	1.0984	1.2716
N₃		0.0000	0.0000	0.0833	0.1667	0.2488	0.3279
N₄			0.0000	0.0000	0.0139	0.0394	0.0743
N₅				0.0000	0.0000	0.0023	0.0085
N₆					0.0000	0.0000	0.0004
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 41.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.362

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9789830	0.9945820	0.9975922	0.9999821	8.874E+01	4.834E-01	--
α_2	1.79E-05	5.42E-03	2.41E-03	2.10E-02	4.834E-01	8.874E+01	0.650

CCCG = 3, Gamma = 0.363

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9824065	0.9936748	0.9952720	0.9994846	1.925E+02	1.226E+00	--
α_2	2.54E-04	5.23E-03	3.60E-03	1.58E-02	9.769E-01	1.858E+02	0.811
α_3	1.75E-08	1.10E-03	1.90E-04	5.31E-03	2.487E-01	2.269E+02	0.667

CCCG = 4, Gamma = 0.364

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9809277	0.9918588	0.9931153	0.9984941	2.506E+02	2.057E+00	--
α_2	6.71E-04	6.08E-03	4.76E-03	1.60E-02	1.442E+00	2.357E+02	0.891
α_3	1.71E-06	1.36E-03	5.12E-04	5.61E-03	4.114E-01	3.011E+02	0.701
α_4	9.12E-10	6.96E-04	7.58E-05	3.57E-03	2.036E-01	2.924E+02	0.722

CCCG = 5, Gamma = 0.365

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9828727	0.9913309	0.9920893	0.9971983	4.212E+02	3.683E+00	--
α_2	1.15E-03	5.63E-03	4.83E-03	1.29E-02	2.243E+00	3.962E+02	0.975
α_3	1.06E-04	2.11E-03	1.46E-03	6.34E-03	9.912E-01	4.681E+02	0.828
α_4	5.27E-07	7.73E-04	2.61E-04	3.28E-03	3.765E-01	4.865E+02	0.798
α_5	1.32E-21	1.53E-04	8.70E-08	8.82E-04	7.237E-02	4.739E+02	0.820

CCCG = 6, Gamma = 0.366

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9833452	0.9913046	0.9919828	0.9969474	4.719E+02	4.139E+00	--
α_2	9.46E-04	4.92E-03	4.18E-03	1.14E-02	2.128E+00	4.306E+02	1.029
α_3	1.49E-04	2.16E-03	1.57E-03	6.20E-03	1.134E+00	5.229E+02	0.850
α_4	6.47E-06	9.91E-04	4.91E-04	3.67E-03	5.533E-01	5.579E+02	0.798
α_5	1.51E-09	3.88E-04	5.18E-05	1.95E-03	2.210E-01	5.691E+02	0.782
α_6	3.00E-16	2.35E-04	1.64E-06	1.36E-03	1.027E-01	4.363E+02	1.021

CCCG = 7, Gamma = 0.366

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9854585	0.9915463	0.9919731	0.9961767	7.544E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.850E+02	1.069
α_3	3.24E-04	2.18E-03	1.78E-03	5.40E-03	1.746E+00	7.987E+02	0.919
α_4	7.88E-05	1.26E-03	9.05E-04	3.68E-03	1.084E+00	8.559E+02	0.858
α_5	3.50E-06	6.15E-04	2.98E-04	2.30E-03	5.376E-01	8.740E+02	0.841
α_6	2.02E-10	2.30E-04	2.32E-05	1.19E-03	1.979E-01	8.615E+02	0.853
α_7	7.67E-53	3.43E-05	3.43E-15	1.17E-04	2.656E-02	7.753E+02	0.948

CCCG = 8, Gamma = 0.367

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9860414	0.9919804	0.9924066	0.9964640	7.560E+02	6.112E+00	--
α_2	7.69E-04	3.55E-03	3.07E-03	7.99E-03	2.364E+00	6.632E+02	1.115
α_3	2.26E-04	1.90E-03	1.50E-03	4.93E-03	1.512E+00	7.946E+02	0.932
α_4	7.21E-05	1.23E-03	8.72E-04	3.61E-03	1.056E+00	8.572E+02	0.864
α_5	1.14E-05	7.50E-04	4.27E-04	2.59E-03	6.745E-01	8.989E+02	0.825
α_6	4.56E-08	3.39E-04	8.62E-05	1.54E-03	3.076E-01	9.062E+02	0.818
α_7	8.89E-16	1.27E-04	1.25E-06	7.33E-04	1.093E-01	8.604E+02	0.862
α_8	1.88E-18	1.22E-04	3.38E-07	7.10E-04	8.885E-02	7.291E+02	1.017

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.94E-01	9.92E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01
α_2	5.42E-03	5.23E-03	6.08E-03	5.63E-03	4.92E-03	4.13E-03	3.55E-03
α_3		1.10E-03	1.36E-03	2.11E-03	2.16E-03	2.18E-03	1.90E-03
α_4			6.96E-04	7.73E-04	9.91E-04	1.26E-03	1.23E-03
α_5				1.53E-04	3.88E-04	6.15E-04	7.50E-04
α_6					2.35E-04	2.30E-04	3.39E-04
α_7						3.43E-05	1.27E-04
α_8							1.22E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.94E-01	9.92E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01
Beta	5.42E-03	6.33E-03	8.14E-03	8.67E-03	8.70E-03	8.45E-03	8.02E-03
Gamma		1.73E-01	2.53E-01	3.51E-01	4.35E-01	5.12E-01	5.57E-01
Delta			3.38E-01	3.05E-01	4.27E-01	4.96E-01	5.75E-01
Epsilon				1.65E-01	3.86E-01	4.10E-01	5.21E-01
Mu					3.77E-01	3.00E-01	4.40E-01
Omega						1.30E-01	4.23E-01
Sigma							4.90E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	13.67	20.50	27.33	34.17	41.00	47.83	54.67
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 20.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.201

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9404683	0.9840264	0.9921743	0.9999109	3.284E+01	5.331E-01	--
α_2	8.91E-05	1.60E-02	7.83E-03	5.95E-02	5.331E-01	3.284E+01	0.650

CCCG = 3, Gamma = 0.199

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9374280	0.9760961	0.9811783	0.9973695	5.832E+01	1.428E+00	--
α_2	1.59E-03	2.05E-02	1.53E-02	5.72E-02	1.189E+00	5.678E+01	0.811
α_3	3.56E-08	3.40E-03	5.48E-04	1.67E-02	2.396E-01	7.025E+01	0.667

CCCG = 4, Gamma = 0.198

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9331134	0.9697859	0.9736458	0.9932504	7.698E+01	2.398E+00	--
α_2	3.69E-03	2.37E-02	1.96E-02	5.77E-02	1.785E+00	7.344E+01	0.891
α_3	3.78E-06	4.11E-03	1.47E-03	1.71E-02	3.927E-01	9.524E+01	0.701
α_4	9.14E-09	2.38E-03	3.18E-04	1.19E-02	2.207E-01	9.260E+01	0.722

CCCG = 5, Gamma = 0.196

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9431160	0.9700198	0.9722455	0.9893162	1.350E+02	4.172E+00	--
α_2	4.70E-03	1.97E-02	1.73E-02	4.29E-02	2.575E+00	1.282E+02	0.975
α_3	5.50E-04	7.54E-03	5.55E-03	2.14E-02	1.161E+00	1.528E+02	0.828
α_4	1.19E-06	2.27E-03	7.35E-04	9.76E-03	3.632E-01	1.594E+02	0.798
α_5	4.30E-21	4.66E-04	2.70E-07	2.70E-03	7.248E-02	1.555E+02	0.820

CCCG = 6, Gamma = 0.195

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9460600	0.9701972	0.9720337	0.9880593	1.641E+02	5.040E+00	--
α_2	4.07E-03	1.69E-02	1.49E-02	3.68E-02	2.601E+00	1.511E+02	1.029
α_3	9.49E-04	8.05E-03	6.37E-03	2.09E-02	1.499E+00	1.846E+02	0.850
α_4	3.74E-05	3.19E-03	1.74E-03	1.12E-02	6.320E-01	1.977E+02	0.798
α_5	7.84E-09	1.14E-03	1.70E-04	5.67E-03	2.313E-01	2.019E+02	0.782
α_6	4.52E-20	4.96E-04	4.67E-07	2.88E-03	7.684E-02	1.549E+02	1.021

CCCG = 7, Gamma = 0.194

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9512683	0.9707499	0.9720103	0.9859267	2.402E+02	7.237E+00	--
α_2	4.56E-03	1.50E-02	1.36E-02	3.03E-02	3.377E+00	2.214E+02	1.069
α_3	1.21E-03	7.24E-03	6.03E-03	1.74E-02	1.894E+00	2.596E+02	0.919
α_4	2.96E-04	4.12E-03	3.02E-03	1.17E-02	1.154E+00	2.789E+02	0.858
α_5	2.08E-05	2.12E-03	1.13E-03	7.59E-03	6.057E-01	2.851E+02	0.841
α_6	1.12E-10	6.32E-04	4.71E-05	3.35E-03	1.780E-01	2.814E+02	0.853
α_7	5.88E-51	1.08E-04	2.22E-14	3.81E-04	2.734E-02	2.533E+02	0.948

CCCG = 8, Gamma = 0.193

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9517051	0.9708495	0.9720737	0.9858132	2.474E+02	7.428E+00	--
α_2	4.30E-03	1.45E-02	1.31E-02	2.96E-02	3.276E+00	2.221E+02	1.115
α_3	9.65E-04	6.48E-03	5.31E-03	1.60E-02	1.747E+00	2.679E+02	0.932
α_4	2.45E-04	3.79E-03	2.73E-03	1.10E-02	1.101E+00	2.896E+02	0.864
α_5	5.22E-05	2.44E-03	1.47E-03	8.11E-03	7.422E-01	3.039E+02	0.825
α_6	1.30E-06	1.30E-03	4.68E-04	5.39E-03	3.979E-01	3.066E+02	0.818
α_7	2.64E-20	2.64E-04	2.54E-07	1.54E-03	7.703E-02	2.913E+02	0.862
α_8	3.29E-18	3.54E-04	8.85E-07	2.07E-03	8.749E-02	2.469E+02	1.017

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.76E-01	9.70E-01	9.70E-01	9.70E-01	9.71E-01	9.71E-01
α_2	1.60E-02	2.05E-02	2.37E-02	1.97E-02	1.69E-02	1.50E-02	1.45E-02
α_3		3.40E-03	4.11E-03	7.54E-03	8.05E-03	7.24E-03	6.48E-03
α_4			2.38E-03	2.27E-03	3.19E-03	4.12E-03	3.79E-03
α_5				4.66E-04	1.14E-03	2.12E-03	2.44E-03
α_6					4.96E-04	6.32E-04	1.30E-03
α_7						1.08E-04	2.64E-04
α_8							3.54E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.76E-01	9.70E-01	9.70E-01	9.70E-01	9.71E-01	9.71E-01
Beta	1.60E-02	2.39E-02	3.02E-02	3.00E-02	2.98E-02	2.93E-02	2.92E-02
Gamma		1.42E-01	2.15E-01	3.43E-01	4.32E-01	4.86E-01	5.01E-01
Delta			3.67E-01	2.66E-01	3.75E-01	4.91E-01	5.57E-01
Epsilon				1.70E-01	3.40E-01	4.10E-01	5.35E-01
Mu					3.02E-01	2.59E-01	4.40E-01
Omega						1.46E-01	3.23E-01
Sigma							5.73E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.67	10.00	13.33	16.67	20.00	23.33	26.67
N ₁	0.8333	1.0000	1.0000	1.0417	1.0417	1.0127	0.9645
N ₂	0.0833	0.2500	0.5000	0.5833	0.6597	0.7234	0.7716
N ₃		0.0000	0.0000	0.0833	0.1667	0.2488	0.3279

N₄			0.0000	0.0000	0.0139	0.0394	0.0743
N₅				0.0000	0.0000	0.0023	0.0085
N₆					0.0000	0.0000	0.0004
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 5.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8578584	0.9659588	0.9876978	0.9999736	1.079E+01	3.801E-01	--
α_2	2.64E-05	3.40E-02	1.23E-02	1.42E-01	3.801E-01	1.079E+01	0.650

CCCG = 3, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8660580	0.9548654	0.9682580	0.9978153	2.031E+01	9.600E-01	--
α_2	5.02E-04	3.32E-02	1.94E-02	1.13E-01	6.673E-01	1.945E+01	0.811
α_3	1.05E-06	1.20E-02	2.87E-03	5.51E-02	2.927E-01	2.417E+01	0.667

CCCG = 4, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8723244	0.9479453	0.9570095	0.9924947	3.040E+01	1.669E+00	--
α_2	2.05E-03	3.51E-02	2.53E-02	1.02E-01	1.039E+00	2.855E+01	0.891
α_3	8.97E-06	1.03E-02	3.68E-03	4.32E-02	3.887E-01	3.723E+01	0.701
α_4	7.63E-08	6.61E-03	1.09E-03	3.24E-02	2.414E-01	3.627E+01	0.722

CCCG = 5, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9012027	0.9499667	0.9542244	0.9841645	6.621E+01	3.487E+00	--
α_2	4.36E-03	2.79E-02	2.31E-02	6.76E-02	1.791E+00	6.252E+01	0.975
α_3	1.27E-03	1.59E-02	1.19E-02	4.44E-02	1.207E+00	7.451E+01	0.828
α_4	9.77E-06	5.52E-03	2.21E-03	2.23E-02	4.340E-01	7.815E+01	0.798
α_5	1.59E-26	7.18E-04	2.56E-08	3.96E-03	5.493E-02	7.644E+01	0.820

CCCG = 6, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9135277	0.9549619	0.9584248	0.9845537	8.279E+01	3.905E+00	--
α_2	1.71E-03	1.76E-02	1.36E-02	4.73E-02	1.335E+00	7.452E+01	1.029
α_3	2.05E-03	1.67E-02	1.33E-02	4.28E-02	1.531E+00	9.032E+01	0.850
α_4	1.42E-04	7.35E-03	4.37E-03	2.47E-02	7.191E-01	9.717E+01	0.798
α_5	3.62E-08	2.47E-03	4.23E-04	1.20E-02	2.467E-01	9.955E+01	0.782
α_6	1.05E-20	9.52E-04	5.73E-07	5.52E-03	7.279E-02	7.642E+01	1.021

CCCG = 7, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9262759	0.9577727	0.9599909	0.9816899	1.309E+02	5.770E+00	--
α_2	1.62E-03	1.30E-02	1.04E-02	3.32E-02	1.549E+00	1.178E+02	1.069
α_3	2.55E-03	1.43E-02	1.21E-02	3.38E-02	1.989E+00	1.369E+02	0.919
α_4	7.78E-04	8.66E-03	6.57E-03	2.36E-02	1.287E+00	1.474E+02	0.858
α_5	7.60E-05	4.56E-03	2.64E-03	1.55E-02	6.913E-01	1.510E+02	0.841
α_6	1.15E-08	1.56E-03	2.34E-04	7.70E-03	2.327E-01	1.493E+02	0.853
α_7	1.07E-64	1.57E-04	2.38E-17	3.95E-04	2.112E-02	1.345E+02	0.948

CCCG = 8, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9354942	0.9614400	0.9631209	0.9816442	1.749E+02	7.016E+00	--
α_2	1.34E-03	1.04E-02	8.36E-03	2.65E-02	1.583E+00	1.503E+02	1.115
α_3	1.94E-03	1.09E-02	9.19E-03	2.59E-02	1.986E+00	1.797E+02	0.932
α_4	1.19E-03	8.53E-03	6.93E-03	2.14E-02	1.672E+00	1.942E+02	0.864
α_5	2.61E-04	4.92E-03	3.44E-03	1.47E-02	1.011E+00	2.043E+02	0.825
α_6	2.09E-05	2.76E-03	1.40E-03	1.01E-02	5.709E-01	2.064E+02	0.818
α_7	2.11E-10	9.21E-04	7.21E-05	4.87E-03	1.809E-01	1.962E+02	0.862
α_8	1.08E-107	7.48E-05	2.26E-27	5.60E-05	1.245E-02	1.664E+02	1.017

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.66E-01	9.55E-01	9.48E-01	9.50E-01	9.55E-01	9.58E-01	9.61E-01
α_2	3.40E-02	3.32E-02	3.51E-02	2.79E-02	1.76E-02	1.30E-02	1.04E-02
α_3		1.20E-02	1.03E-02	1.59E-02	1.67E-02	1.43E-02	1.09E-02
α_4			6.61E-03	5.52E-03	7.35E-03	8.66E-03	8.53E-03
α_5				7.18E-04	2.47E-03	4.56E-03	4.92E-03
α_6					9.52E-04	1.56E-03	2.76E-03
α_7						1.57E-04	9.21E-04
α_8							7.48E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.66E-01	9.55E-01	9.48E-01	9.50E-01	9.55E-01	9.58E-01	9.61E-01
Beta	3.40E-02	4.51E-02	5.21E-02	5.00E-02	4.50E-02	4.22E-02	3.86E-02
Gamma		2.65E-01	3.25E-01	4.43E-01	6.09E-01	6.93E-01	7.30E-01
Delta			3.90E-01	2.81E-01	3.93E-01	5.10E-01	6.12E-01
Epsilon				1.15E-01	3.18E-01	4.20E-01	5.04E-01
Mu					2.78E-01	2.73E-01	4.33E-01
Omega						9.16E-02	2.65E-01
Sigma							7.51E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.83	2.75	3.67	4.58	5.50	6.42	7.33
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 26.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.230

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9640056	0.9907945	0.9959894	0.9999736	5.065E+01	4.706E-01	--
α_2	2.64E-05	9.21E-03	4.01E-03	3.60E-02	4.706E-01	5.065E+01	0.650

CCCG = 3, Gamma = 0.230

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9674685	0.9886979	0.9918187	0.9992616	9.645E+01	1.103E+00	--
α_2	2.51E-04	8.72E-03	5.54E-03	2.80E-02	8.104E-01	9.215E+01	0.811
α_3	2.17E-07	2.58E-03	6.06E-04	1.19E-02	2.921E-01	1.127E+02	0.667

CCCG = 4, Gamma = 0.231

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9707585	0.9876985	0.9896799	0.9978623	1.568E+02	1.953E+00	--
α_2	8.27E-04	8.86E-03	6.77E-03	2.41E-02	1.312E+00	1.467E+02	0.891
α_3	3.84E-06	2.29E-03	9.04E-04	9.26E-03	4.307E-01	1.878E+02	0.701
α_4	2.29E-09	1.15E-03	1.36E-04	5.85E-03	2.099E-01	1.824E+02	0.722

CCCG = 5, Gamma = 0.231

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9750734	0.9879478	0.9891855	0.9965923	2.547E+02	3.107E+00	--
α_2	9.95E-04	7.05E-03	5.73E-03	1.76E-02	1.684E+00	2.373E+02	0.975
α_3	1.48E-04	3.35E-03	2.27E-03	1.02E-02	9.426E-01	2.804E+02	0.828
α_4	9.81E-07	1.31E-03	4.49E-04	5.52E-03	3.816E-01	2.916E+02	0.798
α_5	1.39E-16	3.47E-04	1.90E-06	2.02E-03	9.865E-02	2.841E+02	0.820

CCCG = 6, Gamma = 0.232

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9775074	0.9884896	0.9894553	0.9961726	3.282E+02	3.822E+00	--
α_2	8.35E-04	5.77E-03	4.70E-03	1.43E-02	1.714E+00	2.955E+02	1.029
α_3	2.02E-04	3.08E-03	2.22E-03	8.88E-03	1.108E+00	3.588E+02	0.850
α_4	2.24E-05	1.70E-03	9.45E-04	5.92E-03	6.509E-01	3.829E+02	0.798
α_5	1.28E-08	6.49E-04	1.17E-04	3.13E-03	2.536E-01	3.908E+02	0.782
α_6	5.18E-17	3.19E-04	1.45E-06	1.86E-03	9.572E-02	2.996E+02	1.021

CCCG = 7, Gamma = 0.232

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9795836	0.9887025	0.9894032	0.9954283	4.547E+02	5.195E+00	--
α_2	9.70E-04	5.11E-03	4.33E-03	1.19E-02	2.105E+00	4.100E+02	1.069
α_3	2.58E-04	2.75E-03	2.10E-03	7.48E-03	1.320E+00	4.782E+02	0.919
α_4	9.90E-05	1.94E-03	1.35E-03	5.82E-03	9.967E-01	5.124E+02	0.858
α_5	5.06E-06	1.00E-03	4.76E-04	3.78E-03	5.249E-01	5.234E+02	0.841
α_6	2.82E-10	3.79E-04	3.71E-05	1.96E-03	1.956E-01	5.160E+02	0.853
α_7	3.25E-28	1.14E-04	2.58E-09	6.18E-04	5.291E-02	4.644E+02	0.948

CCCG = 8, Gamma = 0.233

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9807631	0.9890585	0.9896642	0.9952854	5.272E+02	5.832E+00	--
α_2	9.76E-04	4.81E-03	4.12E-03	1.10E-02	2.229E+00	4.610E+02	1.115
α_3	1.95E-04	2.27E-03	1.71E-03	6.28E-03	1.260E+00	5.529E+02	0.932
α_4	9.91E-05	1.74E-03	1.23E-03	5.15E-03	1.042E+00	5.964E+02	0.864
α_5	2.86E-05	1.22E-03	7.45E-04	4.02E-03	7.626E-01	6.254E+02	0.825
α_6	1.19E-07	5.18E-04	1.45E-04	2.31E-03	3.271E-01	6.306E+02	0.818
α_7	2.17E-13	2.24E-04	6.01E-06	1.26E-03	1.344E-01	5.988E+02	0.862
α_8	1.36E-20	1.51E-04	1.42E-07	8.79E-04	7.682E-02	5.075E+02	1.017

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.89E-01	9.88E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01
α_2	9.21E-03	8.72E-03	8.86E-03	7.05E-03	5.77E-03	5.11E-03	4.81E-03
α_3		2.58E-03	2.29E-03	3.35E-03	3.08E-03	2.75E-03	2.27E-03
α_4			1.15E-03	1.31E-03	1.70E-03	1.94E-03	1.74E-03
α_5				3.47E-04	6.49E-04	1.00E-03	1.22E-03
α_6					3.19E-04	3.79E-04	5.18E-04
α_7						1.14E-04	2.24E-04
α_8							1.51E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.89E-01	9.88E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01
Beta	9.21E-03	1.13E-02	1.23E-02	1.21E-02	1.15E-02	1.13E-02	1.09E-02
Gamma		2.29E-01	2.79E-01	4.15E-01	4.99E-01	5.48E-01	5.60E-01
Delta			3.34E-01	3.30E-01	4.64E-01	5.55E-01	6.29E-01
Epsilon				2.10E-01	3.63E-01	4.35E-01	5.48E-01
Mu					3.30E-01	3.30E-01	4.23E-01
Omega						2.31E-01	4.20E-01
Sigma							4.03E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.67	13.00	17.33	21.67	26.00	30.33	34.67
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 16.5

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.159

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9890018	0.9971110	0.9986554	0.9999872	1.764E+02	5.111E-01	--
α_2	1.28E-05	2.89E-03	1.34E-03	1.10E-02	5.111E-01	1.764E+02	0.650

CCCG = 3, Gamma = 0.158

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9904411	0.9966813	0.9976011	0.9997801	3.343E+02	1.113E+00	--
α_2	5.81E-05	2.42E-03	1.49E-03	7.96E-03	7.673E-01	3.161E+02	0.811
α_3	3.22E-07	8.97E-04	2.71E-04	3.92E-03	3.458E-01	3.850E+02	0.667

CCCG = 4, Gamma = 0.158

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9913341	0.9962183	0.9967644	0.9992360	5.853E+02	2.222E+00	--
α_2	4.08E-04	2.97E-03	2.40E-03	7.48E-03	1.656E+00	5.558E+02	0.891
α_3	1.17E-08	3.73E-04	7.30E-05	1.78E-03	2.646E-01	7.085E+02	0.701
α_4	4.83E-08	4.38E-04	1.07E-04	2.00E-03	3.010E-01	6.876E+02	0.722

CCCG = 5, Gamma = 0.158

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9935659	0.9963984	0.9966125	0.9984996	1.522E+03	5.503E+00	--
α_2	8.66E-04	2.62E-03	2.40E-03	5.14E-03	3.811E+00	1.451E+03	0.975
α_3	7.77E-05	7.91E-04	6.07E-04	2.13E-03	1.354E+00	1.711E+03	0.828
α_4	1.58E-08	1.67E-04	3.98E-05	7.65E-04	2.961E-01	1.777E+03	0.798
α_5	7.30E-35	2.45E-05	2.70E-11	1.22E-04	4.243E-02	1.730E+03	0.820

CCCG = 6, Gamma = 0.158

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9929805	0.9961232	0.9963667	0.9984344	1.337E+03	5.204E+00	--
α_2	7.32E-04	2.55E-03	2.29E-03	5.25E-03	3.183E+00	1.246E+03	1.029
α_3	7.09E-05	8.31E-04	6.24E-04	2.30E-03	1.257E+00	1.511E+03	0.850
α_4	1.27E-06	3.12E-04	1.43E-04	1.20E-03	5.031E-01	1.611E+03	0.798
α_5	2.03E-15	7.03E-05	9.27E-07	4.03E-04	1.155E-01	1.643E+03	0.782
α_6	5.39E-13	1.15E-04	4.22E-06	6.38E-04	1.451E-01	1.260E+03	1.021

CCCG = 7, Gamma = 0.158

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9943754	0.9964136	0.9965312	0.9980502	2.786E+03	1.003E+01	--
α_2	8.21E-04	2.03E-03	1.90E-03	3.67E-03	5.226E+00	2.569E+03	1.069
α_3	2.39E-04	9.35E-04	8.26E-04	2.00E-03	2.800E+00	2.993E+03	0.919
α_4	4.41E-05	4.31E-04	3.33E-04	1.15E-03	1.384E+00	3.206E+03	0.858
α_5	5.30E-07	1.50E-04	6.69E-05	5.79E-04	4.902E-01	3.273E+03	0.841
α_6	8.45E-16	3.55E-05	4.50E-07	2.04E-04	1.146E-01	3.225E+03	0.853
α_7	2.65E-93	5.05E-06	5.37E-25	5.99E-06	1.464E-02	2.902E+03	0.948

CCCG = 8, Gamma = 0.158

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9939544	0.9963532	0.9965097	0.9982176	2.090E+03	7.648E+00	--
α_2	5.72E-04	1.85E-03	1.68E-03	3.73E-03	3.480E+00	1.873E+03	1.115
α_3	1.51E-04	8.73E-04	7.30E-04	2.08E-03	1.960E+00	2.243E+03	0.932
α_4	3.52E-05	4.82E-04	3.53E-04	1.37E-03	1.166E+00	2.419E+03	0.864
α_5	1.20E-06	2.12E-04	1.03E-04	7.93E-04	5.375E-01	2.536E+03	0.825
α_6	1.56E-11	7.06E-05	5.48E-06	3.73E-04	1.805E-01	2.556E+03	0.818
α_7	8.82E-36	1.71E-05	1.28E-11	8.34E-05	4.139E-02	2.426E+03	0.862
α_8	8.39E-09	1.38E-04	3.03E-05	6.41E-04	2.827E-01	2.055E+03	1.017

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	2.89E-03	2.42E-03	2.97E-03	2.62E-03	2.55E-03	2.03E-03	1.85E-03
α_3		8.97E-04	3.73E-04	7.91E-04	8.31E-04	9.35E-04	8.73E-04
α_4			4.38E-04	1.67E-04	3.12E-04	4.31E-04	4.82E-04
α_5				2.45E-05	7.03E-05	1.50E-04	2.12E-04
α_6					1.15E-04	3.55E-05	7.06E-05
α_7						5.05E-06	1.71E-05
α_8							1.38E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	2.89E-03	3.32E-03	3.78E-03	3.60E-03	3.88E-03	3.59E-03	3.65E-03
Gamma		2.70E-01	2.14E-01	2.73E-01	3.43E-01	4.34E-01	4.91E-01
Delta			5.40E-01	1.95E-01	3.74E-01	4.00E-01	5.13E-01
Epsilon				1.28E-01	3.73E-01	3.06E-01	4.76E-01
Mu					6.21E-01	2.13E-01	5.15E-01
Omega						1.24E-01	6.86E-01
Sigma							8.90E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.50	8.25	11.00	13.75	16.50	19.25	22.00
N_1	0.4643	0.6429	0.7857	0.8929	0.9643	1.0000	1.0000
N_2	0.0179	0.0536	0.1071	0.1786	0.2679	0.3750	0.5000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.8.4 SSW-MDP-FR: Standby Service Water Motor-Driven Pumps Fail to Run

Generic CCF Parameters

System Group: Raw Water
System: Standby Service Water
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run < 1H, Fail to Run > 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 79.9

Total Number of Common-Cause Failure Events: 4

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9431842	0.9797269	0.9849326	0.9984633	0.9798594	5.679E+01	1.175E+00
α_2	1.53E-03	2.03E-02	1.51E-02	5.68E-02	2.01E-02	1.175E+00	5.679E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9471929	0.9752266	0.9780297	0.9936790	0.9687379	1.082E+02	2.748E+00
α_2	4.09E-03	2.00E-02	1.72E-02	4.56E-02	2.64E-02	2.221E+00	1.087E+02
α_3	2.46E-05	4.75E-03	2.27E-03	1.79E-02	4.82E-03	5.268E-01	1.104E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9510715	0.9743120	0.9762558	0.9909187	0.9672259	1.568E+02	4.134E+00
α_2	3.59E-03	1.55E-02	1.36E-02	3.42E-02	1.81E-02	2.500E+00	1.584E+02
α_3	9.18E-04	8.72E-03	6.78E-03	2.31E-02	1.46E-02	1.402E+00	1.595E+02
α_4	9.97E-09	1.44E-03	2.14E-04	7.12E-03	0.00E+00	2.315E-01	1.607E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9633741	0.9791040	0.9802364	0.9909652	0.9717092	2.733E+02	5.832E+00
α_2	2.93E-03	1.07E-02	9.57E-03	2.24E-02	1.26E-02	2.991E+00	2.761E+02
α_3	8.92E-04	6.15E-03	5.01E-03	1.53E-02	7.86E-03	1.716E+00	2.774E+02
α_4	2.17E-04	3.76E-03	2.66E-03	1.10E-02	7.86E-03	1.049E+00	2.781E+02
α_5	2.39E-20	2.75E-04	2.56E-07	1.60E-03	0.00E+00	7.674E-02	2.790E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9665994	0.9805200	0.9814798	0.9911502	0.9743286	3.239E+02	6.435E+00
α_2	2.10E-03	8.31E-03	7.34E-03	1.78E-02	1.03E-02	2.746E+00	3.276E+02
α_3	8.04E-04	5.34E-03	4.38E-03	1.31E-02	5.49E-03	1.763E+00	3.286E+02

α_4	2.49E-04	3.49E-03	2.55E-03	9.92E-03	5.49E-03	1.152E+00	3.292E+02
α_5	2.90E-05	2.01E-03	1.14E-03	6.98E-03	4.39E-03	6.655E-01	3.297E+02
α_6	2.61E-15	3.32E-04	3.36E-06	1.92E-03	0.00E+00	1.098E-01	3.302E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9723103	0.9828706	0.9835140	0.9912256	0.9767552	4.868E+02	8.483E+00
α_2	1.89E-03	6.51E-03	5.86E-03	1.34E-02	8.33E-03	3.223E+00	4.920E+02
α_3	8.56E-04	4.37E-03	3.72E-03	1.01E-02	4.53E-03	2.163E+00	4.931E+02
α_4	3.73E-04	3.08E-03	2.45E-03	7.97E-03	3.78E-03	1.527E+00	4.937E+02
α_5	1.21E-04	2.11E-03	1.49E-03	6.22E-03	4.09E-03	1.047E+00	4.942E+02
α_6	3.40E-06	9.85E-04	4.39E-04	3.82E-03	2.52E-03	4.879E-01	4.948E+02
α_7	4.81E-41	7.03E-05	2.61E-12	3.08E-04	0.00E+00	3.480E-02	4.952E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9738111	0.9837545	0.9843568	0.9916323	0.9785085	5.212E+02	8.608E+00
α_2	1.54E-03	5.64E-03	5.03E-03	1.18E-02	7.23E-03	2.988E+00	5.269E+02
α_3	6.00E-04	3.59E-03	2.99E-03	8.64E-03	3.82E-03	1.903E+00	5.280E+02
α_4	3.11E-04	2.76E-03	2.16E-03	7.24E-03	2.98E-03	1.462E+00	5.284E+02
α_5	1.33E-04	2.07E-03	1.49E-03	6.00E-03	2.95E-03	1.098E+00	5.288E+02
α_6	3.27E-05	1.43E-03	8.71E-04	4.72E-03	3.04E-03	7.571E-01	5.291E+02
α_7	7.26E-08	5.76E-04	1.45E-04	2.62E-03	1.47E-03	3.054E-01	5.295E+02
α_8	2.08E-17	1.79E-04	7.57E-07	1.04E-03	0.00E+00	9.469E-02	5.298E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.80E-01	9.75E-01	9.74E-01	9.79E-01	9.81E-01	9.83E-01	9.84E-01
α_2	2.03E-02	2.00E-02	1.55E-02	1.07E-02	8.31E-03	6.51E-03	5.64E-03
α_3		4.75E-03	8.72E-03	6.15E-03	5.34E-03	4.37E-03	3.59E-03
α_4			1.44E-03	3.76E-03	3.49E-03	3.08E-03	2.76E-03
α_5				2.75E-04	2.01E-03	2.11E-03	2.07E-03
α_6					3.32E-04	9.85E-04	1.43E-03
α_7						7.03E-05	5.76E-04
α_8							1.79E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.80E-01	9.75E-01	9.74E-01	9.79E-01	9.81E-01	9.83E-01	9.84E-01
Beta	2.03E-02	2.48E-02	2.57E-02	2.09E-02	1.95E-02	1.71E-02	1.62E-02
Gamma		1.92E-01	3.95E-01	4.87E-01	5.73E-01	6.20E-01	6.53E-01
Delta			1.42E-01	3.96E-01	5.22E-01	5.89E-01	6.61E-01
Epsilon				6.82E-02	4.02E-01	5.07E-01	6.07E-01
Mu					1.42E-01	3.33E-01	5.13E-01
Omega						6.66E-02	3.46E-01
Sigma							2.37E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	31.96	47.94	63.92	79.90	95.88	111.86	127.84
N₁	2.4200	2.2600	2.1867	2.5333	2.8000	3.1080	3.3850
N₂	0.7067	1.3700	1.2400	1.0667	1.0444	0.9803	0.9700
N₃		0.2500	1.0000	0.6667	0.5556	0.5335	0.5120
N₄			0.0000	0.6667	0.5556	0.4444	0.4001
N₅				0.0000	0.4444	0.4815	0.3951
N₆					0.0000	0.2963	0.4074
N₇						0.0000	0.1975
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 13.9

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.158

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9711144	0.9925470	0.9966789	0.9999753	6.438E+01	4.834E-01	--
α_2	2.47E-05	7.45E-03	3.32E-03	2.89E-02	4.834E-01	6.438E+01	0.769

CCCG = 3, Gamma = 0.161

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794562	0.9926102	0.9944731	0.9993973	1.646E+02	1.226E+00	--
α_2	2.97E-04	6.10E-03	4.20E-03	1.84E-02	9.769E-01	1.592E+02	0.869
α_3	2.06E-08	1.29E-03	2.24E-04	6.26E-03	2.487E-01	1.923E+02	0.723

CCCG = 4, Gamma = 0.163

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9790848	0.9910691	0.9924455	0.9983472	2.283E+02	2.057E+00	--
α_2	6.86E-04	6.22E-03	4.87E-03	1.64E-02	1.442E+00	2.302E+02	0.842
α_3	2.65E-06	2.11E-03	7.94E-04	8.69E-03	4.114E-01	1.943E+02	1.002
α_4	7.78E-10	5.94E-04	6.47E-05	3.05E-03	2.036E-01	3.427E+02	0.569

CCCG = 5, Gamma = 0.164

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9827976	0.9912927	0.9920544	0.9971859	4.193E+02	3.683E+00	--
α_2	1.07E-03	5.22E-03	4.48E-03	1.19E-02	2.243E+00	4.274E+02	0.857
α_3	1.13E-04	2.25E-03	1.56E-03	6.75E-03	9.912E-01	4.399E+02	0.835
α_4	7.55E-07	1.11E-03	3.74E-04	4.70E-03	3.765E-01	3.396E+02	1.083
α_5	1.13E-21	1.31E-04	7.46E-08	7.56E-04	7.237E-02	5.528E+02	0.666

CCCG = 6, Gamma = 0.165

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9832376	0.9912482	0.9919307	0.9969275	4.688E+02	4.139E+00	--
α_2	8.85E-04	4.60E-03	3.91E-03	1.07E-02	2.128E+00	4.602E+02	0.911
α_3	1.46E-04	2.11E-03	1.54E-03	6.05E-03	1.134E+00	5.351E+02	0.785
α_4	7.93E-06	1.21E-03	6.02E-04	4.49E-03	5.533E-01	4.553E+02	0.924
α_5	2.36E-09	6.07E-04	8.10E-05	3.04E-03	2.210E-01	3.639E+02	1.157
α_6	2.72E-16	2.14E-04	1.49E-06	1.24E-03	1.027E-01	4.808E+02	0.876

CCCG = 7, Gamma = 0.165

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9863483	0.9920647	0.9924658	0.9964118	8.041E+02	6.432E+00	--
α_2	9.36E-04	3.60E-03	3.19E-03	7.67E-03	2.840E+00	7.859E+02	0.896
α_3	2.95E-04	1.99E-03	1.63E-03	4.93E-03	1.746E+00	8.755E+02	0.806
α_4	7.89E-05	1.27E-03	9.06E-04	3.68E-03	1.084E+00	8.550E+02	0.826
α_5	4.15E-06	7.29E-04	3.53E-04	2.73E-03	5.376E-01	7.365E+02	0.959
α_6	2.82E-10	3.21E-04	3.24E-05	1.66E-03	1.979E-01	6.169E+02	1.146
α_7	6.26E-53	2.80E-05	2.80E-15	9.56E-05	2.656E-02	9.494E+02	0.745

CCCG = 8, Gamma = 0.166

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9866848	0.9923508	0.9927577	0.9966278	7.930E+02	6.112E+00	--
α_2	6.53E-04	3.02E-03	2.61E-03	6.79E-03	2.364E+00	7.810E+02	0.906
α_3	2.11E-04	1.78E-03	1.41E-03	4.61E-03	1.512E+00	8.495E+02	0.834
α_4	7.15E-05	1.22E-03	8.64E-04	3.58E-03	1.056E+00	8.645E+02	0.820
α_5	1.28E-05	8.45E-04	4.81E-04	2.91E-03	6.745E-01	7.975E+02	0.889
α_6	6.25E-08	4.65E-04	1.18E-04	2.11E-03	3.076E-01	6.612E+02	1.072
α_7	1.38E-15	1.97E-04	1.95E-06	1.14E-03	1.093E-01	5.544E+02	1.279
α_8	1.97E-18	1.28E-04	3.54E-07	7.44E-04	8.885E-02	6.960E+02	1.019

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01
α_2	7.45E-03	6.10E-03	6.22E-03	5.22E-03	4.60E-03	3.60E-03	3.02E-03
α_3		1.29E-03	2.11E-03	2.25E-03	2.11E-03	1.99E-03	1.78E-03
α_4			5.94E-04	1.11E-03	1.21E-03	1.27E-03	1.22E-03
α_5				1.31E-04	6.07E-04	7.29E-04	8.45E-04
α_6					2.14E-04	3.21E-04	4.65E-04
α_7						2.80E-05	1.97E-04
α_8							1.28E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01
Beta	7.45E-03	7.39E-03	8.93E-03	8.71E-03	8.75E-03	7.94E-03	7.65E-03
Gamma		1.75E-01	3.03E-01	4.00E-01	4.74E-01	5.46E-01	6.06E-01
Delta			2.19E-01	3.55E-01	4.90E-01	5.41E-01	6.16E-01
Epsilon				1.06E-01	4.03E-01	4.60E-01	5.73E-01
Mu					2.60E-01	3.23E-01	4.83E-01
Omega						8.02E-02	4.11E-01
Sigma							3.93E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.56	8.34	11.12	13.90	16.68	19.46	22.24
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 18.3

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.209

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9360428	0.9838571	0.9932007	0.9999639	2.741E+01	4.498E-01	--
α_2	3.61E-05	1.61E-02	6.80E-03	6.40E-02	4.498E-01	2.741E+01	0.769

CCCG = 3, Gamma = 0.212

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9407480	0.9788275	0.9842410	0.9983876	5.447E+01	1.178E+00	--
α_2	7.75E-04	1.75E-02	1.19E-02	5.30E-02	9.387E-01	5.281E+01	0.869
α_3	3.89E-08	3.71E-03	5.99E-04	1.82E-02	2.396E-01	6.436E+01	0.723

CCCG = 4, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9428445	0.9760429	0.9799258	0.9959538	7.734E+01	1.898E+00	--
α_2	1.46E-03	1.62E-02	1.23E-02	4.41E-02	1.285E+00	7.808E+01	0.842
α_3	5.44E-06	5.89E-03	2.11E-03	2.46E-02	3.927E-01	6.631E+01	1.002
α_4	7.21E-09	1.88E-03	2.51E-04	9.43E-03	2.207E-01	1.172E+02	0.569

CCCG = 5, Gamma = 0.216

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9523495	0.9760693	0.9782035	0.9924934	1.430E+02	3.506E+00	--
α_2	2.39E-03	1.34E-02	1.13E-02	3.16E-02	1.992E+00	1.467E+02	0.857
α_3	4.37E-04	7.07E-03	5.06E-03	2.05E-02	1.078E+00	1.515E+02	0.835
α_4	1.62E-06	3.09E-03	1.00E-03	1.32E-02	3.632E-01	1.173E+02	1.083
α_5	3.50E-21	3.79E-04	2.19E-07	2.19E-03	7.248E-02	1.913E+02	0.666

CCCG = 6, Gamma = 0.217

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9553766	0.9764954	0.9782518	0.9916124	1.745E+02	4.199E+00	--
α_2	1.93E-03	1.12E-02	9.36E-03	2.66E-02	1.941E+00	1.718E+02	0.911
α_3	6.33E-04	6.61E-03	5.06E-03	1.79E-02	1.332E+00	2.002E+02	0.785
α_4	3.87E-05	3.61E-03	1.95E-03	1.28E-02	6.181E-01	1.707E+02	0.924
α_5	1.16E-08	1.69E-03	2.51E-04	8.37E-03	2.313E-01	1.366E+02	1.157
α_6	3.88E-20	4.25E-04	4.00E-07	2.47E-03	7.684E-02	1.807E+02	0.876

CCCG = 7, Gamma = 0.218

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9610466	0.9774320	0.9785771	0.9899067	2.695E+02	6.223E+00	--
α_2	2.42E-03	9.89E-03	8.70E-03	2.14E-02	2.654E+00	2.657E+02	0.896
α_3	7.51E-04	5.51E-03	4.45E-03	1.39E-02	1.645E+00	2.968E+02	0.806
α_4	2.55E-04	3.83E-03	2.77E-03	1.10E-02	1.115E+00	2.902E+02	0.826
α_5	2.33E-05	2.41E-03	1.27E-03	8.63E-03	6.034E-01	2.502E+02	0.959
α_6	1.51E-10	8.48E-04	6.32E-05	4.50E-03	1.780E-01	2.098E+02	1.146
α_7	4.61E-51	8.46E-05	1.74E-14	2.99E-04	2.734E-02	3.230E+02	0.745

CCCG = 8, Gamma = 0.218

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9619124	0.9779182	0.9790356	0.9901079	2.766E+02	6.246E+00	--
α_2	2.08E-03	9.01E-03	7.86E-03	1.99E-02	2.504E+00	2.755E+02	0.906
α_3	5.03E-04	4.70E-03	3.66E-03	1.24E-02	1.419E+00	3.005E+02	0.834
α_4	1.84E-04	3.34E-03	2.35E-03	9.91E-03	1.027E+00	3.061E+02	0.820
α_5	5.34E-05	2.59E-03	1.55E-03	8.66E-03	7.337E-01	2.825E+02	0.889
α_6	1.69E-06	1.69E-03	6.11E-04	7.05E-03	3.975E-01	2.343E+02	1.072
α_7	3.92E-20	3.92E-04	3.76E-07	2.28E-03	7.703E-02	1.967E+02	1.279
α_8	3.29E-18	3.54E-04	8.85E-07	2.07E-03	8.749E-02	2.469E+02	1.019

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.79E-01	9.76E-01	9.76E-01	9.76E-01	9.77E-01	9.78E-01
α_2	1.61E-02	1.75E-02	1.62E-02	1.34E-02	1.12E-02	9.89E-03	9.01E-03
α_3		3.71E-03	5.89E-03	7.07E-03	6.61E-03	5.51E-03	4.70E-03
α_4			1.88E-03	3.09E-03	3.61E-03	3.83E-03	3.34E-03
α_5				3.79E-04	1.69E-03	2.41E-03	2.59E-03
α_6					4.25E-04	8.48E-04	1.69E-03
α_7						8.46E-05	3.92E-04
α_8							3.54E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.79E-01	9.76E-01	9.76E-01	9.76E-01	9.77E-01	9.78E-01
Beta	1.61E-02	2.12E-02	2.40E-02	2.39E-02	2.35E-02	2.26E-02	2.21E-02
Gamma		1.75E-01	3.24E-01	4.40E-01	5.25E-01	5.62E-01	5.92E-01
Delta			2.42E-01	3.29E-01	4.64E-01	5.65E-01	6.41E-01
Epsilon				1.09E-01	3.70E-01	4.66E-01	6.01E-01
Mu					2.01E-01	2.79E-01	4.85E-01
Omega						9.08E-02	3.06E-01
Sigma							4.75E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.32	10.98	14.64	18.30	21.96	25.62	29.28
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 9.1

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.156

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7907742	0.9261234	0.9453697	0.9954449	1.312E+01	1.047E+00	--
α_2	4.56E-03	7.39E-02	5.46E-02	2.09E-01	1.047E+00	1.312E+01	0.769

CCCG = 3, Gamma = 0.144

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7910979	0.9020301	0.9126401	0.9765630	2.265E+01	2.460E+00	--
α_2	1.41E-02	7.93E-02	6.79E-02	1.84E-01	1.917E+00	2.226E+01	0.869
α_3	1.14E-04	1.87E-02	9.31E-03	6.91E-02	5.427E-01	2.851E+01	0.723

CCCG = 4, Gamma = 0.136

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8061462	0.8985095	0.9058403	0.9657588	3.248E+01	3.669E+00	--
α_2	1.01E-02	5.37E-02	4.60E-02	1.24E-01	2.039E+00	3.594E+01	0.842
α_3	4.63E-03	4.35E-02	3.43E-02	1.14E-01	1.389E+00	3.053E+01	1.002
α_4	4.92E-08	4.29E-03	7.05E-04	2.10E-02	2.414E-01	5.597E+01	0.569

CCCG = 5, Gamma = 0.131

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8760948	0.9292182	0.9328937	0.9697740	7.203E+01	5.487E+00	--
α_2	6.97E-03	3.04E-02	2.66E-02	6.69E-02	2.458E+00	7.831E+01	0.857
α_3	3.75E-03	2.26E-02	1.89E-02	5.42E-02	1.874E+00	8.101E+01	0.835
α_4	1.13E-03	1.72E-02	1.25E-02	4.94E-02	1.101E+00	6.282E+01	1.083
α_5	1.17E-26	5.28E-04	1.88E-08	2.91E-03	5.493E-02	1.039E+02	0.666

CCCG = 6, Gamma = 0.128

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8929910	0.9380070	0.9410582	0.9725934	8.934E+01	5.905E+00	--
α_2	2.92E-03	1.90E-02	1.57E-02	4.63E-02	1.779E+00	9.208E+01	0.911
α_3	3.63E-03	1.92E-02	1.63E-02	4.45E-02	2.087E+00	1.068E+02	0.785
α_4	1.22E-03	1.38E-02	1.05E-02	3.77E-02	1.275E+00	9.127E+01	0.924
α_5	1.57E-04	9.35E-03	5.45E-03	3.18E-02	6.911E-01	7.323E+01	1.157
α_6	8.19E-21	7.46E-04	4.48E-07	4.32E-03	7.279E-02	9.756E+01	0.876

CCCG = 7, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9180997	0.9498070	0.9517357	0.9749259	1.470E+02	7.770E+00	--
α_2	1.96E-03	1.22E-02	1.01E-02	2.95E-02	1.845E+00	1.498E+02	0.896
α_3	3.34E-03	1.47E-02	1.28E-02	3.24E-02	2.470E+00	1.662E+02	0.806
α_4	1.55E-03	1.05E-02	8.61E-03	2.60E-02	1.731E+00	1.628E+02	0.826
α_5	6.17E-04	8.28E-03	6.11E-03	2.34E-02	1.173E+00	1.405E+02	0.959
α_6	2.35E-05	4.46E-03	2.14E-03	1.68E-02	5.290E-01	1.181E+02	1.146
α_7	7.85E-65	1.16E-04	1.75E-17	2.91E-04	2.112E-02	1.825E+02	0.745

CCCG = 8, Gamma = 0.123

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9281166	0.9546531	0.9561714	0.9760041	1.898E+02	9.016E+00	--
α_2	1.38E-03	9.03E-03	7.43E-03	2.21E-02	1.781E+00	1.954E+02	0.906
α_3	2.46E-03	1.12E-02	9.69E-03	2.50E-02	2.393E+00	2.118E+02	0.834
α_4	1.77E-03	9.49E-03	8.03E-03	2.22E-02	2.067E+00	2.158E+02	0.820
α_5	7.39E-04	7.00E-03	5.44E-03	1.86E-02	1.406E+00	1.995E+02	0.889
α_6	2.87E-04	5.88E-03	4.05E-03	1.77E-02	9.783E-01	1.655E+02	1.072
α_7	1.92E-06	2.71E-03	9.24E-04	1.15E-02	3.784E-01	1.392E+02	1.279
α_8	1.03E-107	7.11E-05	2.15E-27	5.32E-05	1.245E-02	1.752E+02	1.019

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.26E-01	9.02E-01	8.99E-01	9.29E-01	9.38E-01	9.50E-01	9.55E-01
α_2	7.39E-02	7.93E-02	5.37E-02	3.04E-02	1.90E-02	1.22E-02	9.03E-03
α_3		1.87E-02	4.35E-02	2.26E-02	1.92E-02	1.47E-02	1.12E-02
α_4			4.29E-03	1.72E-02	1.38E-02	1.05E-02	9.49E-03
α_5				5.28E-04	9.35E-03	8.28E-03	7.00E-03
α_6					7.46E-04	4.46E-03	5.88E-03
α_7						1.16E-04	2.71E-03
α_8							7.11E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.26E-01	9.02E-01	8.99E-01	9.29E-01	9.38E-01	9.50E-01	9.55E-01
Beta	7.39E-02	9.80E-02	1.01E-01	7.08E-02	6.20E-02	5.02E-02	4.53E-02
Gamma		1.91E-01	4.71E-01	5.70E-01	6.94E-01	7.58E-01	8.01E-01
Delta			8.98E-02	4.40E-01	5.55E-01	6.15E-01	6.92E-01
Epsilon				2.98E-02	4.23E-01	5.50E-01	6.23E-01
Mu					7.38E-02	3.56E-01	5.53E-01
Omega						2.53E-02	3.21E-01
Sigma							2.55E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.64	5.46	7.28	9.10	10.92	12.74	14.56
N_1	1.1667	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.6667	1.2500	1.0000	0.6667	0.4444	0.2963	0.1975
N_3		0.2500	1.0000	0.6667	0.5556	0.4815	0.4074

N₄			0.0000	0.6667	0.5556	0.4444	0.3951
N₅				0.0000	0.4444	0.4815	0.3951
N₆					0.0000	0.2963	0.4074
N₇						0.0000	0.1975
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 28.5

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.362

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9599951	0.9894588	0.9950505	0.9999530	4.793E+01	5.106E-01	--
α_2	4.70E-05	1.05E-02	4.95E-03	4.00E-02	5.106E-01	4.793E+01	0.769

CCCG = 3, Gamma = 0.366

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9651946	0.9874590	0.9906019	0.9989777	9.626E+01	1.223E+00	--
α_2	4.27E-04	9.94E-03	6.74E-03	3.04E-02	9.304E-01	9.264E+01	0.869
α_3	2.18E-07	2.60E-03	6.09E-04	1.20E-02	2.921E-01	1.122E+02	0.723

CCCG = 4, Gamma = 0.369

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9695439	0.9867093	0.9886205	0.9973392	1.628E+02	2.193E+00	--
α_2	1.17E-03	9.35E-03	7.47E-03	2.40E-02	1.552E+00	1.645E+02	0.842
α_3	5.19E-06	3.09E-03	1.22E-03	1.25E-02	4.307E-01	1.391E+02	1.002
α_4	1.70E-09	8.54E-04	1.01E-04	4.35E-03	2.099E-01	2.455E+02	0.569

CCCG = 5, Gamma = 0.371

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9748617	0.9874267	0.9885723	0.9960771	2.754E+02	3.507E+00	--
α_2	1.38E-03	7.36E-03	6.23E-03	1.72E-02	2.084E+00	2.812E+02	0.857
α_3	1.43E-04	3.24E-03	2.20E-03	9.90E-03	9.426E-01	2.897E+02	0.835
α_4	1.28E-06	1.70E-03	5.85E-04	7.18E-03	3.816E-01	2.238E+02	1.083
α_5	1.08E-16	2.71E-04	1.48E-06	1.57E-03	9.865E-02	3.644E+02	0.666

CCCG = 6, Gamma = 0.371

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9765692	0.9875401	0.9884440	0.9954231	3.505E+02	4.422E+00	--
α_2	1.41E-03	6.64E-03	5.72E-03	1.50E-02	2.314E+00	3.463E+02	0.911
α_3	1.80E-04	2.74E-03	1.98E-03	7.91E-03	1.108E+00	4.032E+02	0.785
α_4	2.50E-05	1.89E-03	1.06E-03	6.61E-03	6.509E-01	3.430E+02	0.924
α_5	1.83E-08	9.24E-04	1.66E-04	4.45E-03	2.536E-01	2.743E+02	1.157
α_6	4.28E-17	2.64E-04	1.20E-06	1.54E-03	9.572E-02	3.625E+02	0.876

CCCG = 7, Gamma = 0.372

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9799584	0.9885541	0.9891766	0.9950239	5.123E+02	5.931E+00	--
α_2	1.41E-03	5.51E-03	4.87E-03	1.18E-02	2.789E+00	5.037E+02	0.896
α_3	2.45E-04	2.44E-03	1.88E-03	6.53E-03	1.372E+00	5.619E+02	0.806
α_4	9.24E-05	1.81E-03	1.26E-03	5.43E-03	9.967E-01	5.487E+02	0.826
α_5	5.61E-06	1.11E-03	5.27E-04	4.19E-03	5.249E-01	4.727E+02	0.959
α_6	3.67E-10	4.94E-04	4.83E-05	2.56E-03	1.956E-01	3.961E+02	1.146
α_7	2.47E-28	8.68E-05	1.97E-09	4.71E-04	5.291E-02	6.096E+02	0.745

CCCG = 8, Gamma = 0.372

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9808105	0.9887267	0.9892692	0.9947906	5.889E+02	6.714E+00	--
α_2	1.40E-03	5.11E-03	4.56E-03	1.07E-02	3.001E+00	5.840E+02	0.906
α_3	2.13E-04	2.14E-03	1.65E-03	5.75E-03	1.365E+00	6.363E+02	0.834
α_4	9.28E-05	1.61E-03	1.14E-03	4.75E-03	1.047E+00	6.475E+02	0.820
α_5	2.99E-05	1.28E-03	7.80E-04	4.21E-03	7.626E-01	5.973E+02	0.889
α_6	1.51E-07	6.60E-04	1.84E-04	2.93E-03	3.271E-01	4.953E+02	1.072
α_7	3.13E-13	3.23E-04	8.67E-06	1.82E-03	1.344E-01	4.153E+02	1.279
α_8	1.33E-20	1.47E-04	1.38E-07	8.55E-04	7.682E-02	5.215E+02	1.019

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01	9.89E-01
α_2	1.05E-02	9.94E-03	9.35E-03	7.36E-03	6.64E-03	5.51E-03	5.11E-03
α_3		2.60E-03	3.09E-03	3.24E-03	2.74E-03	2.44E-03	2.14E-03
α_4			8.54E-04	1.70E-03	1.89E-03	1.81E-03	1.61E-03
α_5				2.71E-04	9.24E-04	1.11E-03	1.28E-03
α_6					2.64E-04	4.94E-04	6.60E-04
α_7						8.68E-05	3.23E-04
α_8							1.47E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01	9.89E-01
Beta	1.05E-02	1.25E-02	1.33E-02	1.26E-02	1.25E-02	1.14E-02	1.13E-02
Gamma		2.07E-01	2.97E-01	4.15E-01	4.67E-01	5.19E-01	5.46E-01
Delta			2.17E-01	3.78E-01	5.29E-01	5.90E-01	6.53E-01
Epsilon				1.37E-01	3.85E-01	4.82E-01	5.98E-01
Mu					2.22E-01	3.44E-01	4.70E-01
Omega						1.50E-01	4.16E-01
Sigma							3.13E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	11.40	17.10	22.80	28.50	34.20	39.90	45.60
N_1	1.2533	1.7600	2.1867	2.5333	2.8000	3.1080	3.3850
N_2	0.0400	0.1200	0.2400	0.4000	0.6000	0.6840	0.7725
N_3		0.0000	0.0000	0.0000	0.0000	0.0520	0.1046

N₄			0.0000	0.0000	0.0000	0.0000	0.0050
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 10.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.115

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9870641	0.9966442	0.9984853	0.9999877	1.465E+02	4.932E-01	--
α_2	1.23E-05	3.36E-03	1.51E-03	1.29E-02	4.932E-01	1.465E+02	0.769

CCCG = 3, Gamma = 0.117

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9899571	0.9965728	0.9975660	0.9997972	3.081E+02	1.059E+00	--
α_2	4.57E-05	2.44E-03	1.44E-03	8.25E-03	7.137E-01	2.915E+02	0.869
α_3	3.54E-07	9.85E-04	2.98E-04	4.30E-03	3.458E-01	3.508E+02	0.723

CCCG = 4, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9917815	0.9964685	0.9970036	0.9993266	5.967E+02	2.115E+00	--
α_2	3.28E-04	2.65E-03	2.11E-03	6.81E-03	1.549E+00	5.838E+02	0.842
α_3	1.68E-08	5.38E-04	1.05E-04	2.56E-03	2.646E-01	4.917E+02	1.002
α_4	3.84E-08	3.47E-04	8.52E-05	1.59E-03	3.010E-01	8.661E+02	0.569

CCCG = 5, Gamma = 0.119

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941489	0.9967510	0.9969507	0.9986711	1.633E+03	5.325E+00	--
α_2	7.02E-04	2.20E-03	2.00E-03	4.38E-03	3.632E+00	1.646E+03	0.857
α_3	7.86E-05	8.00E-04	6.14E-04	2.16E-03	1.354E+00	1.691E+03	0.835
α_4	2.15E-08	2.27E-04	5.41E-05	1.04E-03	2.961E-01	1.305E+03	1.083
α_5	5.95E-35	2.00E-05	2.20E-11	9.90E-05	4.243E-02	2.123E+03	0.666

CCCG = 6, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9937401	0.9965879	0.9968139	0.9986639	1.442E+03	4.936E+00	--
α_2	5.52E-04	2.07E-03	1.84E-03	4.39E-03	2.915E+00	1.402E+03	0.911
α_3	6.58E-05	7.71E-04	5.79E-04	2.13E-03	1.257E+00	1.629E+03	0.785
α_4	1.48E-06	3.63E-04	1.66E-04	1.39E-03	5.031E-01	1.385E+03	0.924
α_5	3.02E-15	1.04E-04	1.38E-06	5.98E-04	1.155E-01	1.107E+03	1.157
α_6	4.64E-13	9.93E-05	3.63E-06	5.50E-04	1.451E-01	1.462E+03	0.876

CCCG = 7, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9951885	0.9969553	0.9970591	0.9983677	3.161E+03	9.654E+00	--
α_2	6.13E-04	1.58E-03	1.48E-03	2.92E-03	4.851E+00	3.059E+03	0.896
α_3	2.11E-04	8.22E-04	7.27E-04	1.76E-03	2.800E+00	3.404E+03	0.806
α_4	4.25E-05	4.16E-04	3.21E-04	1.11E-03	1.384E+00	3.323E+03	0.826
α_5	6.06E-07	1.71E-04	7.66E-05	6.62E-04	4.902E-01	2.862E+03	0.959
α_6	1.14E-15	4.78E-05	6.06E-07	2.74E-04	1.146E-01	2.397E+03	1.146
α_7	2.09E-93	3.97E-06	4.22E-25	4.72E-06	1.464E-02	3.687E+03	0.745

CCCG = 8, Gamma = 0.121

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9949136	0.9969770	0.9971160	0.9985662	2.357E+03	7.148E+00	--
α_2	3.51E-04	1.29E-03	1.15E-03	2.72E-03	2.980E+00	2.299E+03	0.906
α_3	1.36E-04	7.84E-04	6.56E-04	1.87E-03	1.960E+00	2.498E+03	0.834
α_4	3.35E-05	4.59E-04	3.36E-04	1.30E-03	1.166E+00	2.542E+03	0.820
α_5	1.30E-06	2.29E-04	1.11E-04	8.58E-04	5.375E-01	2.345E+03	0.889
α_6	2.05E-11	9.29E-05	7.21E-06	4.91E-04	1.805E-01	1.943E+03	1.072
α_7	1.31E-35	2.54E-05	1.90E-11	1.24E-04	4.139E-02	1.629E+03	1.279
α_8	8.43E-09	1.38E-04	3.05E-05	6.44E-04	2.827E-01	2.045E+03	1.019

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	3.36E-03	2.44E-03	2.65E-03	2.20E-03	2.07E-03	1.58E-03	1.29E-03
α_3		9.85E-04	5.38E-04	8.00E-04	7.71E-04	8.22E-04	7.84E-04
α_4			3.47E-04	2.27E-04	3.63E-04	4.16E-04	4.59E-04
α_5				2.00E-05	1.04E-04	1.71E-04	2.29E-04
α_6					9.93E-05	4.78E-05	9.29E-05
α_7						3.97E-06	2.54E-05
α_8							1.38E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	3.36E-03	3.43E-03	3.53E-03	3.25E-03	3.41E-03	3.04E-03	3.02E-03
Gamma		2.87E-01	2.51E-01	3.22E-01	3.92E-01	4.80E-01	5.72E-01
Delta			3.92E-01	2.36E-01	4.24E-01	4.38E-01	5.46E-01
Epsilon				8.10E-02	3.59E-01	3.49E-01	5.14E-01
Mu					4.87E-01	2.32E-01	5.28E-01
Omega						7.67E-02	6.38E-01
Sigma							8.45E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.04	6.06	8.08	10.10	12.12	14.14	16.16
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.8.5 SWS-MDP-FS: Service Water Motor-Driven Pumps Fail to Start

Generic CCF Parameters

System Group: Raw Water
System: Normally Operating Service Water, Standby Service Water
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Start
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 135.1

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9699852	0.9917805	0.9958006	0.9999397	0.9978207	6.874E+01	5.697E-01
α_2	6.21E-05	8.22E-03	4.20E-03	3.00E-02	2.18E-03	5.697E-01	6.874E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9707030	0.9888680	0.9912831	0.9987803	0.9956318	1.272E+02	1.432E+00
α_2	6.48E-04	8.98E-03	6.59E-03	2.55E-02	4.37E-03	1.155E+00	1.274E+02
α_3	1.07E-07	2.15E-03	4.59E-04	1.01E-02	0.00E+00	2.768E-01	1.283E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9702419	0.9864845	0.9881966	0.9968802	0.9934334	1.825E+02	2.501E+00
α_2	1.65E-03	1.01E-02	8.39E-03	2.44E-02	6.57E-03	1.867E+00	1.832E+02
α_3	2.36E-06	2.18E-03	7.97E-04	9.01E-03	0.00E+00	4.024E-01	1.846E+02
α_4	8.66E-09	1.25E-03	1.86E-04	6.19E-03	0.00E+00	2.315E-01	1.848E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9738143	0.9861856	0.9872215	0.9950283	0.9926732	3.054E+02	4.277E+00
α_2	2.15E-03	8.68E-03	7.64E-03	1.87E-02	6.60E-03	2.686E+00	3.069E+02
α_3	2.52E-04	3.66E-03	2.66E-03	1.05E-02	7.22E-04	1.132E+00	3.085E+02
α_4	9.38E-07	1.23E-03	4.25E-04	5.21E-03	0.00E+00	3.822E-01	3.093E+02
α_5	2.15E-20	2.48E-04	2.31E-07	1.44E-03	0.00E+00	7.674E-02	3.096E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9753941	0.9865410	0.9874172	0.9947007	0.9919825	3.623E+02	4.943E+00
α_2	1.73E-03	7.16E-03	6.28E-03	1.56E-02	6.71E-03	2.629E+00	3.646E+02
α_3	3.78E-04	3.74E-03	2.89E-03	1.00E-02	1.21E-03	1.374E+00	3.659E+02

α_4	1.68E-05	1.66E-03	8.85E-04	5.94E-03	1.00E-04	6.098E-01	3.667E+02
α_5	2.36E-09	6.02E-04	8.04E-05	3.02E-03	0.00E+00	2.211E-01	3.670E+02
α_6	2.35E-15	2.99E-04	3.02E-06	1.72E-03	0.00E+00	1.098E-01	3.672E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9777605	0.9867495	0.9873457	0.9937012	0.9913743	5.314E+02	7.136E+00
α_2	1.86E-03	6.20E-03	5.60E-03	1.26E-02	6.82E-03	3.342E+00	5.352E+02
α_3	5.73E-04	3.49E-03	2.90E-03	8.43E-03	1.55E-03	1.878E+00	5.367E+02
α_4	1.40E-04	2.08E-03	1.51E-03	5.99E-03	2.44E-04	1.122E+00	5.374E+02
α_5	7.76E-06	1.05E-03	5.33E-04	3.87E-03	1.44E-05	5.677E-01	5.380E+02
α_6	1.95E-10	3.56E-04	3.28E-05	1.85E-03	0.00E+00	1.916E-01	5.384E+02
α_7	4.42E-41	6.46E-05	2.40E-12	2.83E-04	0.00E+00	3.480E-02	5.385E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9787165	0.9872167	0.9877761	0.9938218	0.9908441	5.721E+02	7.408E+00
α_2	1.68E-03	5.68E-03	5.12E-03	1.16E-02	6.92E-03	3.290E+00	5.762E+02
α_3	4.30E-04	2.97E-03	2.42E-03	7.37E-03	1.78E-03	1.718E+00	5.778E+02
α_4	1.36E-04	1.96E-03	1.43E-03	5.61E-03	4.04E-04	1.136E+00	5.784E+02
α_5	2.26E-05	1.23E-03	7.22E-04	4.15E-03	4.62E-05	7.111E-01	5.788E+02
α_6	2.39E-07	6.04E-04	1.86E-04	2.63E-03	2.10E-06	3.501E-01	5.792E+02
α_7	9.10E-16	1.86E-04	1.71E-06	1.07E-03	0.00E+00	1.078E-01	5.794E+02
α_8	1.90E-17	1.63E-04	6.92E-07	9.51E-04	0.00E+00	9.469E-02	5.794E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.89E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01	9.87E-01
α_2	8.22E-03	8.98E-03	1.01E-02	8.68E-03	7.16E-03	6.20E-03	5.68E-03
α_3		2.15E-03	2.18E-03	3.66E-03	3.74E-03	3.49E-03	2.97E-03
α_4			1.25E-03	1.23E-03	1.66E-03	2.08E-03	1.96E-03
α_5				2.48E-04	6.02E-04	1.05E-03	1.23E-03
α_6					2.99E-04	3.56E-04	6.04E-04
α_7						6.46E-05	1.86E-04
α_8							1.63E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.89E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01	9.87E-01
Beta	8.22E-03	1.11E-02	1.35E-02	1.38E-02	1.35E-02	1.33E-02	1.28E-02
Gamma		1.93E-01	2.53E-01	3.72E-01	4.68E-01	5.32E-01	5.56E-01
Delta			3.65E-01	2.88E-01	4.06E-01	5.05E-01	5.83E-01
Epsilon				1.67E-01	3.52E-01	4.14E-01	5.27E-01
Mu					3.32E-01	2.85E-01	4.37E-01
Omega						1.54E-01	3.66E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	45.03	67.55	90.07	112.58	135.10	157.62	180.13
N₁	1.2976	1.6429	1.7857	1.9345	2.0060	2.0127	1.9645
N₂	0.1012	0.3036	0.6071	0.7619	0.9276	1.0984	1.2716
N₃		0.0000	0.0000	0.0833	0.1667	0.2488	0.3279
N₄			0.0000	0.0000	0.0139	0.0394	0.0743
N₅				0.0000	0.0000	0.0023	0.0085
N₆					0.0000	0.0000	0.0004
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 49.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.352

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9810957	0.9951277	0.9978363	0.9999839	9.873E+01	4.834E-01	--
α_2	1.61E-05	4.87E-03	2.16E-03	1.89E-02	4.834E-01	9.873E+01	0.611

CCCG = 3, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9837878	0.9941728	0.9956455	0.9995254	2.091E+02	1.226E+00	--
α_2	2.33E-04	4.81E-03	3.31E-03	1.45E-02	9.769E-01	2.023E+02	0.765
α_3	1.63E-08	1.02E-03	1.77E-04	4.95E-03	2.487E-01	2.433E+02	0.638

CCCG = 4, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9823561	0.9924706	0.9936339	0.9986078	2.711E+02	2.057E+00	--
α_2	6.18E-04	5.61E-03	4.39E-03	1.48E-02	1.442E+00	2.558E+02	0.842
α_3	1.59E-06	1.27E-03	4.77E-04	5.23E-03	4.114E-01	3.230E+02	0.670
α_4	8.54E-10	6.51E-04	7.09E-05	3.34E-03	2.036E-01	3.125E+02	0.693

CCCG = 5, Gamma = 0.354

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9838422	0.9918231	0.9925390	0.9973580	4.467E+02	3.683E+00	--
α_2	1.08E-03	5.29E-03	4.54E-03	1.21E-02	2.243E+00	4.216E+02	0.932
α_3	1.01E-04	2.01E-03	1.39E-03	6.02E-03	9.912E-01	4.932E+02	0.800
α_4	5.01E-07	7.36E-04	2.48E-04	3.12E-03	3.765E-01	5.113E+02	0.772
α_5	1.24E-21	1.43E-04	8.15E-08	8.27E-04	7.237E-02	5.055E+02	0.781

CCCG = 6, Gamma = 0.355

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9843728	0.9918426	0.9924795	0.9971369	5.033E+02	4.139E+00	--
α_2	8.81E-04	4.58E-03	3.89E-03	1.06E-02	2.128E+00	4.625E+02	0.976
α_3	1.41E-04	2.05E-03	1.49E-03	5.87E-03	1.134E+00	5.522E+02	0.820
α_4	6.13E-06	9.39E-04	4.65E-04	3.48E-03	5.533E-01	5.887E+02	0.769
α_5	1.43E-09	3.67E-04	4.90E-05	1.84E-03	2.210E-01	6.018E+02	0.753
α_6	2.82E-16	2.22E-04	1.54E-06	1.28E-03	1.027E-01	4.634E+02	0.978

CCCG = 7, Gamma = 0.355

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9861734	0.9919628	0.9923689	0.9963656	7.939E+02	6.432E+00	--
α_2	1.01E-03	3.88E-03	3.44E-03	8.27E-03	2.840E+00	7.282E+02	1.019
α_3	3.11E-04	2.09E-03	1.71E-03	5.18E-03	1.746E+00	8.322E+02	0.893
α_4	7.56E-05	1.21E-03	8.69E-04	3.53E-03	1.084E+00	8.915E+02	0.834
α_5	3.36E-06	5.91E-04	2.86E-04	2.21E-03	5.376E-01	9.096E+02	0.818
α_6	1.94E-10	2.21E-04	2.23E-05	1.14E-03	1.979E-01	8.942E+02	0.833
α_7	7.24E-53	3.23E-05	3.24E-15	1.10E-04	2.656E-02	8.214E+02	0.907

CCCG = 8, Gamma = 0.355

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9868050	0.9924201	0.9928233	0.9966584	8.003E+02	6.112E+00	--
α_2	7.18E-04	3.32E-03	2.86E-03	7.46E-03	2.364E+00	7.105E+02	1.056
α_3	2.15E-04	1.81E-03	1.43E-03	4.69E-03	1.512E+00	8.349E+02	0.900
α_4	6.91E-05	1.18E-03	8.35E-04	3.46E-03	1.056E+00	8.943E+02	0.840
α_5	1.08E-05	7.16E-04	4.08E-04	2.47E-03	6.745E-01	9.417E+02	0.799
α_6	4.37E-08	3.25E-04	8.26E-05	1.48E-03	3.076E-01	9.459E+02	0.795
α_7	8.59E-16	1.23E-04	1.21E-06	7.08E-04	1.093E-01	8.899E+02	0.846
α_8	1.74E-18	1.13E-04	3.13E-07	6.58E-04	8.885E-02	7.867E+02	0.956

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.94E-01	9.92E-01	9.92E-01	9.92E-01	9.92E-01	9.92E-01
α_2	4.87E-03	4.81E-03	5.61E-03	5.29E-03	4.58E-03	3.88E-03	3.32E-03
α_3		1.02E-03	1.27E-03	2.01E-03	2.05E-03	2.09E-03	1.81E-03
α_4			6.51E-04	7.36E-04	9.39E-04	1.21E-03	1.18E-03
α_5				1.43E-04	3.67E-04	5.91E-04	7.16E-04
α_6					2.22E-04	2.21E-04	3.25E-04
α_7						3.23E-05	1.23E-04
α_8							1.13E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.94E-01	9.92E-01	9.92E-01	9.92E-01	9.92E-01	9.92E-01
Beta	4.87E-03	5.83E-03	7.53E-03	8.18E-03	8.16E-03	8.04E-03	7.58E-03
Gamma		1.75E-01	2.55E-01	3.53E-01	4.39E-01	5.17E-01	5.62E-01
Delta			3.39E-01	3.05E-01	4.27E-01	4.96E-01	5.76E-01
Epsilon				1.63E-01	3.85E-01	4.10E-01	5.20E-01
Mu					3.76E-01	3.00E-01	4.39E-01
Omega						1.27E-01	4.20E-01
Sigma							4.79E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	16.33	24.50	32.67	40.83	49.00	57.17	65.33
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 27.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9493832	0.9864341	0.9933733	0.9999246	3.877E+01	5.331E-01	--
α_2	7.54E-05	1.36E-02	6.63E-03	5.06E-02	5.331E-01	3.877E+01	0.611

CCCG = 3, Gamma = 0.212

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9448799	0.9789728	0.9834655	0.9976914	6.650E+01	1.428E+00	--
α_2	1.39E-03	1.80E-02	1.34E-02	5.03E-02	1.189E+00	6.485E+01	0.765
α_3	3.17E-08	3.03E-03	4.88E-04	1.48E-02	2.396E-01	7.889E+01	0.638

CCCG = 4, Gamma = 0.211

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9406465	0.9732281	0.9766706	0.9940320	8.719E+01	2.398E+00	--
α_2	3.25E-03	2.10E-02	1.73E-02	5.11E-02	1.785E+00	8.334E+01	0.842
α_3	3.38E-06	3.67E-03	1.31E-03	1.53E-02	3.927E-01	1.066E+02	0.670
α_4	8.19E-09	2.13E-03	2.85E-04	1.07E-02	2.207E-01	1.033E+02	0.693

CCCG = 5, Gamma = 0.210

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9477718	0.9724973	0.9745492	0.9902100	1.475E+02	4.172E+00	--
α_2	4.30E-03	1.80E-02	1.58E-02	3.92E-02	2.575E+00	1.404E+02	0.932
α_3	5.08E-04	6.96E-03	5.12E-03	1.97E-02	1.161E+00	1.656E+02	0.800
α_4	1.10E-06	2.10E-03	6.80E-04	9.03E-03	3.632E-01	1.723E+02	0.772
α_5	3.92E-21	4.25E-04	2.46E-07	2.46E-03	7.248E-02	1.705E+02	0.781

CCCG = 6, Gamma = 0.209

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9506298	0.9727444	0.9744326	0.9890912	1.799E+02	5.040E+00	--
α_2	3.70E-03	1.54E-02	1.35E-02	3.34E-02	2.601E+00	1.666E+02	0.976
α_3	8.76E-04	7.44E-03	5.88E-03	1.93E-02	1.499E+00	2.001E+02	0.820
α_4	3.46E-05	2.94E-03	1.61E-03	1.04E-02	6.320E-01	2.140E+02	0.769
α_5	7.23E-09	1.05E-03	1.57E-04	5.22E-03	2.313E-01	2.191E+02	0.753
α_6	4.15E-20	4.55E-04	4.29E-07	2.65E-03	7.684E-02	1.688E+02	0.978

CCCG = 7, Gamma = 0.208

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9546218	0.9727780	0.9739559	0.9869115	2.586E+02	7.237E+00	--
α_2	4.20E-03	1.38E-02	1.25E-02	2.80E-02	3.377E+00	2.405E+02	1.019
α_3	1.13E-03	6.81E-03	5.67E-03	1.64E-02	1.894E+00	2.763E+02	0.893
α_4	2.78E-04	3.88E-03	2.84E-03	1.10E-02	1.154E+00	2.966E+02	0.834
α_5	1.96E-05	1.99E-03	1.06E-03	7.15E-03	6.057E-01	3.030E+02	0.818
α_6	1.06E-10	5.97E-04	4.44E-05	3.17E-03	1.780E-01	2.982E+02	0.833
α_7	5.43E-51	9.98E-05	2.05E-14	3.52E-04	2.734E-02	2.740E+02	0.907

CCCG = 8, Gamma = 0.208

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9553849	0.9730871	0.9742225	0.9869119	2.686E+02	7.428E+00	--
α_2	3.92E-03	1.33E-02	1.20E-02	2.70E-02	3.276E+00	2.436E+02	1.056
α_3	8.98E-04	6.03E-03	4.94E-03	1.49E-02	1.747E+00	2.879E+02	0.900
α_4	2.30E-04	3.55E-03	2.56E-03	1.03E-02	1.101E+00	3.090E+02	0.840
α_5	4.88E-05	2.27E-03	1.37E-03	7.57E-03	7.422E-01	3.256E+02	0.799
α_6	1.22E-06	1.21E-03	4.39E-04	5.05E-03	3.979E-01	3.273E+02	0.795
α_7	2.50E-20	2.50E-04	2.40E-07	1.45E-03	7.703E-02	3.081E+02	0.846
α_8	2.98E-18	3.21E-04	8.02E-07	1.87E-03	8.749E-02	2.724E+02	0.956

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.79E-01	9.73E-01	9.72E-01	9.73E-01	9.73E-01	9.73E-01
α_2	1.36E-02	1.80E-02	2.10E-02	1.80E-02	1.54E-02	1.38E-02	1.33E-02
α_3		3.03E-03	3.67E-03	6.96E-03	7.44E-03	6.81E-03	6.03E-03
α_4			2.13E-03	2.10E-03	2.94E-03	3.88E-03	3.55E-03
α_5				4.25E-04	1.05E-03	1.99E-03	2.27E-03
α_6					4.55E-04	5.97E-04	1.21E-03
α_7						9.98E-05	2.50E-04
α_8							3.21E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.79E-01	9.73E-01	9.72E-01	9.73E-01	9.73E-01	9.73E-01
Beta	1.36E-02	2.10E-02	2.68E-02	2.75E-02	2.73E-02	2.72E-02	2.69E-02
Gamma		1.44E-01	2.17E-01	3.45E-01	4.36E-01	4.91E-01	5.07E-01
Delta			3.68E-01	2.66E-01	3.75E-01	4.91E-01	5.58E-01
Epsilon				1.68E-01	3.39E-01	4.10E-01	5.33E-01
Mu					3.01E-01	2.59E-01	4.40E-01
Omega						1.43E-01	3.20E-01
Sigma							5.62E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	9.00	13.50	18.00	22.50	27.00	31.50	36.00
N_1	0.8333	1.0000	1.0000	1.0417	1.0417	1.0127	0.9645
N_2	0.0833	0.2500	0.5000	0.5833	0.6597	0.7234	0.7716
N_3		0.0000	0.0000	0.0833	0.1667	0.2488	0.3279

N₄			0.0000	0.0000	0.0139	0.0394	0.0743
N₅				0.0000	0.0000	0.0023	0.0085
N₆					0.0000	0.0000	0.0004
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 5.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.039

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8661802	0.9679803	0.9884685	0.9999752	1.149E+01	3.801E-01	--
α_2	2.48E-05	3.20E-02	1.15E-02	1.34E-01	3.801E-01	1.149E+01	0.611

CCCG = 3, Gamma = 0.040

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8730042	0.9572634	0.9699946	0.9979366	2.150E+01	9.600E-01	--
α_2	4.73E-04	3.13E-02	1.82E-02	1.07E-01	6.673E-01	2.066E+01	0.765
α_3	1.00E-06	1.15E-02	2.75E-03	5.27E-02	2.927E-01	2.527E+01	0.638

CCCG = 4, Gamma = 0.040

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8786615	0.9505939	0.9592403	0.9928909	3.211E+01	1.669E+00	--
α_2	1.93E-03	3.32E-02	2.38E-02	9.64E-02	1.039E+00	3.027E+01	0.842
α_3	8.57E-06	9.88E-03	3.52E-03	4.13E-02	3.887E-01	3.897E+01	0.670
α_4	7.31E-08	6.34E-03	1.05E-03	3.10E-02	2.414E-01	3.782E+01	0.693

CCCG = 5, Gamma = 0.040

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9050472	0.9519499	0.9560555	0.9848074	6.908E+01	3.487E+00	--
α_2	4.17E-03	2.66E-02	2.21E-02	6.46E-02	1.791E+00	6.546E+01	0.932
α_3	1.23E-03	1.54E-02	1.15E-02	4.28E-02	1.207E+00	7.722E+01	0.800
α_4	9.45E-06	5.34E-03	2.14E-03	2.15E-02	4.340E-01	8.076E+01	0.772
α_5	1.52E-26	6.85E-04	2.44E-08	3.77E-03	5.493E-02	8.018E+01	0.781

CCCG = 6, Gamma = 0.040

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9171190	0.9568620	0.9601917	0.9852187	8.661E+01	3.905E+00	--
α_2	1.62E-03	1.67E-02	1.29E-02	4.48E-02	1.335E+00	7.866E+01	0.976
α_3	1.97E-03	1.61E-02	1.28E-02	4.13E-02	1.531E+00	9.374E+01	0.820
α_4	1.37E-04	7.09E-03	4.22E-03	2.38E-02	7.191E-01	1.007E+02	0.769
α_5	3.48E-08	2.38E-03	4.07E-04	1.16E-02	2.467E-01	1.034E+02	0.753
α_6	1.00E-20	9.12E-04	5.49E-07	5.29E-03	7.279E-02	7.973E+01	0.978

CCCG = 7, Gamma = 0.040

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9287259	0.9591938	0.9613437	0.9823158	1.356E+02	5.770E+00	--
α_2	1.54E-03	1.24E-02	9.88E-03	3.17E-02	1.549E+00	1.237E+02	1.019
α_3	2.48E-03	1.39E-02	1.17E-02	3.29E-02	1.989E+00	1.409E+02	0.893
α_4	7.56E-04	8.42E-03	6.39E-03	2.30E-02	1.287E+00	1.516E+02	0.834
α_5	7.40E-05	4.43E-03	2.57E-03	1.51E-02	6.913E-01	1.552E+02	0.818
α_6	1.12E-08	1.52E-03	2.29E-04	7.51E-03	2.327E-01	1.530E+02	0.833
α_7	1.02E-64	1.50E-04	2.27E-17	3.78E-04	2.112E-02	1.407E+02	0.907

CCCG = 8, Gamma = 0.040

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9378459	0.9628606	0.9644844	0.9823291	1.819E+02	7.016E+00	--
α_2	1.27E-03	9.87E-03	7.92E-03	2.51E-02	1.583E+00	1.588E+02	1.056
α_3	1.87E-03	1.06E-02	8.87E-03	2.50E-02	1.986E+00	1.862E+02	0.900
α_4	1.16E-03	8.30E-03	6.74E-03	2.08E-02	1.672E+00	1.998E+02	0.840
α_5	2.52E-04	4.77E-03	3.33E-03	1.42E-02	1.011E+00	2.111E+02	0.799
α_6	2.03E-05	2.68E-03	1.36E-03	9.81E-03	5.709E-01	2.124E+02	0.795
α_7	2.07E-10	9.03E-04	7.07E-05	4.77E-03	1.809E-01	2.001E+02	0.846
α_8	1.02E-107	7.03E-05	2.13E-27	5.27E-05	1.245E-02	1.770E+02	0.956

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.57E-01	9.51E-01	9.52E-01	9.57E-01	9.59E-01	9.63E-01
α_2	3.20E-02	3.13E-02	3.32E-02	2.66E-02	1.67E-02	1.24E-02	9.87E-03
α_3		1.15E-02	9.88E-03	1.54E-02	1.61E-02	1.39E-02	1.06E-02
α_4			6.34E-03	5.34E-03	7.09E-03	8.42E-03	8.30E-03
α_5				6.85E-04	2.38E-03	4.43E-03	4.77E-03
α_6					9.12E-04	1.52E-03	2.68E-03
α_7						1.50E-04	9.03E-04
α_8							7.03E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.57E-01	9.51E-01	9.52E-01	9.57E-01	9.59E-01	9.63E-01
Beta	3.20E-02	4.27E-02	4.94E-02	4.81E-02	4.31E-02	4.08E-02	3.71E-02
Gamma		2.68E-01	3.28E-01	4.46E-01	6.13E-01	6.97E-01	7.34E-01
Delta			3.91E-01	2.81E-01	3.92E-01	5.10E-01	6.13E-01
Epsilon				1.14E-01	3.17E-01	4.20E-01	5.04E-01
Mu					2.77E-01	2.73E-01	4.34E-01
Omega						8.99E-02	2.66E-01
Sigma							7.22E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.83	2.75	3.67	4.58	5.50	6.42	7.33
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 33.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.238

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9683791	0.9919169	0.9964837	0.9999769	5.775E+01	4.706E-01	--
α_2	2.31E-05	8.08E-03	3.52E-03	3.16E-02	4.706E-01	5.775E+01	0.611

CCCG = 3, Gamma = 0.238

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9705821	0.9897852	0.9926106	0.9993333	1.068E+02	1.103E+00	--
α_2	2.26E-04	7.85E-03	4.98E-03	2.53E-02	8.104E-01	1.024E+02	0.765
α_3	1.98E-07	2.36E-03	5.54E-04	1.09E-02	2.921E-01	1.234E+02	0.638

CCCG = 4, Gamma = 0.239

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9732126	0.9887361	0.9905538	0.9980440	1.714E+02	1.953E+00	--
α_2	7.54E-04	8.09E-03	6.18E-03	2.20E-02	1.312E+00	1.609E+02	0.842
α_3	3.54E-06	2.11E-03	8.34E-04	8.55E-03	4.307E-01	2.035E+02	0.670
α_4	2.12E-09	1.06E-03	1.25E-04	5.42E-03	2.099E-01	1.970E+02	0.693

CCCG = 5, Gamma = 0.239

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9766581	0.9887173	0.9898777	0.9968111	2.723E+02	3.107E+00	--
α_2	9.28E-04	6.57E-03	5.34E-03	1.64E-02	1.684E+00	2.546E+02	0.932
α_3	1.39E-04	3.15E-03	2.14E-03	9.64E-03	9.426E-01	2.979E+02	0.800
α_4	9.26E-07	1.23E-03	4.24E-04	5.21E-03	3.816E-01	3.090E+02	0.772
α_5	1.29E-16	3.23E-04	1.77E-06	1.88E-03	9.865E-02	3.056E+02	0.781

CCCG = 6, Gamma = 0.239

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9789791	0.9892456	0.9901492	0.9964253	3.516E+02	3.822E+00	--
α_2	7.74E-04	5.34E-03	4.36E-03	1.33E-02	1.714E+00	3.190E+02	0.976
α_3	1.90E-04	2.90E-03	2.09E-03	8.37E-03	1.108E+00	3.808E+02	0.820
α_4	2.11E-05	1.60E-03	8.91E-04	5.59E-03	6.509E-01	4.061E+02	0.769
α_5	1.21E-08	6.10E-04	1.10E-04	2.94E-03	2.536E-01	4.153E+02	0.753
α_6	4.85E-17	2.99E-04	1.36E-06	1.74E-03	9.572E-02	3.199E+02	0.978

CCCG = 7, Gamma = 0.240

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9806894	0.9893165	0.9899799	0.9956778	4.811E+02	5.195E+00	--
α_2	9.07E-04	4.78E-03	4.05E-03	1.11E-02	2.105E+00	4.385E+02	1.019
α_3	2.46E-04	2.63E-03	2.00E-03	7.13E-03	1.320E+00	5.013E+02	0.893
α_4	9.44E-05	1.85E-03	1.28E-03	5.55E-03	9.967E-01	5.370E+02	0.834
α_5	4.84E-06	9.57E-04	4.54E-04	3.61E-03	5.249E-01	5.480E+02	0.818
α_6	2.70E-10	3.63E-04	3.55E-05	1.88E-03	1.956E-01	5.388E+02	0.833
α_7	3.05E-28	1.07E-04	2.42E-09	5.80E-04	5.291E-02	4.950E+02	0.907

CCCG = 8, Gamma = 0.240

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9818795	0.9896954	0.9902666	0.9955609	5.601E+02	5.832E+00	--
α_2	9.08E-04	4.47E-03	3.83E-03	1.02E-02	2.229E+00	4.959E+02	1.056
α_3	1.85E-04	2.16E-03	1.62E-03	5.95E-03	1.260E+00	5.832E+02	0.900
α_4	9.46E-05	1.67E-03	1.17E-03	4.91E-03	1.042E+00	6.246E+02	0.840
α_5	2.72E-05	1.16E-03	7.08E-04	3.82E-03	7.626E-01	6.577E+02	0.799
α_6	1.13E-07	4.95E-04	1.38E-04	2.20E-03	3.271E-01	6.609E+02	0.795
α_7	2.09E-13	2.16E-04	5.79E-06	1.21E-03	1.344E-01	6.218E+02	0.846
α_8	1.26E-20	1.40E-04	1.31E-07	8.11E-04	7.682E-02	5.497E+02	0.956

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.90E-01	9.89E-01	9.89E-01	9.89E-01	9.89E-01	9.90E-01
α_2	8.08E-03	7.85E-03	8.09E-03	6.57E-03	5.34E-03	4.78E-03	4.47E-03
α_3		2.36E-03	2.11E-03	3.15E-03	2.90E-03	2.63E-03	2.16E-03
α_4			1.06E-03	1.23E-03	1.60E-03	1.85E-03	1.67E-03
α_5				3.23E-04	6.10E-04	9.57E-04	1.16E-03
α_6					2.99E-04	3.63E-04	4.95E-04
α_7						1.07E-04	2.16E-04
α_8							1.40E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.90E-01	9.89E-01	9.89E-01	9.89E-01	9.89E-01	9.90E-01
Beta	8.08E-03	1.02E-02	1.13E-02	1.13E-02	1.08E-02	1.07E-02	1.03E-02
Gamma		2.31E-01	2.82E-01	4.18E-01	5.03E-01	5.53E-01	5.66E-01
Delta			3.35E-01	3.30E-01	4.64E-01	5.55E-01	6.30E-01
Epsilon				2.07E-01	3.62E-01	4.35E-01	5.47E-01
Mu					3.29E-01	3.29E-01	4.23E-01
Omega						2.28E-01	4.18E-01
Sigma							3.93E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	11.03	16.55	22.07	27.58	33.10	38.62	44.13
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 20.5

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.158

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9897726	0.9973137	0.9987501	0.9999881	1.897E+02	5.111E-01	--
α_2	1.19E-05	2.69E-03	1.25E-03	1.02E-02	5.111E-01	1.897E+02	0.611

CCCG = 3, Gamma = 0.158

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9910173	0.9968816	0.9977462	0.9997934	3.558E+02	1.113E+00	--
α_2	5.43E-05	2.27E-03	1.39E-03	7.45E-03	7.673E-01	3.378E+02	0.765
α_3	3.06E-07	8.52E-04	2.58E-04	3.72E-03	3.458E-01	4.054E+02	0.638

CCCG = 4, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9918288	0.9964345	0.9969496	0.9992797	6.209E+02	2.222E+00	--
α_2	3.84E-04	2.79E-03	2.26E-03	7.03E-03	1.656E+00	5.913E+02	0.842
α_3	1.11E-08	3.55E-04	6.94E-05	1.69E-03	2.646E-01	7.452E+02	0.670
α_4	4.61E-08	4.18E-04	1.02E-04	1.91E-03	3.010E-01	7.206E+02	0.693

CCCG = 5, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9938456	0.9965551	0.9967600	0.9985650	1.592E+03	5.503E+00	--
α_2	8.26E-04	2.50E-03	2.29E-03	4.90E-03	3.811E+00	1.521E+03	0.932
α_3	7.48E-05	7.62E-04	5.85E-04	2.05E-03	1.354E+00	1.777E+03	0.800
α_4	1.53E-08	1.61E-04	3.84E-05	7.39E-04	2.961E-01	1.841E+03	0.772
α_5	6.94E-35	2.33E-05	2.57E-11	1.16E-04	4.243E-02	1.819E+03	0.781

CCCG = 6, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9933272	0.9963149	0.9965464	0.9985119	1.407E+03	5.204E+00	--
α_2	6.92E-04	2.41E-03	2.16E-03	4.97E-03	3.183E+00	1.318E+03	0.976
α_3	6.81E-05	7.99E-04	6.00E-04	2.21E-03	1.257E+00	1.572E+03	0.820
α_4	1.22E-06	3.00E-04	1.37E-04	1.15E-03	5.031E-01	1.676E+03	0.769
α_5	1.95E-15	6.75E-05	8.90E-07	3.87E-04	1.155E-01	1.712E+03	0.753
α_6	5.15E-13	1.10E-04	4.03E-06	6.10E-04	1.451E-01	1.318E+03	0.978

CCCG = 7, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9946023	0.9965584	0.9966713	0.9981290	2.904E+03	1.003E+01	--
α_2	7.81E-04	1.93E-03	1.81E-03	3.49E-03	5.226E+00	2.701E+03	1.019
α_3	2.32E-04	9.07E-04	8.02E-04	1.94E-03	2.800E+00	3.085E+03	0.893
α_4	4.28E-05	4.19E-04	3.23E-04	1.12E-03	1.384E+00	3.303E+03	0.834
α_5	5.15E-07	1.45E-04	6.50E-05	5.63E-04	4.902E-01	3.369E+03	0.818
α_6	8.23E-16	3.46E-05	4.39E-07	1.99E-04	1.146E-01	3.311E+03	0.833
α_7	2.53E-93	4.81E-06	5.12E-25	5.72E-06	1.464E-02	3.041E+03	0.907

CCCG = 8, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9942323	0.9965210	0.9966704	0.9982997	2.191E+03	7.648E+00	--
α_2	5.40E-04	1.75E-03	1.59E-03	3.52E-03	3.480E+00	1.983E+03	1.056
α_3	1.46E-04	8.41E-04	7.03E-04	2.01E-03	1.960E+00	2.329E+03	0.900
α_4	3.42E-05	4.67E-04	3.43E-04	1.33E-03	1.166E+00	2.494E+03	0.840
α_5	1.16E-06	2.05E-04	9.90E-05	7.66E-04	5.375E-01	2.625E+03	0.799
α_6	1.51E-11	6.85E-05	5.31E-06	3.62E-04	1.805E-01	2.636E+03	0.795
α_7	8.63E-36	1.67E-05	1.25E-11	8.16E-05	4.139E-02	2.480E+03	0.846
α_8	7.86E-09	1.29E-04	2.84E-05	6.01E-04	2.827E-01	2.192E+03	0.956

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01
α_2	2.69E-03	2.27E-03	2.79E-03	2.50E-03	2.41E-03	1.93E-03	1.75E-03
α_3		8.52E-04	3.55E-04	7.62E-04	7.99E-04	9.07E-04	8.41E-04
α_4			4.18E-04	1.61E-04	3.00E-04	4.19E-04	4.67E-04
α_5				2.33E-05	6.75E-05	1.45E-04	2.05E-04
α_6					1.10E-04	3.46E-05	6.85E-05
α_7						4.81E-06	1.67E-05
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01
Beta	2.69E-03	3.12E-03	3.57E-03	3.44E-03	3.69E-03	3.44E-03	3.48E-03
Gamma		2.73E-01	2.17E-01	2.75E-01	3.46E-01	4.39E-01	4.96E-01
Delta			5.41E-01	1.95E-01	3.74E-01	4.00E-01	5.13E-01
Epsilon				1.27E-01	3.72E-01	3.06E-01	4.73E-01
Mu					6.20E-01	2.13E-01	5.11E-01
Omega						1.22E-01	6.80E-01
Sigma							8.85E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.83	10.25	13.67	17.08	20.50	23.92	27.33
N_1	0.4643	0.6429	0.7857	0.8929	0.9643	1.0000	1.0000
N_2	0.0179	0.0536	0.1071	0.1786	0.2679	0.3750	0.5000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.8.6 SWS-MDP-FR: Service Water Motor-Driven Pumps Fail to Run

Generic CCF Parameters

System Group: Raw Water
System: Normally Operating Service Water, Standby Service Water
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run, Fail to Run < 1H, Fail to Run > 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 131.4

Total Number of Common-Cause Failure Events: 7

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9408571	0.9729614	0.9762903	0.9936820	0.9708131	9.027E+01	2.509E+00
α_2	6.32E-03	2.70E-02	2.37E-02	5.91E-02	2.92E-02	2.509E+00	9.027E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9462075	0.9707162	0.9726340	0.9886732	0.9648652	1.574E+02	4.748E+00
α_2	5.81E-03	1.99E-02	1.79E-02	4.06E-02	2.30E-02	3.221E+00	1.589E+02
α_3	1.15E-03	9.42E-03	7.49E-03	2.43E-02	1.21E-02	1.527E+00	1.606E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9506723	0.9709517	0.9723141	0.9865718	0.9650946	2.217E+02	6.634E+00
α_2	5.40E-03	1.64E-02	1.50E-02	3.22E-02	1.83E-02	3.750E+00	2.246E+02
α_3	1.84E-03	9.43E-03	8.04E-03	2.18E-02	1.29E-02	2.152E+00	2.262E+02
α_4	6.54E-05	3.20E-03	1.92E-03	1.07E-02	3.68E-03	7.315E-01	2.276E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9610259	0.9756466	0.9765184	0.9872971	0.9679325	3.538E+02	8.832E+00
α_2	4.49E-03	1.22E-02	1.13E-02	2.30E-02	1.49E-02	4.428E+00	3.582E+02
α_3	1.54E-03	6.80E-03	5.92E-03	1.51E-02	8.41E-03	2.466E+00	3.602E+02
α_4	5.86E-04	4.44E-03	3.57E-03	1.13E-02	7.30E-03	1.611E+00	3.611E+02
α_5	2.04E-07	9.01E-04	2.51E-04	4.01E-03	1.48E-03	3.267E-01	3.623E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9639522	0.9769636	0.9777022	0.9874617	0.9697861	4.200E+02	9.904E+00
α_2	3.59E-03	9.98E-03	9.23E-03	1.89E-02	1.29E-02	4.292E+00	4.256E+02
α_3	1.47E-03	6.10E-03	5.35E-03	1.33E-02	7.04E-03	2.622E+00	4.273E+02

α_4	5.64E-04	3.95E-03	3.21E-03	9.86E-03	5.49E-03	1.698E+00	4.282E+02
α_5	1.44E-04	2.46E-03	1.74E-03	7.21E-03	4.16E-03	1.056E+00	4.289E+02
α_6	4.47E-09	5.46E-04	8.37E-05	2.69E-03	6.22E-04	2.348E-01	4.297E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9695618	0.9797407	0.9802602	0.9881388	0.9715878	5.984E+02	1.237E+01
α_2	3.04E-03	7.87E-03	7.34E-03	1.45E-02	1.10E-02	4.806E+00	6.060E+02
α_3	1.48E-03	5.18E-03	4.65E-03	1.07E-02	6.57E-03	3.163E+00	6.076E+02
α_4	6.43E-04	3.42E-03	2.90E-03	7.99E-03	4.32E-03	2.090E+00	6.087E+02
α_5	2.77E-04	2.42E-03	1.90E-03	6.32E-03	3.91E-03	1.477E+00	6.093E+02
α_6	2.60E-05	1.21E-03	7.32E-04	4.05E-03	2.36E-03	7.418E-01	6.100E+02
α_7	4.23E-17	1.59E-04	8.01E-07	9.26E-04	2.68E-04	9.730E-02	6.107E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9709673	0.9805414	0.9810217	0.9884692	0.9731032	6.484E+02	1.287E+01
α_2	2.56E-03	6.87E-03	6.38E-03	1.29E-02	9.51E-03	4.544E+00	6.567E+02
α_3	1.26E-03	4.59E-03	4.10E-03	9.58E-03	6.18E-03	3.032E+00	6.582E+02
α_4	5.92E-04	3.16E-03	2.67E-03	7.38E-03	3.86E-03	2.087E+00	6.592E+02
α_5	2.80E-04	2.31E-03	1.83E-03	5.98E-03	3.11E-03	1.529E+00	6.597E+02
α_6	1.03E-04	1.64E-03	1.18E-03	4.78E-03	2.77E-03	1.086E+00	6.602E+02
α_7	1.79E-06	7.00E-04	2.96E-04	2.76E-03	1.34E-03	4.626E-01	6.608E+02
α_8	4.38E-14	1.90E-04	3.82E-06	1.08E-03	1.18E-04	1.259E-01	6.612E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.73E-01	9.71E-01	9.71E-01	9.76E-01	9.77E-01	9.80E-01	9.81E-01
α_2	2.70E-02	1.99E-02	1.64E-02	1.22E-02	9.98E-03	7.87E-03	6.87E-03
α_3		9.42E-03	9.43E-03	6.80E-03	6.10E-03	5.18E-03	4.59E-03
α_4			3.20E-03	4.44E-03	3.95E-03	3.42E-03	3.16E-03
α_5				9.01E-04	2.46E-03	2.42E-03	2.31E-03
α_6					5.46E-04	1.21E-03	1.64E-03
α_7						1.59E-04	7.00E-04
α_8							1.90E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.73E-01	9.71E-01	9.71E-01	9.76E-01	9.77E-01	9.80E-01	9.81E-01
Beta	2.70E-02	2.93E-02	2.90E-02	2.44E-02	2.30E-02	2.03E-02	1.95E-02
Gamma		3.22E-01	4.35E-01	4.99E-01	5.67E-01	6.12E-01	6.47E-01
Delta			2.54E-01	4.40E-01	5.33E-01	5.82E-01	6.36E-01
Epsilon				1.69E-01	4.32E-01	5.26E-01	6.06E-01
Mu					1.82E-01	3.62E-01	5.23E-01
Omega						1.16E-01	3.51E-01
Sigma							2.14E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	63.43	95.15	126.87	158.59	190.30	222.02	253.74
N₁	4.4200	4.2600	4.1867	4.4083	4.4875	4.5846	4.6506
N₂	2.0400	2.3700	2.4900	2.5042	2.5913	2.5623	2.5257
N₃		1.2500	1.7500	1.4167	1.4149	1.5335	1.6419
N₄			0.5000	1.2292	1.1024	1.0069	1.0251
N₅				0.2500	0.8351	0.9112	0.8267
N₆					0.1250	0.5502	0.7365
N₇						0.0625	0.3548
N₈							0.0313

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 25.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9721132	0.9928055	0.9967952	0.9999761	6.671E+01	4.834E-01	--
α_2	2.39E-05	7.19E-03	3.20E-03	2.79E-02	4.834E-01	6.671E+01	0.844

CCCG = 3, Gamma = 0.180

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804193	0.9929579	0.9947341	0.9994258	1.728E+02	1.226E+00	--
α_2	2.69E-04	5.53E-03	3.81E-03	1.67E-02	9.769E-01	1.756E+02	0.846
α_3	2.41E-08	1.51E-03	2.62E-04	7.32E-03	2.487E-01	1.645E+02	0.907

CCCG = 4, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9799759	0.9914510	0.9927695	0.9984183	2.386E+02	2.057E+00	--
α_2	6.40E-04	5.80E-03	4.54E-03	1.53E-02	1.442E+00	2.471E+02	0.840
α_3	2.41E-06	1.93E-03	7.23E-04	7.92E-03	4.114E-01	2.132E+02	0.977
α_4	1.08E-09	8.20E-04	8.94E-05	4.21E-03	2.036E-01	2.481E+02	0.840

CCCG = 5, Gamma = 0.183

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9828121	0.9913001	0.9920611	0.9971883	4.197E+02	3.683E+00	--
α_2	1.06E-03	5.20E-03	4.45E-03	1.19E-02	2.243E+00	4.295E+02	0.892
α_3	1.11E-04	2.22E-03	1.53E-03	6.65E-03	9.912E-01	4.463E+02	0.861
α_4	7.31E-07	1.07E-03	3.63E-04	4.55E-03	3.765E-01	3.505E+02	1.098
α_5	1.87E-21	2.15E-04	1.23E-07	1.24E-03	7.237E-02	3.363E+02	1.145

CCCG = 6, Gamma = 0.185

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9830609	0.9911557	0.9918453	0.9968949	4.638E+02	4.139E+00	--
α_2	8.97E-04	4.66E-03	3.96E-03	1.08E-02	2.128E+00	4.542E+02	0.968
α_3	1.48E-04	2.14E-03	1.56E-03	6.13E-03	1.134E+00	5.285E+02	0.834
α_4	7.84E-06	1.20E-03	5.95E-04	4.44E-03	5.533E-01	4.606E+02	0.957
α_5	2.30E-09	5.91E-04	7.88E-05	2.96E-03	2.210E-01	3.740E+02	1.180
α_6	3.17E-16	2.49E-04	1.73E-06	1.44E-03	1.027E-01	4.123E+02	1.071

CCCG = 7, Gamma = 0.185

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9858197	0.9917567	0.9921731	0.9962722	7.738E+02	6.432E+00	--
α_2	9.79E-04	3.77E-03	3.34E-03	8.02E-03	2.840E+00	7.510E+02	0.969
α_3	3.10E-04	2.09E-03	1.71E-03	5.17E-03	1.746E+00	8.336E+02	0.875
α_4	7.98E-05	1.28E-03	9.17E-04	3.73E-03	1.084E+00	8.448E+02	0.864
α_5	4.19E-06	7.36E-04	3.57E-04	2.76E-03	5.376E-01	7.296E+02	1.001
α_6	2.86E-10	3.26E-04	3.29E-05	1.68E-03	1.979E-01	6.072E+02	1.203
α_7	9.40E-53	4.19E-05	4.20E-15	1.43E-04	2.656E-02	6.332E+02	1.154

CCCG = 8, Gamma = 0.186

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9857907	0.9918360	0.9922698	0.9964002	7.426E+02	6.112E+00	--
α_2	7.03E-04	3.25E-03	2.81E-03	7.30E-03	2.364E+00	7.254E+02	1.012
α_3	2.35E-04	1.98E-03	1.56E-03	5.14E-03	1.512E+00	7.627E+02	0.964
α_4	7.48E-05	1.28E-03	9.04E-04	3.75E-03	1.056E+00	8.260E+02	0.891
α_5	1.31E-05	8.65E-04	4.92E-04	2.98E-03	6.745E-01	7.794E+02	0.944
α_6	6.33E-08	4.71E-04	1.20E-04	2.14E-03	3.076E-01	6.529E+02	1.128
α_7	1.41E-15	2.02E-04	1.99E-06	1.16E-03	1.093E-01	5.422E+02	1.358
α_8	1.90E-18	1.23E-04	3.42E-07	7.19E-04	8.885E-02	7.204E+02	1.022

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01
α_2	7.19E-03	5.53E-03	5.80E-03	5.20E-03	4.66E-03	3.77E-03	3.25E-03
α_3		1.51E-03	1.93E-03	2.22E-03	2.14E-03	2.09E-03	1.98E-03
α_4			8.20E-04	1.07E-03	1.20E-03	1.28E-03	1.28E-03
α_5				2.15E-04	5.91E-04	7.36E-04	8.65E-04
α_6					2.49E-04	3.26E-04	4.71E-04
α_7						4.19E-05	2.02E-04
α_8							1.23E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01
Beta	7.19E-03	7.04E-03	8.55E-03	8.70E-03	8.84E-03	8.24E-03	8.16E-03
Gamma		2.14E-01	3.21E-01	4.03E-01	4.73E-01	5.43E-01	6.02E-01
Delta			2.99E-01	3.68E-01	4.88E-01	5.33E-01	5.98E-01
Epsilon				1.67E-01	4.12E-01	4.63E-01	5.65E-01
Mu					2.97E-01	3.33E-01	4.79E-01
Omega						1.14E-01	4.08E-01
Sigma							3.80E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	12.36	18.54	24.72	30.90	37.08	43.26	49.43
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 35.4

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.245

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9517318	0.9878378	0.9949064	0.9999730	3.653E+01	4.498E-01	--
α_2	2.70E-05	1.22E-02	5.09E-03	4.83E-02	4.498E-01	3.653E+01	0.844

CCCG = 3, Gamma = 0.249

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9537531	0.9835141	0.9877615	0.9987498	7.029E+01	1.178E+00	--
α_2	5.71E-04	1.29E-02	8.82E-03	3.94E-02	9.387E-01	7.158E+01	0.846
α_3	3.72E-08	3.54E-03	5.71E-04	1.74E-02	2.396E-01	6.741E+01	0.907

CCCG = 4, Gamma = 0.252

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9543698	0.9809163	0.9840365	0.9967877	9.758E+01	1.898E+00	--
α_2	1.12E-03	1.25E-02	9.50E-03	3.41E-02	1.285E+00	1.016E+02	0.840
α_3	4.10E-06	4.44E-03	1.59E-03	1.85E-02	3.927E-01	8.800E+01	0.977
α_4	8.25E-09	2.15E-03	2.87E-04	1.08E-02	2.207E-01	1.025E+02	0.840

CCCG = 5, Gamma = 0.254

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9581539	0.9790071	0.9808900	0.9934246	1.635E+02	3.506E+00	--
α_2	2.09E-03	1.17E-02	9.85E-03	2.77E-02	1.992E+00	1.682E+02	0.892
α_3	3.78E-04	6.11E-03	4.38E-03	1.78E-02	1.078E+00	1.752E+02	0.861
α_4	1.38E-06	2.63E-03	8.50E-04	1.13E-02	3.632E-01	1.380E+02	1.098
α_5	5.05E-21	5.47E-04	3.16E-07	3.16E-03	7.248E-02	1.325E+02	1.145

CCCG = 6, Gamma = 0.255

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9601313	0.9790181	0.9805937	0.9925211	1.959E+02	4.199E+00	--
α_2	1.72E-03	1.00E-02	8.38E-03	2.39E-02	1.941E+00	1.919E+02	0.968
α_3	5.67E-04	5.92E-03	4.54E-03	1.60E-02	1.332E+00	2.237E+02	0.834
α_4	3.38E-05	3.16E-03	1.70E-03	1.12E-02	6.181E-01	1.953E+02	0.957
α_5	9.98E-09	1.45E-03	2.16E-04	7.21E-03	2.313E-01	1.587E+02	1.180
α_6	4.00E-20	4.39E-04	4.13E-07	2.55E-03	7.684E-02	1.751E+02	1.071

CCCG = 7, Gamma = 0.256

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9633893	0.9787978	0.9798765	0.9905223	2.873E+02	6.223E+00	--
α_2	2.29E-03	9.37E-03	8.24E-03	2.03E-02	2.654E+00	2.807E+02	0.969
α_3	7.14E-04	5.24E-03	4.23E-03	1.32E-02	1.645E+00	3.124E+02	0.875
α_4	2.33E-04	3.51E-03	2.54E-03	1.01E-02	1.115E+00	3.169E+02	0.864
α_5	2.13E-05	2.20E-03	1.16E-03	7.89E-03	6.034E-01	2.739E+02	1.001
α_6	1.38E-10	7.79E-04	5.81E-05	4.14E-03	1.780E-01	2.282E+02	1.203
α_7	6.25E-51	1.15E-04	2.36E-14	4.06E-04	2.734E-02	2.380E+02	1.154

CCCG = 8, Gamma = 0.257

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9634992	0.9788439	0.9799165	0.9905258	2.890E+02	6.246E+00	--
α_2	2.01E-03	8.72E-03	7.60E-03	1.92E-02	2.504E+00	2.848E+02	1.012
α_3	5.04E-04	4.70E-03	3.66E-03	1.25E-02	1.419E+00	3.003E+02	0.964
α_4	1.73E-04	3.15E-03	2.21E-03	9.32E-03	1.027E+00	3.255E+02	0.891
α_5	4.91E-05	2.38E-03	1.43E-03	7.96E-03	7.337E-01	3.072E+02	0.944
α_6	1.54E-06	1.54E-03	5.56E-04	6.42E-03	3.975E-01	2.575E+02	1.128
α_7	3.60E-20	3.60E-04	3.45E-07	2.09E-03	7.703E-02	2.140E+02	1.358
α_8	2.85E-18	3.08E-04	7.68E-07	1.79E-03	8.749E-02	2.844E+02	1.022

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.84E-01	9.81E-01	9.79E-01	9.79E-01	9.79E-01	9.79E-01
α_2	1.22E-02	1.29E-02	1.25E-02	1.17E-02	1.00E-02	9.37E-03	8.72E-03
α_3		3.54E-03	4.44E-03	6.11E-03	5.92E-03	5.24E-03	4.70E-03
α_4			2.15E-03	2.63E-03	3.16E-03	3.51E-03	3.15E-03
α_5				5.47E-04	1.45E-03	2.20E-03	2.38E-03
α_6					4.39E-04	7.79E-04	1.54E-03
α_7						1.15E-04	3.60E-04
α_8							3.08E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.84E-01	9.81E-01	9.79E-01	9.79E-01	9.79E-01	9.79E-01
Beta	1.22E-02	1.65E-02	1.91E-02	2.10E-02	2.10E-02	2.12E-02	2.12E-02
Gamma		2.15E-01	3.45E-01	4.42E-01	5.23E-01	5.58E-01	5.88E-01
Delta			3.26E-01	3.42E-01	4.60E-01	5.57E-01	6.22E-01
Epsilon				1.72E-01	3.75E-01	4.69E-01	5.93E-01
Mu					2.32E-01	2.89E-01	4.81E-01
Omega						1.28E-01	3.02E-01
Sigma							4.61E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	17.09	25.63	34.18	42.72	51.27	59.81	68.36
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 13.2

Total Number of Common-Cause Failure Events: 5

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.165

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7476378	0.8816341	0.8942658	0.9722602	1.773E+01	2.380E+00	--
α_2	2.77E-02	1.18E-01	1.06E-01	2.52E-01	2.380E+00	1.773E+01	0.844

CCCG = 3, Gamma = 0.151

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7610178	0.8671265	0.8744343	0.9481990	2.911E+01	4.460E+00	--
α_2	2.36E-02	8.48E-02	7.68E-02	1.73E-01	2.917E+00	3.148E+01	0.846
α_3	6.13E-03	4.81E-02	3.90E-02	1.21E-01	1.543E+00	3.055E+01	0.907

CCCG = 4, Gamma = 0.142

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7816339	0.8694787	0.8746988	0.9394592	4.110E+01	6.169E+00	--
α_2	2.01E-02	6.58E-02	6.01E-02	1.31E-01	3.289E+00	4.666E+01	0.840
α_3	9.92E-03	4.98E-02	4.30E-02	1.13E-01	2.139E+00	4.079E+01	0.977
α_4	3.22E-04	1.49E-02	9.06E-03	4.92E-02	7.414E-01	4.917E+01	0.840

CCCG = 5, Gamma = 0.135

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8453407	0.9022567	0.9053428	0.9486251	7.834E+01	8.487E+00	--
α_2	1.47E-02	4.29E-02	3.96E-02	8.26E-02	3.895E+00	8.680E+01	0.892
α_3	6.82E-03	2.79E-02	2.46E-02	6.02E-02	2.624E+00	9.134E+01	0.861
α_4	3.16E-03	2.26E-02	1.84E-02	5.62E-02	1.663E+00	7.206E+01	1.098
α_5	5.41E-07	4.31E-03	1.09E-03	1.96E-02	3.049E-01	7.036E+01	1.145

CCCG = 6, Gamma = 0.131

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8598555	0.9098964	0.9125202	0.9509719	9.466E+01	9.373E+00	--
α_2	9.84E-03	3.26E-02	2.96E-02	6.56E-02	3.326E+00	9.883E+01	0.968
α_3	6.75E-03	2.48E-02	2.22E-02	5.19E-02	2.946E+00	1.156E+02	0.834
α_4	2.81E-03	1.76E-02	1.46E-02	4.28E-02	1.822E+00	1.014E+02	0.957
α_5	8.09E-04	1.29E-02	9.29E-03	3.74E-02	1.082E+00	8.270E+01	1.180
α_6	1.88E-09	2.14E-03	2.17E-04	1.11E-02	1.978E-01	9.213E+01	1.071

CCCG = 7, Gamma = 0.127

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.8907454	0.9271886	0.9289639	0.9575691	1.485E+02	1.166E+01	--
α_2	6.78E-03	2.20E-02	2.00E-02	4.42E-02	3.427E+00	1.522E+02	0.969
α_3	6.25E-03	2.01E-02	1.83E-02	4.02E-02	3.470E+00	1.690E+02	0.875
α_4	2.77E-03	1.31E-02	1.13E-02	2.97E-02	2.294E+00	1.723E+02	0.864
α_5	1.40E-03	1.06E-02	8.56E-03	2.70E-02	1.602E+00	1.491E+02	1.001
α_6	1.61E-04	6.24E-03	3.89E-03	2.03E-02	7.829E-01	1.246E+02	1.203
α_7	1.27E-18	6.40E-04	1.16E-06	3.73E-03	8.362E-02	1.306E+02	1.154

CCCG = 8, Gamma = 0.124

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9009372	0.9325600	0.9340224	0.9591894	1.836E+02	1.328E+01	--
α_2	5.21E-03	1.73E-02	1.57E-02	3.50E-02	3.336E+00	1.893E+02	1.012
α_3	5.47E-03	1.74E-02	1.58E-02	3.47E-02	3.523E+00	1.988E+02	0.964
α_4	3.05E-03	1.23E-02	1.08E-02	2.65E-02	2.692E+00	2.163E+02	0.891
α_5	1.42E-03	8.90E-03	7.37E-03	2.16E-02	1.838E+00	2.047E+02	0.944
α_6	7.00E-04	7.56E-03	5.77E-03	2.06E-02	1.307E+00	1.716E+02	1.128
α_7	2.09E-05	3.73E-03	1.81E-03	1.40E-02	5.357E-01	1.430E+02	1.358
α_8	5.17E-33	2.29E-04	3.95E-10	1.15E-03	4.370E-02	1.907E+02	1.022

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	8.82E-01	8.67E-01	8.69E-01	9.02E-01	9.10E-01	9.27E-01	9.33E-01
α_2	1.18E-01	8.48E-02	6.58E-02	4.29E-02	3.26E-02	2.20E-02	1.73E-02
α_3		4.81E-02	4.98E-02	2.79E-02	2.48E-02	2.01E-02	1.74E-02
α_4			1.49E-02	2.26E-02	1.76E-02	1.31E-02	1.23E-02
α_5				4.31E-03	1.29E-02	1.06E-02	8.90E-03
α_6					2.14E-03	6.24E-03	7.56E-03
α_7						6.40E-04	3.73E-03
α_8							2.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	8.82E-01	8.67E-01	8.69E-01	9.02E-01	9.10E-01	9.27E-01	9.33E-01
Beta	1.18E-01	1.33E-01	1.31E-01	9.77E-02	9.01E-02	7.28E-02	6.74E-02
Gamma		3.62E-01	4.96E-01	5.61E-01	6.39E-01	6.97E-01	7.43E-01
Delta			2.30E-01	4.90E-01	5.68E-01	6.04E-01	6.53E-01
Epsilon				1.61E-01	4.60E-01	5.71E-01	6.24E-01
Mu					1.42E-01	3.93E-01	5.64E-01
Omega						9.29E-02	3.44E-01
Sigma							5.79E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.37	9.56	12.74	15.93	19.12	22.30	25.49
N_1	3.1667	2.5000	2.0000	1.8750	1.6875	1.4766	1.2656
N_2	2.0000	2.2500	2.2500	2.1042	1.9913	1.8783	1.7532
N_3		1.2500	1.7500	1.4167	1.4149	1.4815	1.5373

N₄			0.5000	1.2292	1.1024	1.0069	1.0201
N₅				0.2500	0.8351	0.9112	0.8267
N₆					0.1250	0.5502	0.7365
N₇						0.0625	0.3548
N₈							0.0313

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 41.5

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.305

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9643575	0.9906132	0.9955989	0.9999582	5.389E+01	5.106E-01	--
α_2	4.18E-05	9.39E-03	4.40E-03	3.56E-02	5.106E-01	5.389E+01	0.844

CCCG = 3, Gamma = 0.310

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9689989	0.9888375	0.9916411	0.9990912	1.083E+02	1.223E+00	--
α_2	3.58E-04	8.35E-03	5.65E-03	2.56E-02	9.304E-01	1.105E+02	0.846
α_3	2.36E-07	2.81E-03	6.59E-04	1.30E-02	2.921E-01	1.036E+02	0.907

CCCG = 4, Gamma = 0.313

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9722554	0.9878988	0.9896427	0.9975792	1.790E+02	2.193E+00	--
α_2	1.04E-03	8.30E-03	6.62E-03	2.13E-02	1.552E+00	1.855E+02	0.840
α_3	4.50E-06	2.68E-03	1.06E-03	1.08E-02	4.307E-01	1.603E+02	0.977
α_4	2.23E-09	1.12E-03	1.32E-04	5.72E-03	2.099E-01	1.867E+02	0.840

CCCG = 5, Gamma = 0.315

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9757688	0.9878825	0.9889875	0.9962201	2.859E+02	3.507E+00	--
α_2	1.32E-03	7.03E-03	5.96E-03	1.64E-02	2.084E+00	2.942E+02	0.892
α_3	1.36E-04	3.07E-03	2.08E-03	9.38E-03	9.426E-01	3.060E+02	0.861
α_4	1.19E-06	1.58E-03	5.45E-04	6.69E-03	3.816E-01	2.404E+02	1.098
α_5	1.71E-16	4.27E-04	2.34E-06	2.49E-03	9.865E-02	2.307E+02	1.145

CCCG = 6, Gamma = 0.316

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9770678	0.9878063	0.9886914	0.9955214	3.582E+02	4.422E+00	--
α_2	1.38E-03	6.52E-03	5.62E-03	1.47E-02	2.314E+00	3.526E+02	0.968
α_3	1.76E-04	2.69E-03	1.94E-03	7.76E-03	1.108E+00	4.108E+02	0.834
α_4	2.40E-05	1.81E-03	1.01E-03	6.34E-03	6.509E-01	3.580E+02	0.957
α_5	1.73E-08	8.71E-04	1.57E-04	4.20E-03	2.536E-01	2.908E+02	1.180
α_6	4.84E-17	2.98E-04	1.35E-06	1.74E-03	9.572E-02	3.207E+02	1.071

CCCG = 7, Gamma = 0.317

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9797951	0.9884605	0.9890880	0.9949830	5.081E+02	5.931E+00	--
α_2	1.43E-03	5.58E-03	4.94E-03	1.19E-02	2.789E+00	4.966E+02	0.969
α_3	2.50E-04	2.48E-03	1.91E-03	6.65E-03	1.372E+00	5.521E+02	0.875
α_4	9.06E-05	1.78E-03	1.23E-03	5.33E-03	9.967E-01	5.594E+02	0.864
α_5	5.49E-06	1.09E-03	5.15E-04	4.09E-03	5.249E-01	4.832E+02	1.001
α_6	3.61E-10	4.86E-04	4.75E-05	2.52E-03	1.956E-01	4.022E+02	1.203
α_7	3.60E-28	1.26E-04	2.86E-09	6.84E-04	5.291E-02	4.195E+02	1.154

CCCG = 8, Gamma = 0.318

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9800494	0.9882781	0.9888417	0.9945825	5.661E+02	6.714E+00	--
α_2	1.47E-03	5.37E-03	4.79E-03	1.12E-02	3.001E+00	5.563E+02	1.012
α_3	2.32E-04	2.32E-03	1.79E-03	6.24E-03	1.365E+00	5.860E+02	0.964
α_4	9.47E-05	1.65E-03	1.16E-03	4.85E-03	1.047E+00	6.346E+02	0.891
α_5	2.98E-05	1.27E-03	7.78E-04	4.20E-03	7.626E-01	5.988E+02	0.944
α_6	1.49E-07	6.52E-04	1.82E-04	2.90E-03	3.271E-01	5.017E+02	1.128
α_7	3.12E-13	3.22E-04	8.64E-06	1.81E-03	1.344E-01	4.167E+02	1.358
α_8	1.25E-20	1.39E-04	1.30E-07	8.05E-04	7.682E-02	5.537E+02	1.022

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.89E-01	9.88E-01	9.88E-01	9.88E-01	9.88E-01	9.88E-01
α_2	9.39E-03	8.35E-03	8.30E-03	7.03E-03	6.52E-03	5.58E-03	5.37E-03
α_3		2.81E-03	2.68E-03	3.07E-03	2.69E-03	2.48E-03	2.32E-03
α_4			1.12E-03	1.58E-03	1.81E-03	1.78E-03	1.65E-03
α_5				4.27E-04	8.71E-04	1.09E-03	1.27E-03
α_6					2.98E-04	4.86E-04	6.52E-04
α_7						1.26E-04	3.22E-04
α_8							1.39E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.89E-01	9.88E-01	9.88E-01	9.88E-01	9.88E-01	9.88E-01
Beta	9.39E-03	1.12E-02	1.21E-02	1.21E-02	1.22E-02	1.15E-02	1.17E-02
Gamma		2.52E-01	3.14E-01	4.19E-01	4.65E-01	5.16E-01	5.42E-01
Delta			2.95E-01	3.96E-01	5.26E-01	5.84E-01	6.34E-01
Epsilon				2.12E-01	3.92E-01	4.88E-01	5.91E-01
Mu					2.55E-01	3.61E-01	4.67E-01
Omega						2.06E-01	4.14E-01
Sigma							3.01E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	20.03	30.05	40.07	50.09	60.10	70.12	80.14
N_1	1.2533	1.7600	2.1867	2.5333	2.8000	3.1080	3.3850
N_2	0.0400	0.1200	0.2400	0.4000	0.6000	0.6840	0.7725
N_3		0.0000	0.0000	0.0000	0.0000	0.0520	0.1046

N₄			0.0000	0.0000	0.0000	0.0000	0.0050
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 15.7

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.108

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9862429	0.9964308	0.9983886	0.9999869	1.377E+02	4.932E-01	--
α_2	1.31E-05	3.57E-03	1.61E-03	1.38E-02	4.932E-01	1.377E+02	0.844

CCCG = 3, Gamma = 0.110

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9896290	0.9964606	0.9974861	0.9997905	2.983E+02	1.060E+00	--
α_2	4.35E-05	2.33E-03	1.37E-03	7.86E-03	7.137E-01	3.057E+02	0.846
α_3	4.35E-07	1.21E-03	3.66E-04	5.28E-03	3.458E-01	2.855E+02	0.907

CCCG = 4, Gamma = 0.112

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9915650	0.9963753	0.9969244	0.9993088	5.813E+02	2.115E+00	--
α_2	3.22E-04	2.60E-03	2.07E-03	6.70E-03	1.549E+00	5.939E+02	0.840
α_3	1.61E-08	5.17E-04	1.01E-04	2.46E-03	2.646E-01	5.114E+02	0.977
α_4	5.59E-08	5.06E-04	1.24E-04	2.31E-03	3.010E-01	5.946E+02	0.840

CCCG = 5, Gamma = 0.113

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9939475	0.9966390	0.9968456	0.9986253	1.579E+03	5.325E+00	--
α_2	7.26E-04	2.28E-03	2.07E-03	4.53E-03	3.632E+00	1.590E+03	0.892
α_3	8.05E-05	8.20E-04	6.29E-04	2.21E-03	1.354E+00	1.650E+03	0.861
α_4	2.17E-08	2.29E-04	5.45E-05	1.05E-03	2.961E-01	1.295E+03	1.098
α_5	1.02E-34	3.42E-05	3.76E-11	1.69E-04	4.243E-02	1.242E+03	1.145

CCCG = 6, Gamma = 0.113

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9934024	0.9964036	0.9966417	0.9985916	1.367E+03	4.936E+00	--
α_2	5.81E-04	2.19E-03	1.94E-03	4.62E-03	2.915E+00	1.331E+03	0.968
α_3	6.93E-05	8.12E-04	6.10E-04	2.24E-03	1.257E+00	1.547E+03	0.834
α_4	1.52E-06	3.73E-04	1.71E-04	1.43E-03	5.031E-01	1.348E+03	0.957
α_5	3.06E-15	1.06E-04	1.39E-06	6.05E-04	1.155E-01	1.094E+03	1.180
α_6	5.63E-13	1.20E-04	4.41E-06	6.67E-04	1.451E-01	1.205E+03	1.071

CCCG = 7, Gamma = 0.114

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9948475	0.9967393	0.9968505	0.9982518	2.951E+03	9.654E+00	--
α_2	6.60E-04	1.71E-03	1.59E-03	3.14E-03	4.851E+00	2.840E+03	0.969
α_3	2.27E-04	8.88E-04	7.85E-04	1.90E-03	2.800E+00	3.150E+03	0.875
α_4	4.43E-05	4.34E-04	3.35E-04	1.16E-03	1.384E+00	3.191E+03	0.864
α_5	6.30E-07	1.78E-04	7.95E-05	6.88E-04	4.902E-01	2.755E+03	1.001
α_6	1.19E-15	5.00E-05	6.33E-07	2.87E-04	1.146E-01	2.293E+03	1.203
α_7	3.22E-93	6.13E-06	6.52E-25	7.28E-06	1.464E-02	2.390E+03	1.154

CCCG = 8, Gamma = 0.114

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9943873	0.9966640	0.9968172	0.9984175	2.136E+03	7.148E+00	--
α_2	3.90E-04	1.44E-03	1.28E-03	3.02E-03	2.980E+00	2.070E+03	1.012
α_3	1.56E-04	9.00E-04	7.53E-04	2.15E-03	1.960E+00	2.175E+03	0.964
α_4	3.62E-05	4.95E-04	3.63E-04	1.40E-03	1.166E+00	2.355E+03	0.891
α_5	1.37E-06	2.42E-04	1.17E-04	9.05E-04	5.375E-01	2.222E+03	0.944
α_6	2.14E-11	9.70E-05	7.53E-06	5.13E-04	1.805E-01	1.861E+03	1.128
α_7	1.39E-35	2.68E-05	2.00E-11	1.31E-04	4.139E-02	1.545E+03	1.358
α_8	8.40E-09	1.38E-04	3.04E-05	6.42E-04	2.827E-01	2.052E+03	1.022

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01
α_2	3.57E-03	2.33E-03	2.60E-03	2.28E-03	2.19E-03	1.71E-03	1.44E-03
α_3		1.21E-03	5.17E-04	8.20E-04	8.12E-04	8.88E-04	9.00E-04
α_4			5.06E-04	2.29E-04	3.73E-04	4.34E-04	4.95E-04
α_5				3.42E-05	1.06E-04	1.78E-04	2.42E-04
α_6					1.20E-04	5.00E-05	9.70E-05
α_7						6.13E-06	2.68E-05
α_8							1.38E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01
Beta	3.57E-03	3.54E-03	3.62E-03	3.36E-03	3.60E-03	3.26E-03	3.34E-03
Gamma		3.42E-01	2.82E-01	3.22E-01	3.92E-01	4.77E-01	5.69E-01
Delta			4.95E-01	2.43E-01	4.25E-01	4.29E-01	5.26E-01
Epsilon				1.30E-01	3.77E-01	3.51E-01	5.04E-01
Mu					5.33E-01	2.40E-01	5.20E-01
Omega						1.09E-01	6.29E-01
Sigma							8.37E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.58	11.37	15.16	18.95	22.74	26.53	30.32
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.9 High Pressure Safety Injection Pumps

2.1.9.1 HPI-MDP-FS: HPSI Motor-Driven Pumps Fail to Start

Generic CCF Parameters

System Group: Clean Water
System: Chemical and Volume Control, High Pressure Injection
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Start
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 42.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9717411	0.9927898	0.9968831	0.9999780	1.0000000	6.451E+01	4.685E-01
α_2	2.01E-05	7.21E-03	3.12E-03	2.83E-02	0.00E+00	4.685E-01	6.451E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9681735	0.9888541	0.9918709	0.9992312	1.0000000	1.001E+02	1.128E+00
α_2	2.81E-04	8.41E-03	5.47E-03	2.66E-02	0.00E+00	8.512E-01	1.004E+02
α_3	1.36E-07	2.74E-03	5.84E-04	1.28E-02	0.00E+00	2.768E-01	1.009E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9662771	0.9859388	0.9882609	0.9976511	1.0000000	1.328E+02	1.894E+00
α_2	8.07E-04	9.35E-03	7.06E-03	2.57E-02	0.00E+00	1.260E+00	1.334E+02
α_3	3.24E-06	2.99E-03	1.10E-03	1.24E-02	0.00E+00	4.024E-01	1.343E+02
α_4	1.19E-08	1.72E-03	2.56E-04	8.51E-03	0.00E+00	2.315E-01	1.344E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9708151	0.9854798	0.9868289	0.9955425	1.0000000	2.329E+02	3.432E+00
α_2	1.38E-03	8.14E-03	6.80E-03	1.95E-02	0.00E+00	1.924E+00	2.344E+02
α_3	2.57E-04	4.44E-03	3.14E-03	1.30E-02	0.00E+00	1.049E+00	2.353E+02
α_4	1.23E-06	1.62E-03	5.57E-04	6.82E-03	0.00E+00	3.822E-01	2.360E+02
α_5	2.82E-20	3.25E-04	3.02E-07	1.89E-03	0.00E+00	7.674E-02	2.363E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9724157	0.9858571	0.9870367	0.9952820	1.0000000	2.673E+02	3.835E+00

α_2	8.99E-04	6.27E-03	5.11E-03	1.56E-02	0.00E+00	1.701E+00	2.695E+02
α_3	3.51E-04	4.45E-03	3.31E-03	1.25E-02	0.00E+00	1.207E+00	2.699E+02
α_4	2.01E-05	2.20E-03	1.15E-03	7.92E-03	0.00E+00	5.960E-01	2.706E+02
α_5	3.19E-09	8.15E-04	1.09E-04	4.09E-03	0.00E+00	2.211E-01	2.709E+02
α_6	3.18E-15	4.05E-04	4.10E-06	2.34E-03	0.00E+00	1.098E-01	2.710E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9758612	0.9863043	0.9870677	0.9941355	1.0000000	4.139E+02	5.747E+00
α_2	1.09E-03	5.35E-03	4.58E-03	1.22E-02	0.00E+00	2.243E+00	4.174E+02
α_3	5.21E-04	3.88E-03	3.13E-03	9.82E-03	0.00E+00	1.630E+00	4.180E+02
α_4	1.61E-04	2.58E-03	1.85E-03	7.51E-03	0.00E+00	1.083E+00	4.186E+02
α_5	9.74E-06	1.35E-03	6.79E-04	4.95E-03	0.00E+00	5.654E-01	4.191E+02
α_6	2.51E-10	4.57E-04	4.22E-05	2.38E-03	0.00E+00	1.916E-01	4.195E+02
α_7	5.68E-41	8.29E-05	3.08E-12	3.64E-04	0.00E+00	3.480E-02	4.196E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9769221	0.9869233	0.9876605	0.9944129	1.0000000	4.321E+02	5.726E+00
α_2	8.31E-04	4.61E-03	3.88E-03	1.09E-02	0.00E+00	2.018E+00	4.358E+02
α_3	3.28E-04	3.18E-03	2.46E-03	8.47E-03	0.00E+00	1.391E+00	4.365E+02
α_4	1.44E-04	2.43E-03	1.72E-03	7.11E-03	0.00E+00	1.062E+00	4.368E+02
α_5	2.83E-05	1.60E-03	9.37E-04	5.45E-03	0.00E+00	7.026E-01	4.371E+02
α_6	3.14E-07	7.99E-04	2.45E-04	3.47E-03	0.00E+00	3.497E-01	4.375E+02
α_7	1.20E-15	2.46E-04	2.26E-06	1.42E-03	0.00E+00	1.078E-01	4.377E+02
α_8	2.52E-17	2.16E-04	9.16E-07	1.26E-03	0.00E+00	9.469E-02	4.378E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.89E-01	9.86E-01	9.85E-01	9.86E-01	9.86E-01	9.87E-01
α_2	7.21E-03	8.41E-03	9.35E-03	8.14E-03	6.27E-03	5.35E-03	4.61E-03
α_3		2.74E-03	2.99E-03	4.44E-03	4.45E-03	3.88E-03	3.18E-03
α_4			1.72E-03	1.62E-03	2.20E-03	2.58E-03	2.43E-03
α_5				3.25E-04	8.15E-04	1.35E-03	1.60E-03
α_6					4.05E-04	4.57E-04	7.99E-04
α_7						8.29E-05	2.46E-04
α_8							2.16E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.89E-01	9.86E-01	9.85E-01	9.86E-01	9.86E-01	9.87E-01
Beta	7.21E-03	1.11E-02	1.41E-02	1.45E-02	1.41E-02	1.37E-02	1.31E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	42.10	42.10	42.10	42.10	42.10	42.10	42.10
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 15.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.356

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9792747	0.9946573	0.9976259	0.9999823	9.000E+01	4.834E-01	--
α_2	1.77E-05	5.34E-03	2.37E-03	2.07E-02	4.834E-01	9.000E+01	0.656

CCCG = 3, Gamma = 0.356

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9801420	0.9928578	0.9946590	0.9994176	1.704E+02	1.226E+00	--
α_2	2.70E-04	5.56E-03	3.83E-03	1.67E-02	9.769E-01	1.748E+02	0.830
α_3	2.53E-08	1.59E-03	2.75E-04	7.69E-03	2.487E-01	1.566E+02	0.930

CCCG = 4, Gamma = 0.356

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9774071	0.9903497	0.9918351	0.9982132	2.111E+02	2.057E+00	--
α_2	7.26E-04	6.58E-03	5.15E-03	1.73E-02	1.442E+00	2.177E+02	0.908
α_3	2.54E-06	2.03E-03	7.61E-04	8.33E-03	4.114E-01	2.027E+02	0.980
α_4	1.37E-09	1.05E-03	1.14E-04	5.36E-03	2.036E-01	1.946E+02	1.021

CCCG = 5, Gamma = 0.356

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9799496	0.9898460	0.9907317	0.9967160	3.590E+02	3.683E+00	--
α_2	1.22E-03	5.99E-03	5.14E-03	1.37E-02	2.243E+00	3.723E+02	0.986
α_3	1.43E-04	2.85E-03	1.97E-03	8.54E-03	9.912E-01	3.474E+02	1.060
α_4	7.59E-07	1.11E-03	3.76E-04	4.72E-03	3.765E-01	3.376E+02	1.093
α_5	1.79E-21	2.06E-04	1.17E-07	1.19E-03	7.237E-02	3.511E+02	1.052

CCCG = 6, Gamma = 0.356

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9808194	0.9899813	0.9907608	0.9964807	4.090E+02	4.139E+00	--
α_2	9.18E-04	4.77E-03	4.06E-03	1.11E-02	2.128E+00	4.438E+02	0.941
α_3	2.01E-04	2.91E-03	2.12E-03	8.34E-03	1.134E+00	3.883E+02	1.077
α_4	9.41E-06	1.44E-03	7.14E-04	5.33E-03	5.533E-01	3.836E+02	1.092
α_5	2.20E-09	5.66E-04	7.55E-05	2.84E-03	2.210E-01	3.904E+02	1.074
α_6	4.18E-16	3.28E-04	2.28E-06	1.90E-03	1.027E-01	3.130E+02	1.340

CCCG = 7, Gamma = 0.356

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9836258	0.9904779	0.9909577	0.9956919	6.691E+02	6.432E+00	--
α_2	9.92E-04	3.81E-03	3.38E-03	8.12E-03	2.840E+00	7.416E+02	0.944
α_3	4.10E-04	2.76E-03	2.26E-03	6.83E-03	1.746E+00	6.305E+02	1.111
α_4	1.07E-04	1.71E-03	1.23E-03	4.99E-03	1.084E+00	6.311E+02	1.111
α_5	4.86E-06	8.55E-04	4.14E-04	3.20E-03	5.376E-01	6.280E+02	1.118
α_6	2.89E-10	3.29E-04	3.32E-05	1.70E-03	1.979E-01	6.011E+02	1.168
α_7	1.04E-52	4.63E-05	4.64E-15	1.58E-04	2.656E-02	5.737E+02	1.225

CCCG = 8, Gamma = 0.356

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9843478	0.9910048	0.9914820	0.9960325	6.734E+02	6.112E+00	--
α_2	6.70E-04	3.10E-03	2.68E-03	6.97E-03	2.364E+00	7.608E+02	0.920
α_3	2.76E-04	2.32E-03	1.83E-03	6.01E-03	1.512E+00	6.514E+02	1.075
α_4	1.00E-04	1.70E-03	1.21E-03	5.01E-03	1.056E+00	6.184E+02	1.134
α_5	1.59E-05	1.05E-03	5.99E-04	3.63E-03	6.745E-01	6.402E+02	1.096
α_6	6.52E-08	4.85E-04	1.23E-04	2.20E-03	3.076E-01	6.335E+02	1.108
α_7	1.40E-15	2.00E-04	1.97E-06	1.15E-03	1.093E-01	5.467E+02	1.284
α_8	2.15E-18	1.39E-04	3.87E-07	8.13E-04	8.885E-02	6.369E+02	1.102

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.93E-01	9.90E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
α_2	5.34E-03	5.56E-03	6.58E-03	5.99E-03	4.77E-03	3.81E-03	3.10E-03
α_3		1.59E-03	2.03E-03	2.85E-03	2.91E-03	2.76E-03	2.32E-03
α_4			1.05E-03	1.11E-03	1.44E-03	1.71E-03	1.70E-03
α_5				2.06E-04	5.66E-04	8.55E-04	1.05E-03
α_6					3.28E-04	3.29E-04	4.85E-04
α_7						4.63E-05	2.00E-04
α_8							1.39E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.93E-01	9.90E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
Beta	5.34E-03	7.14E-03	9.65E-03	1.02E-02	1.00E-02	9.52E-03	9.00E-03
Gamma		2.22E-01	3.18E-01	4.10E-01	5.24E-01	5.99E-01	6.56E-01
Delta			3.40E-01	3.17E-01	4.45E-01	5.16E-01	6.07E-01
Epsilon				1.56E-01	3.83E-01	4.18E-01	5.24E-01
Mu					3.67E-01	3.05E-01	4.39E-01
Omega						1.23E-01	4.12E-01
Sigma							4.11E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	15.00	15.00	15.00	15.00	15.00	15.00	15.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 10.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.249

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9524367	0.9880163	0.9949825	0.9999734	3.708E+01	4.498E-01	--
α_2	2.66E-05	1.20E-02	5.02E-03	4.76E-02	4.498E-01	3.708E+01	0.656

CCCG = 3, Gamma = 0.249

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9393794	0.9783330	0.9838684	0.9983492	5.320E+01	1.178E+00	--
α_2	7.47E-04	1.68E-02	1.15E-02	5.12E-02	9.387E-01	5.478E+01	0.830
α_3	5.07E-08	4.82E-03	7.80E-04	2.36E-02	2.396E-01	4.948E+01	0.930

CCCG = 4, Gamma = 0.249

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9325225	0.9716594	0.9762162	0.9951989	6.509E+01	1.898E+00	--
α_2	1.68E-03	1.86E-02	1.42E-02	5.06E-02	1.285E+00	6.777E+01	0.908
α_3	5.68E-06	6.14E-03	2.20E-03	2.56E-02	3.927E-01	6.359E+01	0.980
α_4	1.39E-08	3.60E-03	4.82E-04	1.81E-02	2.207E-01	6.117E+01	1.021

CCCG = 5, Gamma = 0.249

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9405359	0.9700697	0.9727079	0.9905835	1.136E+02	3.506E+00	--
α_2	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.992E+00	1.193E+02	0.986
α_3	5.92E-04	9.55E-03	6.85E-03	2.77E-02	1.078E+00	1.118E+02	1.060
α_4	1.75E-06	3.32E-03	1.08E-03	1.42E-02	3.632E-01	1.091E+02	1.093
α_5	5.89E-21	6.37E-04	3.69E-07	3.69E-03	7.248E-02	1.137E+02	1.052

CCCG = 6, Gamma = 0.249

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9446700	0.9707985	0.9729560	0.9895527	1.396E+02	4.199E+00	--
α_2	2.14E-03	1.24E-02	1.04E-02	2.96E-02	1.941E+00	1.541E+02	0.941
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.349E+02	1.077
α_4	4.94E-05	4.60E-03	2.48E-03	1.63E-02	6.181E-01	1.338E+02	1.092
α_5	1.16E-08	1.69E-03	2.51E-04	8.38E-03	2.313E-01	1.365E+02	1.074
α_6	6.41E-20	7.01E-04	6.62E-07	4.08E-03	7.684E-02	1.095E+02	1.340

CCCG = 7, Gamma = 0.249

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9504161	0.9712206	0.9726627	0.9870996	2.100E+02	6.223E+00	--
α_2	2.72E-03	1.11E-02	9.78E-03	2.41E-02	2.654E+00	2.362E+02	0.944
α_3	1.11E-03	8.11E-03	6.56E-03	2.04E-02	1.645E+00	2.012E+02	1.111
α_4	3.66E-04	5.50E-03	3.98E-03	1.58E-02	1.115E+00	2.017E+02	1.111
α_5	2.90E-05	2.99E-03	1.59E-03	1.07E-02	6.034E-01	2.011E+02	1.118
α_6	1.64E-10	9.23E-04	6.88E-05	4.90E-03	1.780E-01	1.928E+02	1.168
α_7	8.09E-51	1.49E-04	3.05E-14	5.25E-04	2.734E-02	1.841E+02	1.225

CCCG = 8, Gamma = 0.249

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9524370	0.9723799	0.9737620	0.9876020	2.199E+02	6.246E+00	--
α_2	2.28E-03	9.89E-03	8.63E-03	2.18E-02	2.504E+00	2.507E+02	0.920
α_3	7.03E-04	6.55E-03	5.11E-03	1.73E-02	1.419E+00	2.152E+02	1.075
α_4	2.75E-04	5.00E-03	3.51E-03	1.48E-02	1.027E+00	2.045E+02	1.134
α_5	7.12E-05	3.45E-03	2.07E-03	1.15E-02	7.337E-01	2.119E+02	1.096
α_6	1.88E-06	1.89E-03	6.83E-04	7.87E-03	3.975E-01	2.098E+02	1.108
α_7	4.25E-20	4.25E-04	4.08E-07	2.47E-03	7.703E-02	1.813E+02	1.284
α_8	3.84E-18	4.14E-04	1.03E-06	2.42E-03	8.749E-02	2.112E+02	1.102

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.78E-01	9.72E-01	9.70E-01	9.71E-01	9.71E-01	9.72E-01
α_2	1.20E-02	1.68E-02	1.86E-02	1.64E-02	1.24E-02	1.11E-02	9.89E-03
α_3		4.82E-03	6.14E-03	9.55E-03	9.77E-03	8.11E-03	6.55E-03
α_4			3.60E-03	3.32E-03	4.60E-03	5.50E-03	5.00E-03
α_5				6.37E-04	1.69E-03	2.99E-03	3.45E-03
α_6					7.01E-04	9.23E-04	1.89E-03
α_7						1.49E-04	4.25E-04
α_8							4.14E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.78E-01	9.72E-01	9.70E-01	9.71E-01	9.71E-01	9.72E-01
Beta	1.20E-02	2.17E-02	2.83E-02	2.99E-02	2.92E-02	2.88E-02	2.76E-02
Gamma		2.22E-01	3.43E-01	4.51E-01	5.74E-01	6.14E-01	6.42E-01
Delta			3.69E-01	2.93E-01	4.17E-01	5.41E-01	6.31E-01
Epsilon				1.61E-01	3.42E-01	4.25E-01	5.53E-01
Mu					2.93E-01	2.64E-01	4.42E-01
Omega						1.39E-01	3.07E-01
Sigma							4.94E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	10.50	10.50	10.50	10.50	10.50	10.50	10.50
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 7.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.181

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9624922	0.9904059	0.9958178	0.9999725	4.858E+01	4.706E-01	--
α_2	2.75E-05	9.59E-03	4.18E-03	3.75E-02	4.706E-01	4.858E+01	0.656

CCCG = 3, Gamma = 0.181

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9611898	0.9865015	0.9902160	0.9991163	8.057E+01	1.103E+00	--
α_2	2.77E-04	9.62E-03	6.11E-03	3.09E-02	8.104E-01	8.347E+01	0.830
α_3	3.27E-07	3.88E-03	9.13E-04	1.79E-02	2.921E-01	7.493E+01	0.930

CCCG = 4, Gamma = 0.181

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9644827	0.9850406	0.9874388	0.9973957	1.286E+02	1.953E+00	--
α_2	9.10E-04	9.75E-03	7.45E-03	2.64E-02	1.312E+00	1.332E+02	0.908
α_3	5.81E-06	3.45E-03	1.37E-03	1.40E-02	4.307E-01	1.242E+02	0.980
α_4	3.50E-09	1.75E-03	2.07E-04	8.93E-03	2.099E-01	1.194E+02	1.021

CCCG = 5, Gamma = 0.181

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9699817	0.9854722	0.9869572	0.9958869	2.107E+02	3.107E+00	--
α_2	1.07E-03	7.58E-03	6.17E-03	1.89E-02	1.684E+00	2.203E+02	0.986
α_3	2.02E-04	4.56E-03	3.10E-03	1.39E-02	9.426E-01	2.056E+02	1.060
α_4	1.43E-06	1.90E-03	6.55E-04	8.04E-03	3.816E-01	2.000E+02	1.093
α_5	1.89E-16	4.74E-04	2.60E-06	2.76E-03	9.865E-02	2.081E+02	1.052

CCCG = 6, Gamma = 0.181

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9733983	0.9863767	0.9875150	0.9954656	2.767E+02	3.822E+00	--
α_2	8.12E-04	5.61E-03	4.57E-03	1.39E-02	1.714E+00	3.040E+02	0.941
α_3	2.72E-04	4.15E-03	3.00E-03	1.20E-02	1.108E+00	2.658E+02	1.077
α_4	3.27E-05	2.47E-03	1.38E-03	8.63E-03	6.509E-01	2.627E+02	1.092
α_5	1.88E-08	9.47E-04	1.71E-04	4.57E-03	2.536E-01	2.675E+02	1.074
α_6	7.24E-17	4.46E-04	2.03E-06	2.60E-03	9.572E-02	2.145E+02	1.340

CCCG = 7, Gamma = 0.181

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9764780	0.9869770	0.9877820	0.9947265	3.937E+02	5.195E+00	--
α_2	9.02E-04	4.75E-03	4.03E-03	1.11E-02	2.105E+00	4.406E+02	0.944
α_3	3.30E-04	3.51E-03	2.68E-03	9.53E-03	1.320E+00	3.746E+02	1.111
α_4	1.35E-04	2.65E-03	1.84E-03	7.94E-03	9.967E-01	3.749E+02	1.111
α_5	7.10E-06	1.40E-03	6.67E-04	5.30E-03	5.249E-01	3.732E+02	1.118
α_6	4.07E-10	5.47E-04	5.35E-05	2.84E-03	1.956E-01	3.574E+02	1.168
α_7	4.43E-28	1.55E-04	3.52E-09	8.42E-04	5.291E-02	3.411E+02	1.225

CCCG = 8, Gamma = 0.181

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9782984	0.9876514	0.9883332	0.9946763	4.664E+02	5.832E+00	--
α_2	8.50E-04	4.19E-03	3.59E-03	9.59E-03	2.229E+00	5.296E+02	0.920
α_3	2.38E-04	2.77E-03	2.08E-03	7.64E-03	1.260E+00	4.537E+02	1.075
α_4	1.37E-04	2.41E-03	1.70E-03	7.12E-03	1.042E+00	4.306E+02	1.134
α_5	4.01E-05	1.71E-03	1.05E-03	5.63E-03	7.626E-01	4.458E+02	1.096
α_6	1.69E-07	7.41E-04	2.07E-04	3.29E-03	3.271E-01	4.413E+02	1.108
α_7	3.42E-13	3.53E-04	9.46E-06	1.98E-03	1.344E-01	3.809E+02	1.284
α_8	1.56E-20	1.73E-04	1.62E-07	1.00E-03	7.682E-02	4.438E+02	1.102

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.87E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	9.59E-03	9.62E-03	9.75E-03	7.58E-03	5.61E-03	4.75E-03	4.19E-03
α_3		3.88E-03	3.45E-03	4.56E-03	4.15E-03	3.51E-03	2.77E-03
α_4			1.75E-03	1.90E-03	2.47E-03	2.65E-03	2.41E-03
α_5				4.74E-04	9.47E-04	1.40E-03	1.71E-03
α_6					4.46E-04	5.47E-04	7.41E-04
α_7						1.55E-04	3.53E-04
α_8							1.73E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.87E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	9.59E-03	1.35E-02	1.50E-02	1.45E-02	1.36E-02	1.30E-02	1.23E-02
Gamma		2.88E-01	3.48E-01	4.78E-01	5.88E-01	6.35E-01	6.61E-01
Delta			3.37E-01	3.43E-01	4.82E-01	5.75E-01	6.61E-01
Epsilon				1.99E-01	3.60E-01	4.43E-01	5.52E-01
Mu					3.20E-01	3.33E-01	4.26E-01
Omega						2.21E-01	4.15E-01
Sigma							3.29E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.60	7.60	7.60	7.60	7.60	7.60	7.60
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 9.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9894329	0.9972594	0.9987640	0.9999899	1.795E+02	4.932E-01	--
α_2	1.01E-05	2.74E-03	1.24E-03	1.06E-02	4.932E-01	1.795E+02	0.656

CCCG = 3, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9895768	0.9964428	0.9974734	0.9997894	2.968E+02	1.059E+00	--
α_2	4.31E-05	2.31E-03	1.36E-03	7.78E-03	7.137E-01	3.088E+02	0.830
α_3	4.50E-07	1.25E-03	3.79E-04	5.46E-03	3.458E-01	2.759E+02	0.930

CCCG = 4, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9907048	0.9960050	0.9966098	0.9992380	5.272E+02	2.115E+00	--
α_2	3.53E-04	2.85E-03	2.27E-03	7.33E-03	1.549E+00	5.424E+02	0.908
α_3	1.64E-08	5.25E-04	1.03E-04	2.50E-03	2.646E-01	5.038E+02	0.980
α_4	6.88E-08	6.22E-04	1.53E-04	2.84E-03	3.010E-01	4.833E+02	1.021

CCCG = 5, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931353	0.9961875	0.9964216	0.9984403	1.391E+03	5.325E+00	--
α_2	8.09E-04	2.54E-03	2.31E-03	5.04E-03	3.632E+00	1.429E+03	0.986
α_3	9.98E-05	1.02E-03	7.80E-04	2.74E-03	1.354E+00	1.331E+03	1.060
α_4	2.17E-08	2.29E-04	5.47E-05	1.05E-03	2.961E-01	1.292E+03	1.093
α_5	9.40E-35	3.16E-05	3.48E-11	1.57E-04	4.243E-02	1.343E+03	1.052

CCCG = 6, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928696	0.9961128	0.9963700	0.9984776	1.265E+03	4.936E+00	--
α_2	5.71E-04	2.15E-03	1.91E-03	4.54E-03	2.915E+00	1.355E+03	0.941
α_3	9.05E-05	1.06E-03	7.97E-04	2.93E-03	1.257E+00	1.184E+03	1.077
α_4	1.75E-06	4.30E-04	1.97E-04	1.65E-03	5.031E-01	1.169E+03	1.092
α_5	2.81E-15	9.71E-05	1.28E-06	5.57E-04	1.155E-01	1.189E+03	1.074
α_6	7.12E-13	1.52E-04	5.58E-06	8.43E-04	1.451E-01	9.529E+02	1.340

CCCG = 7, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9942768	0.9963779	0.9965013	0.9980578	2.656E+03	9.654E+00	--
α_2	6.47E-04	1.67E-03	1.56E-03	3.08E-03	4.851E+00	2.899E+03	0.944
α_3	2.91E-04	1.14E-03	1.00E-03	2.43E-03	2.800E+00	2.463E+03	1.111
α_4	5.73E-05	5.61E-04	4.33E-04	1.50E-03	1.384E+00	2.465E+03	1.111
α_5	7.08E-07	2.00E-04	8.94E-05	7.73E-04	4.902E-01	2.451E+03	1.118
α_6	1.16E-15	4.89E-05	6.19E-07	2.80E-04	1.146E-01	2.346E+03	1.168
α_7	3.44E-93	6.54E-06	6.96E-25	7.77E-06	1.464E-02	2.238E+03	1.225

CCCG = 8, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940670	0.9964734	0.9966353	0.9983270	2.020E+03	7.148E+00	--
α_2	3.58E-04	1.32E-03	1.18E-03	2.77E-03	2.980E+00	2.255E+03	0.920
α_3	1.76E-04	1.01E-03	8.49E-04	2.42E-03	1.960E+00	1.929E+03	1.075
α_4	4.65E-05	6.36E-04	4.67E-04	1.81E-03	1.166E+00	1.831E+03	1.134
α_5	1.61E-06	2.84E-04	1.37E-04	1.06E-03	5.375E-01	1.895E+03	1.096
α_6	2.13E-11	9.63E-05	7.47E-06	5.09E-04	1.805E-01	1.874E+03	1.108
α_7	1.32E-35	2.56E-05	1.91E-11	1.25E-04	4.139E-02	1.617E+03	1.284
α_8	9.15E-09	1.50E-04	3.31E-05	6.99E-04	2.827E-01	1.884E+03	1.102

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	2.74E-03	2.31E-03	2.85E-03	2.54E-03	2.15E-03	1.67E-03	1.32E-03
α_3		1.25E-03	5.25E-04	1.02E-03	1.06E-03	1.14E-03	1.01E-03
α_4			6.22E-04	2.29E-04	4.30E-04	5.61E-04	6.36E-04
α_5				3.16E-05	9.71E-05	2.00E-04	2.84E-04
α_6					1.52E-04	4.89E-05	9.63E-05
α_7						6.54E-06	2.56E-05
α_8							1.50E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	2.74E-03	3.56E-03	3.99E-03	3.81E-03	3.89E-03	3.62E-03	3.53E-03
Gamma		3.52E-01	2.87E-01	3.35E-01	4.48E-01	5.39E-01	6.26E-01
Delta			5.42E-01	2.04E-01	3.91E-01	4.18E-01	5.40E-01
Epsilon				1.21E-01	3.67E-01	3.13E-01	4.66E-01
Mu					6.10E-01	2.17E-01	4.90E-01
Omega						1.18E-01	6.46E-01
Sigma							8.54E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	9.00	9.00	9.00	9.00	9.00	9.00	9.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.9.2 HPI-MDP-FH: HPSI Motor-Driven Pumps Fail to Run Less Than One Hour

Generic CCF Parameters

System Group: Clean Water
System: Chemical and Volume Control, High Pressure Injection
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run < 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9265716	0.9811696	0.9917194	0.9999431	1.0000000	2.441E+01	4.685E-01
α_2	5.35E-05	1.88E-02	8.28E-03	7.34E-02	0.00E+00	4.685E-01	2.441E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9474768	0.9815399	0.9864769	0.9987198	1.0000000	5.998E+01	1.128E+00
α_2	4.68E-04	1.39E-02	9.10E-03	4.39E-02	0.00E+00	8.512E-01	6.026E+01
α_3	2.27E-07	4.53E-03	9.72E-04	2.13E-02	0.00E+00	2.768E-01	6.083E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9521027	0.9799764	0.9832554	0.9966416	1.0000000	9.268E+01	1.894E+00
α_2	1.15E-03	1.33E-02	1.01E-02	3.66E-02	0.00E+00	1.260E+00	9.331E+01
α_3	4.63E-06	4.26E-03	1.56E-03	1.76E-02	0.00E+00	4.024E-01	9.417E+01
α_4	1.70E-08	2.45E-03	3.65E-04	1.21E-02	0.00E+00	2.315E-01	9.434E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9648968	0.9825131	0.9841236	0.9946232	1.0000000	1.928E+02	3.432E+00
α_2	1.67E-03	9.80E-03	8.20E-03	2.34E-02	0.00E+00	1.924E+00	1.943E+02
α_3	3.10E-04	5.34E-03	3.79E-03	1.57E-02	0.00E+00	1.049E+00	1.952E+02
α_4	1.48E-06	1.95E-03	6.71E-04	8.21E-03	0.00E+00	3.822E-01	1.959E+02
α_5	3.40E-20	3.91E-04	3.64E-07	2.27E-03	0.00E+00	7.674E-02	1.962E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9676555	0.9834025	0.9847752	0.9944521	1.0000000	2.272E+02	3.835E+00
α_2	1.06E-03	7.36E-03	6.00E-03	1.83E-02	0.00E+00	1.701E+00	2.294E+02
α_3	4.12E-04	5.22E-03	3.88E-03	1.46E-02	0.00E+00	1.207E+00	2.298E+02

α_4	2.36E-05	2.58E-03	1.35E-03	9.29E-03	0.00E+00	5.960E-01	2.305E+02
α_5	3.75E-09	9.57E-04	1.28E-04	4.80E-03	0.00E+00	2.211E-01	2.308E+02
α_6	3.74E-15	4.75E-04	4.81E-06	2.74E-03	0.00E+00	1.098E-01	2.309E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9733172	0.9848573	0.9856988	0.9935127	1.0000000	3.738E+02	5.747E+00
α_2	1.21E-03	5.91E-03	5.07E-03	1.35E-02	0.00E+00	2.243E+00	3.773E+02
α_3	5.76E-04	4.29E-03	3.46E-03	1.09E-02	0.00E+00	1.630E+00	3.779E+02
α_4	1.78E-04	2.85E-03	2.04E-03	8.30E-03	0.00E+00	1.083E+00	3.785E+02
α_5	1.08E-05	1.49E-03	7.51E-04	5.47E-03	0.00E+00	5.654E-01	3.790E+02
α_6	2.77E-10	5.05E-04	4.66E-05	2.63E-03	0.00E+00	1.916E-01	3.794E+02
α_7	6.28E-41	9.17E-05	3.41E-12	4.02E-04	0.00E+00	3.480E-02	3.795E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9746063	0.9856050	0.9864091	0.9938511	1.0000000	3.920E+02	5.726E+00
α_2	9.15E-04	5.07E-03	4.27E-03	1.20E-02	0.00E+00	2.018E+00	3.957E+02
α_3	3.61E-04	3.50E-03	2.71E-03	9.33E-03	0.00E+00	1.391E+00	3.964E+02
α_4	1.59E-04	2.67E-03	1.90E-03	7.82E-03	0.00E+00	1.062E+00	3.967E+02
α_5	3.12E-05	1.77E-03	1.03E-03	6.00E-03	0.00E+00	7.026E-01	3.970E+02
α_6	3.45E-07	8.79E-04	2.70E-04	3.82E-03	0.00E+00	3.497E-01	3.974E+02
α_7	1.33E-15	2.71E-04	2.49E-06	1.57E-03	0.00E+00	1.078E-01	3.976E+02
α_8	2.77E-17	2.38E-04	1.01E-06	1.39E-03	0.00E+00	9.469E-02	3.977E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.88E-02	1.39E-02	1.33E-02	9.80E-03	7.36E-03	5.91E-03	5.07E-03
α_3		4.53E-03	4.26E-03	5.34E-03	5.22E-03	4.29E-03	3.50E-03
α_4			2.45E-03	1.95E-03	2.58E-03	2.85E-03	2.67E-03
α_5				3.91E-04	9.57E-04	1.49E-03	1.77E-03
α_6					4.75E-04	5.05E-04	8.79E-04
α_7						9.17E-05	2.71E-04
α_8							2.38E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.88E-02	1.85E-02	2.00E-02	1.75E-02	1.66E-02	1.51E-02	1.44E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9081027	0.9767306	0.9900982	0.9999474	1.888E+01	4.498E-01	--
α_2	5.26E-05	2.33E-02	9.90E-03	9.19E-02	4.498E-01	1.888E+01	0.782

CCCG = 3, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9332854	0.9761279	0.9822046	0.9981776	4.818E+01	1.178E+00	--
α_2	8.24E-04	1.86E-02	1.27E-02	5.63E-02	9.387E-01	4.963E+01	0.727
α_3	5.59E-08	5.31E-03	8.60E-04	2.60E-02	2.396E-01	4.490E+01	0.814

CCCG = 4, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9352419	0.9728161	0.9771961	0.9953985	6.794E+01	1.898E+00	--
α_2	1.64E-03	1.81E-02	1.38E-02	4.93E-02	1.285E+00	6.962E+01	0.750
α_3	5.23E-06	5.66E-03	2.03E-03	2.36E-02	3.927E-01	6.904E+01	0.766
α_4	1.31E-08	3.40E-03	4.57E-04	1.71E-02	2.207E-01	6.460E+01	0.821

CCCG = 5, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9522818	0.9760349	0.9781721	0.9924825	1.428E+02	3.506E+00	--
α_2	2.43E-03	1.36E-02	1.15E-02	3.22E-02	1.992E+00	1.441E+02	0.753
α_3	4.55E-04	7.35E-03	5.27E-03	2.14E-02	1.078E+00	1.455E+02	0.751
α_4	1.32E-06	2.52E-03	8.16E-04	1.08E-02	3.632E-01	1.437E+02	0.764
α_5	4.23E-21	4.58E-04	2.65E-07	2.65E-03	7.248E-02	1.580E+02	0.696

CCCG = 6, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9564101	0.9770441	0.9787613	0.9918103	1.787E+02	4.199E+00	--
α_2	1.77E-03	1.03E-02	8.61E-03	2.45E-02	1.941E+00	1.868E+02	0.728
α_3	7.12E-04	7.43E-03	5.69E-03	2.01E-02	1.332E+00	1.780E+02	0.766
α_4	3.65E-05	3.41E-03	1.84E-03	1.21E-02	6.181E-01	1.809E+02	0.757
α_5	8.55E-09	1.25E-03	1.85E-04	6.17E-03	2.313E-01	1.854E+02	0.740
α_6	5.39E-20	5.91E-04	5.57E-07	3.44E-03	7.684E-02	1.300E+02	1.055

CCCG = 7, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9636583	0.9789545	0.9800256	0.9905928	2.895E+02	6.223E+00	--
α_2	2.04E-03	8.34E-03	7.34E-03	1.81E-02	2.654E+00	3.154E+02	0.679
α_3	8.23E-04	6.04E-03	4.88E-03	1.52E-02	1.645E+00	2.707E+02	0.793
α_4	2.58E-04	3.88E-03	2.81E-03	1.12E-02	1.115E+00	2.860E+02	0.752
α_5	1.98E-05	2.05E-03	1.08E-03	7.34E-03	6.034E-01	2.945E+02	0.732
α_6	1.14E-10	6.40E-04	4.77E-05	3.40E-03	1.780E-01	2.779E+02	0.777
α_7	4.95E-51	9.10E-05	1.87E-14	3.21E-04	2.734E-02	3.006E+02	0.718

CCCG = 8, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9653567	0.9799269	0.9809468	0.9910143	3.049E+02	6.246E+00	--
α_2	1.66E-03	7.19E-03	6.27E-03	1.59E-02	2.504E+00	3.459E+02	0.641
α_3	5.31E-04	4.96E-03	3.86E-03	1.31E-02	1.419E+00	2.849E+02	0.780
α_4	2.00E-04	3.63E-03	2.55E-03	1.08E-02	1.027E+00	2.816E+02	0.791
α_5	4.91E-05	2.39E-03	1.43E-03	7.97E-03	7.337E-01	3.069E+02	0.726
α_6	1.27E-06	1.27E-03	4.59E-04	5.30E-03	3.975E-01	3.117E+02	0.716
α_7	3.00E-20	3.00E-04	2.88E-07	1.74E-03	7.703E-02	2.567E+02	0.870
α_8	3.14E-18	3.39E-04	8.46E-07	1.97E-03	8.749E-02	2.583E+02	0.865

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.77E-01	9.76E-01	9.73E-01	9.76E-01	9.77E-01	9.79E-01	9.80E-01
α_2	2.33E-02	1.86E-02	1.81E-02	1.36E-02	1.03E-02	8.34E-03	7.19E-03
α_3		5.31E-03	5.66E-03	7.35E-03	7.43E-03	6.04E-03	4.96E-03
α_4			3.40E-03	2.52E-03	3.41E-03	3.88E-03	3.63E-03
α_5				4.58E-04	1.25E-03	2.05E-03	2.39E-03
α_6					5.91E-04	6.40E-04	1.27E-03
α_7						9.10E-05	3.00E-04
α_8							3.39E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.77E-01	9.76E-01	9.73E-01	9.76E-01	9.77E-01	9.79E-01	9.80E-01
Beta	2.33E-02	2.39E-02	2.72E-02	2.40E-02	2.30E-02	2.10E-02	2.01E-02
Gamma		2.22E-01	3.33E-01	4.31E-01	5.52E-01	6.03E-01	6.42E-01
Delta			3.76E-01	2.88E-01	4.14E-01	5.24E-01	6.15E-01
Epsilon				1.54E-01	3.50E-01	4.17E-01	5.42E-01
Mu					3.22E-01	2.63E-01	4.45E-01
Omega						1.24E-01	3.34E-01
Sigma							5.30E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9438553	0.9856085	0.9936854	0.9999584	3.223E+01	4.706E-01	--
α_2	4.16E-05	1.44E-02	6.31E-03	5.61E-02	4.706E-01	3.223E+01	0.782

CCCG = 3, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9624766	0.9869520	0.9905451	0.9991462	8.339E+01	1.103E+00	--
α_2	2.68E-04	9.30E-03	5.91E-03	2.99E-02	8.104E-01	8.637E+01	0.727
α_3	3.16E-07	3.75E-03	8.82E-04	1.73E-02	2.921E-01	7.755E+01	0.814

CCCG = 4, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9694311	0.9871368	0.9892067	0.9977638	1.498E+02	1.953E+00	--
α_2	7.94E-04	8.52E-03	6.51E-03	2.31E-02	1.312E+00	1.527E+02	0.750
α_3	4.80E-06	2.86E-03	1.13E-03	1.15E-02	4.307E-01	1.504E+02	0.766
α_4	2.97E-09	1.49E-03	1.76E-04	7.59E-03	2.099E-01	1.406E+02	0.821

CCCG = 5, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9772226	0.9889914	0.9901241	0.9968890	2.791E+02	3.107E+00	--
α_2	8.44E-04	5.98E-03	4.86E-03	1.49E-02	1.684E+00	2.801E+02	0.753
α_3	1.47E-04	3.33E-03	2.26E-03	1.02E-02	9.426E-01	2.817E+02	0.751
α_4	1.03E-06	1.37E-03	4.72E-04	5.80E-03	3.816E-01	2.774E+02	0.764
α_5	1.29E-16	3.24E-04	1.77E-06	1.88E-03	9.865E-02	3.048E+02	0.696

CCCG = 6, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9799825	0.9897609	0.9906220	0.9965974	3.695E+02	3.822E+00	--
α_2	6.42E-04	4.44E-03	3.62E-03	1.10E-02	1.714E+00	3.844E+02	0.728
α_3	1.98E-04	3.02E-03	2.18E-03	8.71E-03	1.108E+00	3.658E+02	0.766
α_4	2.31E-05	1.75E-03	9.77E-04	6.12E-03	6.509E-01	3.707E+02	0.757
α_5	1.32E-08	6.68E-04	1.20E-04	3.22E-03	2.536E-01	3.796E+02	0.740
α_6	5.83E-17	3.60E-04	1.63E-06	2.09E-03	9.572E-02	2.661E+02	1.055

CCCG = 7, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9832913	0.9907601	0.9913355	0.9962640	5.571E+02	5.195E+00	--
α_2	6.59E-04	3.48E-03	2.95E-03	8.10E-03	2.105E+00	6.036E+02	0.679
α_3	2.39E-04	2.55E-03	1.94E-03	6.92E-03	1.320E+00	5.172E+02	0.793
α_4	9.29E-05	1.82E-03	1.26E-03	5.46E-03	9.967E-01	5.458E+02	0.752
α_5	4.72E-06	9.34E-04	4.44E-04	3.53E-03	5.249E-01	5.614E+02	0.732
α_6	2.74E-10	3.69E-04	3.61E-05	1.91E-03	1.956E-01	5.293E+02	0.777
α_7	2.64E-28	9.24E-05	2.09E-09	5.01E-04	5.291E-02	5.724E+02	0.718

CCCG = 8, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9846640	0.9912830	0.9917677	0.9962471	6.632E+02	5.832E+00	--
α_2	6.00E-04	2.96E-03	2.53E-03	6.78E-03	2.229E+00	7.505E+02	0.641
α_3	1.75E-04	2.04E-03	1.53E-03	5.62E-03	1.260E+00	6.174E+02	0.780
α_4	9.69E-05	1.71E-03	1.20E-03	5.03E-03	1.042E+00	6.095E+02	0.791
α_5	2.69E-05	1.15E-03	7.02E-04	3.79E-03	7.626E-01	6.638E+02	0.726
α_6	1.11E-07	4.85E-04	1.35E-04	2.16E-03	3.271E-01	6.740E+02	0.716
α_7	2.35E-13	2.42E-04	6.49E-06	1.36E-03	1.344E-01	5.546E+02	0.870
α_8	1.24E-20	1.38E-04	1.29E-07	7.99E-04	7.682E-02	5.582E+02	0.865

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.87E-01	9.87E-01	9.89E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.44E-02	9.30E-03	8.52E-03	5.98E-03	4.44E-03	3.48E-03	2.96E-03
α_3		3.75E-03	2.86E-03	3.33E-03	3.02E-03	2.55E-03	2.04E-03
α_4			1.49E-03	1.37E-03	1.75E-03	1.82E-03	1.71E-03
α_5				3.24E-04	6.68E-04	9.34E-04	1.15E-03
α_6					3.60E-04	3.69E-04	4.85E-04
α_7						9.24E-05	2.42E-04
α_8							1.38E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.87E-01	9.87E-01	9.89E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.44E-02	1.30E-02	1.29E-02	1.10E-02	1.02E-02	9.24E-03	8.72E-03
Gamma		2.88E-01	3.38E-01	4.57E-01	5.66E-01	6.24E-01	6.60E-01
Delta			3.43E-01	3.37E-01	4.79E-01	5.58E-01	6.46E-01
Epsilon				1.91E-01	3.70E-01	4.34E-01	5.41E-01
Mu					3.50E-01	3.31E-01	4.30E-01
Omega						2.00E-01	4.39E-01
Sigma							3.62E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.9.3 HPI-MDP-FHRH: HPSI Motor-Driven Pumps Fail to Run Less Than or Greater Than One Hour

Generic CCF Parameters

System Group: Clean Water
 System: Chemical and Volume Control, High Pressure Injection
 Component Group: Pump
 Component Type: Motor Driven Pump
 Component Subtype: Centrifugal
 Failure Mode: Fail to Run, Fail to Run < 1H, Fail to Run > 1H
 Date Range: 2006 through 2020
 Prior: Default 2015

Total Number of Independent Failure Events: 18.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9424464	0.9827821	0.9896609	0.9996625	0.9867374	4.101E+01	7.185E-01
α_2	3.36E-04	1.72E-02	1.03E-02	5.76E-02	1.33E-02	7.185E-01	4.101E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9530440	0.9813153	0.9848585	0.9974714	0.9821588	8.550E+01	1.628E+00
α_2	1.16E-03	1.41E-02	1.06E-02	3.90E-02	1.34E-02	1.226E+00	8.591E+01
α_3	4.97E-06	4.61E-03	1.69E-03	1.91E-02	4.46E-03	4.018E-01	8.673E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9567102	0.9801004	0.9825167	0.9952391	0.9814877	1.271E+02	2.581E+00
α_2	1.71E-03	1.26E-02	1.02E-02	3.17E-02	1.01E-02	1.635E+00	1.281E+02
α_3	6.73E-05	5.03E-03	2.82E-03	1.75E-02	6.73E-03	6.524E-01	1.291E+02
α_4	2.02E-07	2.27E-03	5.37E-04	1.04E-02	1.68E-03	2.940E-01	1.294E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9665141	0.9823499	0.9836679	0.9936713	0.9824206	2.362E+02	4.245E+00
α_2	1.90E-03	9.30E-03	7.98E-03	2.12E-02	6.76E-03	2.237E+00	2.383E+02
α_3	5.64E-04	5.66E-03	4.36E-03	1.52E-02	6.76E-03	1.362E+00	2.391E+02
α_4	1.29E-05	2.24E-03	1.09E-03	8.37E-03	3.38E-03	5.385E-01	2.400E+02
α_5	2.28E-15	4.49E-04	4.16E-06	2.59E-03	6.76E-04	1.080E-01	2.404E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9693058	0.9833806	0.9844988	0.9936235	0.9838901	2.796E+02	4.726E+00
α_2	1.17E-03	6.81E-03	5.69E-03	1.63E-02	4.24E-03	1.935E+00	2.824E+02

α_3	6.43E-04	5.34E-03	4.24E-03	1.38E-02	5.65E-03	1.520E+00	2.828E+02
α_4	9.00E-05	2.92E-03	1.87E-03	9.33E-03	4.24E-03	8.303E-01	2.835E+02
α_5	1.83E-07	1.11E-03	2.92E-04	4.99E-03	1.70E-03	3.148E-01	2.840E+02
α_6	9.20E-14	4.41E-04	8.69E-06	2.50E-03	2.83E-04	1.254E-01	2.842E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9742501	0.9848721	0.9855954	0.9930170	0.9854295	4.352E+02	6.685E+00
α_2	1.20E-03	5.45E-03	4.72E-03	1.22E-02	2.55E-03	2.407E+00	4.395E+02
α_3	7.20E-04	4.31E-03	3.59E-03	1.04E-02	4.25E-03	1.903E+00	4.400E+02
α_4	3.03E-04	3.07E-03	2.36E-03	8.26E-03	4.25E-03	1.356E+00	4.405E+02
α_5	3.33E-05	1.65E-03	9.86E-04	5.53E-03	2.55E-03	7.294E-01	4.412E+02
α_6	7.96E-09	5.57E-04	9.45E-05	2.71E-03	8.50E-04	2.463E-01	4.416E+02
α_7	3.88E-34	9.64E-05	1.14E-10	4.79E-04	1.21E-04	4.261E-02	4.418E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9757244	0.9857391	0.9864216	0.9934125	0.9868543	4.625E+02	6.690E+00
α_2	8.72E-04	4.53E-03	3.85E-03	1.05E-02	1.49E-03	2.127E+00	4.670E+02
α_3	4.51E-04	3.43E-03	2.76E-03	8.72E-03	2.98E-03	1.609E+00	4.675E+02
α_4	2.73E-04	2.85E-03	2.18E-03	7.70E-03	3.73E-03	1.336E+00	4.678E+02
α_5	8.15E-05	1.96E-03	1.32E-03	6.05E-03	2.98E-03	9.213E-01	4.682E+02
α_6	2.40E-06	9.79E-04	4.12E-04	3.87E-03	1.49E-03	4.591E-01	4.687E+02
α_7	5.91E-13	2.96E-04	9.17E-06	1.66E-03	4.26E-04	1.391E-01	4.690E+02
α_8	8.25E-17	2.10E-04	1.15E-06	1.22E-03	5.32E-05	9.860E-02	4.690E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.72E-02	1.41E-02	1.26E-02	9.30E-03	6.81E-03	5.45E-03	4.53E-03
α_3		4.61E-03	5.03E-03	5.66E-03	5.34E-03	4.31E-03	3.43E-03
α_4			2.27E-03	2.24E-03	2.92E-03	3.07E-03	2.85E-03
α_5				4.49E-04	1.11E-03	1.65E-03	1.96E-03
α_6					4.41E-04	5.57E-04	9.79E-04
α_7						9.64E-05	2.96E-04
α_8							2.10E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.72E-02	1.87E-02	1.99E-02	1.77E-02	1.66E-02	1.51E-02	1.43E-02
Gamma		2.47E-01	3.67E-01	4.73E-01	5.90E-01	6.40E-01	6.82E-01
Delta			3.11E-01	3.22E-01	4.55E-01	5.55E-01	6.47E-01
Epsilon				1.67E-01	3.46E-01	4.29E-01	5.48E-01
Mu					2.85E-01	2.84E-01	4.31E-01
Omega						1.48E-01	3.41E-01
Sigma							4.15E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	18.10	27.15	36.20	45.25	54.30	63.35	72.40
N₁	0.5000	0.3750	0.2500	0.1563	0.0938	0.0547	0.0313
N₂	0.2500	0.3750	0.3750	0.3125	0.2344	0.1641	0.1094
N₃		0.1250	0.2500	0.3125	0.3125	0.2734	0.2188
N₄			0.0625	0.1563	0.2344	0.2734	0.2734
N₅				0.0313	0.0938	0.1641	0.2188
N₆					0.0156	0.0547	0.1094
N₇						0.0078	0.0313
N₈							0.0039

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 1.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.085

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9672932	0.9915574	0.9962330	0.9999720	5.677E+01	4.834E-01	--
α_2	2.80E-05	8.44E-03	3.77E-03	3.27E-02	4.834E-01	5.677E+01	0.802

CCCG = 3, Gamma = 0.086

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787695	0.9923622	0.9942869	0.9993769	1.592E+02	1.226E+00	--
α_2	2.96E-04	6.08E-03	4.19E-03	1.83E-02	9.769E-01	1.598E+02	0.829
α_3	2.49E-08	1.56E-03	2.71E-04	7.57E-03	2.487E-01	1.591E+02	0.837

CCCG = 4, Gamma = 0.086

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9784919	0.9908149	0.9922299	0.9982999	2.219E+02	2.057E+00	--
α_2	6.93E-04	6.29E-03	4.92E-03	1.65E-02	1.442E+00	2.279E+02	0.816
α_3	2.50E-06	2.00E-03	7.49E-04	8.20E-03	4.114E-01	2.058E+02	0.908
α_4	1.18E-09	9.03E-04	9.84E-05	4.63E-03	2.036E-01	2.253E+02	0.830

CCCG = 5, Gamma = 0.087

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9826834	0.9912348	0.9920014	0.9971671	4.165E+02	3.683E+00	--
α_2	1.07E-03	5.22E-03	4.47E-03	1.19E-02	2.243E+00	4.275E+02	0.834
α_3	1.21E-04	2.40E-03	1.66E-03	7.20E-03	9.912E-01	4.123E+02	0.867
α_4	6.56E-07	9.63E-04	3.25E-04	4.08E-03	3.765E-01	3.906E+02	0.916
α_5	1.60E-21	1.85E-04	1.05E-07	1.07E-03	7.237E-02	3.920E+02	0.914

CCCG = 6, Gamma = 0.087

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9834803	0.9913753	0.9920481	0.9969723	4.758E+02	4.139E+00	--
α_2	8.16E-04	4.25E-03	3.61E-03	9.86E-03	2.128E+00	4.990E+02	0.817
α_3	1.64E-04	2.38E-03	1.73E-03	6.82E-03	1.134E+00	4.747E+02	0.860
α_4	7.99E-06	1.22E-03	6.06E-04	4.53E-03	5.533E-01	4.519E+02	0.905
α_5	1.93E-09	4.95E-04	6.60E-05	2.48E-03	2.210E-01	4.464E+02	0.916
α_6	3.54E-16	2.78E-04	1.93E-06	1.61E-03	1.027E-01	3.697E+02	1.107

CCCG = 7, Gamma = 0.087

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9865299	0.9921705	0.9925663	0.9964598	8.151E+02	6.432E+00	--
α_2	8.46E-04	3.25E-03	2.88E-03	6.93E-03	2.840E+00	8.698E+02	0.794
α_3	3.27E-04	2.20E-03	1.80E-03	5.45E-03	1.746E+00	7.911E+02	0.874
α_4	8.63E-05	1.39E-03	9.91E-04	4.03E-03	1.084E+00	7.814E+02	0.886
α_5	3.92E-06	6.89E-04	3.34E-04	2.58E-03	5.376E-01	7.799E+02	0.888
α_6	2.31E-10	2.63E-04	2.65E-05	1.36E-03	1.979E-01	7.527E+02	0.921
α_7	7.97E-53	3.56E-05	3.57E-15	1.22E-04	2.656E-02	7.461E+02	0.929

CCCG = 8, Gamma = 0.087

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9872012	0.9926481	0.9930394	0.9967592	8.253E+02	6.112E+00	--
α_2	5.59E-04	2.58E-03	2.23E-03	5.81E-03	2.364E+00	9.125E+02	0.758
α_3	2.23E-04	1.87E-03	1.48E-03	4.86E-03	1.512E+00	8.056E+02	0.859
α_4	8.00E-05	1.36E-03	9.67E-04	4.01E-03	1.056E+00	7.727E+02	0.896
α_5	1.31E-05	8.63E-04	4.91E-04	2.97E-03	6.745E-01	7.812E+02	0.887
α_6	5.22E-08	3.88E-04	9.86E-05	1.76E-03	3.076E-01	7.920E+02	0.875
α_7	1.06E-15	1.51E-04	1.49E-06	8.72E-04	1.093E-01	7.226E+02	0.960
α_8	1.97E-18	1.27E-04	3.54E-07	7.42E-04	8.885E-02	6.977E+02	0.994

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.92E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.93E-01
α_2	8.44E-03	6.08E-03	6.29E-03	5.22E-03	4.25E-03	3.25E-03	2.58E-03
α_3		1.56E-03	2.00E-03	2.40E-03	2.38E-03	2.20E-03	1.87E-03
α_4			9.03E-04	9.63E-04	1.22E-03	1.39E-03	1.36E-03
α_5				1.85E-04	4.95E-04	6.89E-04	8.63E-04
α_6					2.78E-04	2.63E-04	3.88E-04
α_7						3.56E-05	1.51E-04
α_8							1.27E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.92E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.93E-01
Beta	8.44E-03	7.64E-03	9.19E-03	8.77E-03	8.62E-03	7.83E-03	7.35E-03
Gamma		2.04E-01	3.16E-01	4.05E-01	5.08E-01	5.84E-01	6.49E-01
Delta			3.12E-01	3.24E-01	4.56E-01	5.19E-01	6.07E-01
Epsilon				1.61E-01	3.87E-01	4.16E-01	5.28E-01
Mu					3.59E-01	3.02E-01	4.36E-01
Omega						1.19E-01	4.18E-01
Sigma							4.57E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.60	2.40	3.20	4.00	4.80	5.60	6.40
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 5.5

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.332

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9074778	0.9724321	0.9835393	0.9995050	2.468E+01	6.998E-01	--
α_2	4.95E-04	2.76E-02	1.65E-02	9.25E-02	6.998E-01	2.468E+01	0.802

CCCG = 3, Gamma = 0.326

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9231244	0.9689209	0.9745178	0.9955536	5.232E+01	1.678E+00	--
α_2	2.30E-03	2.43E-02	1.87E-02	6.54E-02	1.314E+00	5.279E+01	0.829
α_3	3.71E-06	6.80E-03	2.23E-03	2.91E-02	3.646E-01	5.326E+01	0.837

CCCG = 4, Gamma = 0.321

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9267544	0.9661143	0.9701088	0.9918063	7.373E+01	2.586E+00	--
α_2	2.95E-03	2.11E-02	1.72E-02	5.27E-02	1.660E+00	7.692E+01	0.816
α_3	1.15E-04	9.10E-03	5.06E-03	3.18E-02	6.427E-01	7.001E+01	0.908
α_4	2.29E-07	3.67E-03	8.17E-04	1.71E-02	2.832E-01	7.699E+01	0.830

CCCG = 5, Gamma = 0.318

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9438366	0.9701391	0.9722825	0.9891158	1.403E+02	4.318E+00	--
α_2	3.29E-03	1.55E-02	1.34E-02	3.50E-02	2.305E+00	1.462E+02	0.834
α_3	1.01E-03	9.73E-03	7.56E-03	2.59E-02	1.391E+00	1.414E+02	0.867
α_4	1.85E-05	3.84E-03	1.82E-03	1.45E-02	5.195E-01	1.346E+02	0.916
α_5	1.29E-15	7.66E-04	5.66E-06	4.44E-03	1.037E-01	1.354E+02	0.914

CCCG = 6, Gamma = 0.316

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9487642	0.9716360	0.9733718	0.9885773	1.744E+02	5.090E+00	--
α_2	2.29E-03	1.16E-02	9.87E-03	2.66E-02	2.175E+00	1.862E+02	0.817
α_3	1.26E-03	9.20E-03	7.44E-03	2.31E-02	1.645E+00	1.772E+02	0.860
α_4	1.68E-04	5.01E-03	3.25E-03	1.59E-02	8.525E-01	1.692E+02	0.905
α_5	4.21E-07	1.94E-03	5.37E-04	8.63E-03	3.251E-01	1.675E+02	0.916
α_6	3.71E-17	6.65E-04	2.42E-06	3.88E-03	9.247E-02	1.389E+02	1.107

CCCG = 7, Gamma = 0.315

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9568284	0.9741711	0.9753038	0.9876456	2.701E+02	7.160E+00	--
α_2	2.46E-03	9.52E-03	8.44E-03	2.03E-02	2.818E+00	2.932E+02	0.794
α_3	1.21E-03	7.13E-03	5.95E-03	1.71E-02	1.918E+00	2.671E+02	0.874
α_4	5.39E-04	5.23E-03	4.05E-03	1.39E-02	1.388E+00	2.641E+02	0.886
α_5	6.96E-05	2.90E-03	1.78E-03	9.53E-03	7.675E-01	2.640E+02	0.888
α_6	6.71E-09	9.11E-04	1.37E-04	4.50E-03	2.327E-01	2.552E+02	0.921
α_7	2.23E-40	1.39E-04	6.25E-12	6.14E-04	3.515E-02	2.531E+02	0.929

CCCG = 8, Gamma = 0.313

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9589286	0.9753987	0.9764727	0.9882008	2.859E+02	7.211E+00	--
α_2	1.94E-03	8.07E-03	7.08E-03	1.76E-02	2.613E+00	3.211E+02	0.758
α_3	7.76E-04	5.73E-03	4.63E-03	1.45E-02	1.638E+00	2.840E+02	0.859
α_4	4.34E-04	4.75E-03	3.61E-03	1.30E-02	1.300E+00	2.725E+02	0.896
α_5	1.56E-04	3.44E-03	2.34E-03	1.05E-02	9.525E-01	2.757E+02	0.887
α_6	7.66E-06	1.81E-03	8.34E-04	6.91E-03	5.069E-01	2.799E+02	0.875
α_7	2.31E-15	4.23E-04	3.98E-06	2.45E-03	1.083E-01	2.556E+02	0.960
α_8	1.43E-17	3.70E-04	1.25E-06	2.16E-03	9.140E-02	2.468E+02	0.994

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.72E-01	9.69E-01	9.66E-01	9.70E-01	9.72E-01	9.74E-01	9.75E-01
α_2	2.76E-02	2.43E-02	2.11E-02	1.55E-02	1.16E-02	9.52E-03	8.07E-03
α_3		6.80E-03	9.10E-03	9.73E-03	9.20E-03	7.13E-03	5.73E-03
α_4			3.67E-03	3.84E-03	5.01E-03	5.23E-03	4.75E-03
α_5				7.66E-04	1.94E-03	2.90E-03	3.44E-03
α_6					6.65E-04	9.11E-04	1.81E-03
α_7						1.39E-04	4.23E-04
α_8							3.70E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.72E-01	9.69E-01	9.66E-01	9.70E-01	9.72E-01	9.74E-01	9.75E-01
Beta	2.76E-02	3.11E-02	3.39E-02	2.99E-02	2.84E-02	2.58E-02	2.46E-02
Gamma		2.19E-01	3.77E-01	4.80E-01	5.93E-01	6.31E-01	6.72E-01
Delta			2.87E-01	3.21E-01	4.53E-01	5.63E-01	6.53E-01
Epsilon				1.66E-01	3.42E-01	4.30E-01	5.60E-01
Mu					2.56E-01	2.66E-01	4.30E-01
Omega						1.32E-01	3.05E-01
Sigma							4.66E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.50	8.25	11.00	13.75	16.50	19.25	22.00
N_1	0.5000	0.3750	0.2500	0.1563	0.0938	0.0547	0.0313
N_2	0.2500	0.3750	0.3750	0.3125	0.2344	0.1641	0.1094
N_3		0.1250	0.2500	0.3125	0.3125	0.2734	0.2188

N₄			0.0625	0.1563	0.2344	0.2734	0.2734
N₅				0.0313	0.0938	0.1641	0.2188
N₆					0.0156	0.0547	0.1094
N₇						0.0078	0.0313
N₈							0.0039

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.053

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8031062	0.9525443	0.9824462	0.9999622	7.629E+00	3.801E-01	--
α_2	3.78E-05	4.75E-02	1.76E-02	1.97E-01	3.801E-01	7.629E+00	0.802

CCCG = 3, Gamma = 0.054

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8433802	0.9469876	0.9625120	0.9974127	1.715E+01	9.600E-01	--
α_2	5.59E-04	3.67E-02	2.15E-02	1.25E-01	6.673E-01	1.749E+01	0.829
α_3	1.44E-06	1.63E-02	3.94E-03	7.48E-02	2.927E-01	1.770E+01	0.837

CCCG = 4, Gamma = 0.054

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8612003	0.9432783	0.9530672	0.9917926	2.776E+01	1.669E+00	--
α_2	2.00E-03	3.43E-02	2.47E-02	9.97E-02	1.039E+00	2.923E+01	0.816
α_3	1.25E-05	1.43E-02	5.13E-03	5.96E-02	3.887E-01	2.682E+01	0.908
α_4	9.39E-08	8.11E-03	1.34E-03	3.97E-02	2.414E-01	2.952E+01	0.830

CCCG = 5, Gamma = 0.054

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9026550	0.9507163	0.9549166	0.9844077	6.727E+01	3.487E+00	--
α_2	3.85E-03	2.46E-02	2.04E-02	5.99E-02	1.791E+00	7.092E+01	0.834
α_3	1.38E-03	1.73E-02	1.29E-02	4.80E-02	1.207E+00	6.872E+01	0.867
α_4	1.16E-05	6.56E-03	2.63E-03	2.64E-02	4.340E-01	6.571E+01	0.916
α_5	1.84E-26	8.28E-04	2.95E-08	4.57E-03	5.493E-02	6.628E+01	0.914

CCCG = 6, Gamma = 0.054

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9145243	0.9554895	0.9589155	0.9847385	8.382E+01	3.905E+00	--
α_2	1.40E-03	1.44E-02	1.11E-02	3.88E-02	1.335E+00	9.122E+01	0.817
α_3	2.14E-03	1.74E-02	1.39E-02	4.47E-02	1.531E+00	8.635E+01	0.860
α_4	1.66E-04	8.61E-03	5.13E-03	2.89E-02	7.191E-01	8.283E+01	0.905
α_5	4.38E-08	2.99E-03	5.12E-04	1.45E-02	2.467E-01	8.223E+01	0.916
α_6	1.17E-20	1.07E-03	6.43E-07	6.19E-03	7.279E-02	6.822E+01	1.107

CCCG = 7, Gamma = 0.054

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9305272	0.9602379	0.9623373	0.9827751	1.393E+02	5.770E+00	--
α_2	1.23E-03	9.87E-03	7.88E-03	2.53E-02	1.549E+00	1.554E+02	0.794
α_3	2.48E-03	1.39E-02	1.17E-02	3.29E-02	1.989E+00	1.406E+02	0.874
α_4	8.22E-04	9.14E-03	6.95E-03	2.50E-02	1.287E+00	1.395E+02	0.886
α_5	8.22E-05	4.92E-03	2.86E-03	1.68E-02	6.913E-01	1.397E+02	0.888
α_6	1.27E-08	1.72E-03	2.59E-04	8.50E-03	2.327E-01	1.352E+02	0.921
α_7	1.07E-64	1.57E-04	2.38E-17	3.96E-04	2.112E-02	1.342E+02	0.929

CCCG = 8, Gamma = 0.054

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9396137	0.9639278	0.9655084	0.9828431	1.875E+02	7.016E+00	--
α_2	9.30E-04	7.23E-03	5.79E-03	1.84E-02	1.583E+00	2.174E+02	0.758
α_3	1.82E-03	1.03E-02	8.65E-03	2.43E-02	1.986E+00	1.912E+02	0.859
α_4	1.26E-03	9.03E-03	7.33E-03	2.26E-02	1.672E+00	1.835E+02	0.896
α_5	2.86E-04	5.40E-03	3.77E-03	1.61E-02	1.011E+00	1.861E+02	0.887
α_6	2.28E-05	3.01E-03	1.53E-03	1.10E-02	5.709E-01	1.891E+02	0.875
α_7	2.40E-10	1.05E-03	8.19E-05	5.53E-03	1.809E-01	1.728E+02	0.960
α_8	1.08E-107	7.45E-05	2.26E-27	5.58E-05	1.245E-02	1.670E+02	0.994

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.53E-01	9.47E-01	9.43E-01	9.51E-01	9.55E-01	9.60E-01	9.64E-01
α_2	4.75E-02	3.67E-02	3.43E-02	2.46E-02	1.44E-02	9.87E-03	7.23E-03
α_3		1.63E-02	1.43E-02	1.73E-02	1.74E-02	1.39E-02	1.03E-02
α_4			8.11E-03	6.56E-03	8.61E-03	9.14E-03	9.03E-03
α_5				8.28E-04	2.99E-03	4.92E-03	5.40E-03
α_6					1.07E-03	1.72E-03	3.01E-03
α_7						1.57E-04	1.05E-03
α_8							7.45E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.53E-01	9.47E-01	9.43E-01	9.51E-01	9.55E-01	9.60E-01	9.64E-01
Beta	4.75E-02	5.30E-02	5.67E-02	4.93E-02	4.45E-02	3.98E-02	3.61E-02
Gamma		3.07E-01	3.95E-01	5.00E-01	6.76E-01	7.52E-01	8.00E-01
Delta			3.62E-01	3.00E-01	4.21E-01	5.33E-01	6.44E-01
Epsilon				1.12E-01	3.20E-01	4.27E-01	5.14E-01
Mu					2.63E-01	2.76E-01	4.33E-01
Omega						8.39E-02	2.71E-01
Sigma							6.65E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.50	2.00	2.50	3.00	3.50	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 6.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.345

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9525455	0.9878481	0.9946844	0.9999650	3.826E+01	4.706E-01	--
α_2	3.50E-05	1.22E-02	5.32E-03	4.75E-02	4.706E-01	3.826E+01	0.802

CCCG = 3, Gamma = 0.348

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9634426	0.9872901	0.9907920	0.9991686	8.564E+01	1.103E+00	--
α_2	2.68E-04	9.32E-03	5.92E-03	3.00E-02	8.104E-01	8.614E+01	0.829
α_3	2.85E-07	3.39E-03	7.96E-04	1.56E-02	2.921E-01	8.588E+01	0.837

CCCG = 4, Gamma = 0.350

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9695238	0.9871761	0.9892397	0.9977707	1.503E+02	1.953E+00	--
α_2	7.83E-04	8.39E-03	6.41E-03	2.28E-02	1.312E+00	1.550E+02	0.816
α_3	5.15E-06	3.06E-03	1.21E-03	1.24E-02	4.307E-01	1.401E+02	0.908
α_4	2.72E-09	1.37E-03	1.61E-04	6.95E-03	2.099E-01	1.535E+02	0.830

CCCG = 5, Gamma = 0.352

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9758119	0.9883065	0.9895081	0.9966943	2.626E+02	3.107E+00	--
α_2	8.71E-04	6.17E-03	5.01E-03	1.54E-02	1.684E+00	2.713E+02	0.834
α_3	1.59E-04	3.59E-03	2.44E-03	1.10E-02	9.426E-01	2.616E+02	0.867
α_4	1.15E-06	1.54E-03	5.28E-04	6.49E-03	3.816E-01	2.479E+02	0.916
α_5	1.58E-16	3.96E-04	2.17E-06	2.30E-03	9.865E-02	2.489E+02	0.914

CCCG = 6, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9785923	0.9890470	0.9899669	0.9963589	3.451E+02	3.822E+00	--
α_2	6.76E-04	4.67E-03	3.81E-03	1.16E-02	1.714E+00	3.650E+02	0.817
α_3	2.09E-04	3.18E-03	2.30E-03	9.18E-03	1.108E+00	3.471E+02	0.860
α_4	2.60E-05	1.97E-03	1.10E-03	6.86E-03	6.509E-01	3.304E+02	0.905
α_5	1.54E-08	7.76E-04	1.40E-04	3.74E-03	2.536E-01	3.265E+02	0.916
α_6	5.74E-17	3.54E-04	1.61E-06	2.06E-03	9.572E-02	2.705E+02	1.107

CCCG = 7, Gamma = 0.354

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9816092	0.9898269	0.9904593	0.9958852	5.055E+02	5.195E+00	--
α_2	7.33E-04	3.86E-03	3.27E-03	9.00E-03	2.105E+00	5.429E+02	0.794
α_3	2.50E-04	2.67E-03	2.03E-03	7.24E-03	1.320E+00	4.939E+02	0.874
α_4	1.04E-04	2.04E-03	1.41E-03	6.11E-03	9.967E-01	4.878E+02	0.886
α_5	5.44E-06	1.08E-03	5.12E-04	4.06E-03	5.249E-01	4.869E+02	0.888
α_6	3.09E-10	4.16E-04	4.07E-05	2.16E-03	1.956E-01	4.701E+02	0.921
α_7	3.24E-28	1.14E-04	2.57E-09	6.16E-04	5.291E-02	4.660E+02	0.929

CCCG = 8, Gamma = 0.354

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9831115	0.9903980	0.9909310	0.9958647	6.015E+02	5.832E+00	--
α_2	6.75E-04	3.33E-03	2.85E-03	7.62E-03	2.229E+00	6.674E+02	0.758
α_3	1.83E-04	2.13E-03	1.60E-03	5.89E-03	1.260E+00	5.895E+02	0.859
α_4	1.05E-04	1.84E-03	1.30E-03	5.43E-03	1.042E+00	5.653E+02	0.896
α_5	3.13E-05	1.33E-03	8.15E-04	4.39E-03	7.626E-01	5.716E+02	0.887
α_6	1.29E-07	5.64E-04	1.57E-04	2.51E-03	3.271E-01	5.797E+02	0.875
α_7	2.46E-13	2.54E-04	6.81E-06	1.43E-03	1.344E-01	5.289E+02	0.960
α_8	1.35E-20	1.50E-04	1.41E-07	8.73E-04	7.682E-02	5.107E+02	0.994

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01	9.90E-01	9.90E-01
α_2	1.22E-02	9.32E-03	8.39E-03	6.17E-03	4.67E-03	3.86E-03	3.33E-03
α_3		3.39E-03	3.06E-03	3.59E-03	3.18E-03	2.67E-03	2.13E-03
α_4			1.37E-03	1.54E-03	1.97E-03	2.04E-03	1.84E-03
α_5				3.96E-04	7.76E-04	1.08E-03	1.33E-03
α_6					3.54E-04	4.16E-04	5.64E-04
α_7						1.14E-04	2.54E-04
α_8							1.50E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01	9.90E-01	9.90E-01
Beta	1.22E-02	1.27E-02	1.28E-02	1.17E-02	1.10E-02	1.02E-02	9.60E-03
Gamma		2.67E-01	3.45E-01	4.72E-01	5.73E-01	6.20E-01	6.53E-01
Delta			3.08E-01	3.50E-01	4.93E-01	5.78E-01	6.60E-01
Epsilon				2.05E-01	3.65E-01	4.41E-01	5.56E-01
Mu					3.13E-01	3.30E-01	4.21E-01
Omega						2.14E-01	4.18E-01
Sigma							3.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.50	9.75	13.00	16.25	19.50	22.75	26.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 3.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.186

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9864459	0.9964836	0.9984125	0.9999871	1.398E+02	4.932E-01	--
α_2	1.29E-05	3.52E-03	1.59E-03	1.36E-02	4.932E-01	1.398E+02	0.802

CCCG = 3, Gamma = 0.187

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898014	0.9965195	0.9975281	0.9997940	3.034E+02	1.059E+00	--
α_2	4.37E-05	2.34E-03	1.38E-03	7.89E-03	7.137E-01	3.046E+02	0.829
α_3	4.11E-07	1.14E-03	3.46E-04	4.99E-03	3.458E-01	3.022E+02	0.837

CCCG = 4, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9917006	0.9964337	0.9969740	0.9993200	5.908E+02	2.115E+00	--
α_2	3.18E-04	2.57E-03	2.05E-03	6.62E-03	1.549E+00	6.012E+02	0.816
α_3	1.52E-08	4.88E-04	9.55E-05	2.32E-03	2.646E-01	5.416E+02	0.908
α_4	5.61E-08	5.08E-04	1.25E-04	2.32E-03	3.010E-01	5.923E+02	0.830

CCCG = 5, Gamma = 0.189

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9942456	0.9968048	0.9970012	0.9986931	1.661E+03	5.325E+00	--
α_2	6.84E-04	2.14E-03	1.95E-03	4.26E-03	3.632E+00	1.690E+03	0.834
α_3	8.16E-05	8.31E-04	6.38E-04	2.24E-03	1.354E+00	1.628E+03	0.867
α_4	1.82E-08	1.92E-04	4.59E-05	8.83E-04	2.961E-01	1.541E+03	0.916
α_5	8.17E-35	2.75E-05	3.02E-11	1.36E-04	4.243E-02	1.545E+03	0.914

CCCG = 6, Gamma = 0.190

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9939972	0.9967282	0.9969449	0.9987189	1.504E+03	4.936E+00	--
α_2	4.95E-04	1.86E-03	1.65E-03	3.94E-03	2.915E+00	1.563E+03	0.817
α_3	7.21E-05	8.46E-04	6.35E-04	2.34E-03	1.257E+00	1.485E+03	0.860
α_4	1.45E-06	3.56E-04	1.63E-04	1.36E-03	5.031E-01	1.413E+03	0.905
α_5	2.40E-15	8.28E-05	1.09E-06	4.75E-04	1.155E-01	1.395E+03	0.916
α_6	5.87E-13	1.26E-04	4.60E-06	6.96E-04	1.451E-01	1.155E+03	1.107

CCCG = 7, Gamma = 0.190

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9953455	0.9970547	0.9971552	0.9984210	3.268E+03	9.654E+00	--
α_2	5.44E-04	1.40E-03	1.31E-03	2.59E-03	4.851E+00	3.450E+03	0.794
α_3	2.29E-04	8.92E-04	7.89E-04	1.91E-03	2.800E+00	3.136E+03	0.874
α_4	4.56E-05	4.47E-04	3.45E-04	1.20E-03	1.384E+00	3.096E+03	0.886
α_5	5.62E-07	1.59E-04	7.09E-05	6.14E-04	4.902E-01	3.089E+03	0.888
α_6	9.14E-16	3.85E-05	4.87E-07	2.21E-04	1.146E-01	2.980E+03	0.921
α_7	2.61E-93	4.96E-06	5.27E-25	5.89E-06	1.464E-02	2.954E+03	0.929

CCCG = 8, Gamma = 0.191

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9951959	0.9971449	0.9972762	0.9986459	2.496E+03	7.148E+00	--
α_2	2.94E-04	1.09E-03	9.67E-04	2.28E-03	2.980E+00	2.743E+03	0.758
α_3	1.40E-04	8.09E-04	6.77E-04	1.93E-03	1.960E+00	2.421E+03	0.859
α_4	3.67E-05	5.02E-04	3.68E-04	1.42E-03	1.166E+00	2.321E+03	0.896
α_5	1.30E-06	2.29E-04	1.11E-04	8.57E-04	5.375E-01	2.347E+03	0.887
α_6	1.68E-11	7.59E-05	5.89E-06	4.01E-04	1.805E-01	2.378E+03	0.875
α_7	9.87E-36	1.91E-05	1.43E-11	9.33E-05	4.139E-02	2.169E+03	0.960
α_8	8.23E-09	1.35E-04	2.98E-05	6.29E-04	2.827E-01	2.094E+03	0.994

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	3.52E-03	2.34E-03	2.57E-03	2.14E-03	1.86E-03	1.40E-03	1.09E-03
α_3		1.14E-03	4.88E-04	8.31E-04	8.46E-04	8.92E-04	8.09E-04
α_4			5.08E-04	1.92E-04	3.56E-04	4.47E-04	5.02E-04
α_5				2.75E-05	8.28E-05	1.59E-04	2.29E-04
α_6					1.26E-04	3.85E-05	7.59E-05
α_7						4.96E-06	1.91E-05
α_8							1.35E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	3.52E-03	3.48E-03	3.57E-03	3.20E-03	3.27E-03	2.95E-03	2.86E-03
Gamma		3.28E-01	2.79E-01	3.29E-01	4.31E-01	5.23E-01	6.20E-01
Delta			5.10E-01	2.09E-01	4.00E-01	4.21E-01	5.43E-01
Epsilon				1.25E-01	3.69E-01	3.11E-01	4.78E-01
Mu					6.03E-01	2.15E-01	5.01E-01
Omega						1.14E-01	6.70E-01
Sigma							8.76E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.50	5.25	7.00	8.75	10.50	12.25	14.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.9.4 HPI-MDP-RH: HPSI Motor-Driven Pumps Fail to Run Greater Than One Hour

Generic CCF Parameters

System Group: Clean Water
System: Chemical and Volume Control, High Pressure Injection
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run, Fail to Run > 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 16.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9395767	0.9819154	0.9891318	0.9996452	0.9851632	3.901E+01	7.185E-01
α_2	3.53E-04	1.81E-02	1.09E-02	6.04E-02	1.48E-02	7.185E-01	3.901E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9513850	0.9806490	0.9843143	0.9973799	0.9800200	8.250E+01	1.628E+00
α_2	1.20E-03	1.46E-02	1.09E-02	4.04E-02	1.50E-02	1.226E+00	8.291E+01
α_3	5.15E-06	4.78E-03	1.75E-03	1.98E-02	5.00E-03	4.018E-01	8.373E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9553443	0.9794672	0.9819574	0.9950855	0.9792531	1.231E+02	2.581E+00
α_2	1.76E-03	1.30E-02	1.05E-02	3.27E-02	1.13E-02	1.635E+00	1.241E+02
α_3	6.95E-05	5.19E-03	2.91E-03	1.81E-02	7.54E-03	6.524E-01	1.251E+02
α_4	2.08E-07	2.34E-03	5.54E-04	1.08E-02	1.89E-03	2.940E-01	1.254E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9658074	0.9819752	0.9833202	0.9935354	0.9802881	2.312E+02	4.245E+00
α_2	1.94E-03	9.50E-03	8.15E-03	2.17E-02	7.58E-03	2.237E+00	2.333E+02
α_3	5.76E-04	5.78E-03	4.46E-03	1.55E-02	7.58E-03	1.362E+00	2.341E+02
α_4	1.31E-05	2.29E-03	1.11E-03	8.55E-03	3.79E-03	5.385E-01	2.350E+02
α_5	2.33E-15	4.59E-04	4.25E-06	2.65E-03	7.58E-04	1.080E-01	2.354E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9686482	0.9830223	0.9841639	0.9934847	0.9819289	2.736E+02	4.726E+00
α_2	1.19E-03	6.95E-03	5.81E-03	1.66E-02	4.76E-03	1.935E+00	2.764E+02
α_3	6.57E-04	5.46E-03	4.33E-03	1.41E-02	6.34E-03	1.520E+00	2.768E+02

α_4	9.19E-05	2.98E-03	1.91E-03	9.53E-03	4.76E-03	8.303E-01	2.775E+02
α_5	1.87E-07	1.13E-03	2.98E-04	5.09E-03	1.90E-03	3.148E-01	2.780E+02
α_6	9.40E-14	4.51E-04	8.88E-06	2.56E-03	3.17E-04	1.254E-01	2.782E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9738424	0.9846286	0.9853632	0.9929035	0.9836508	4.282E+02	6.685E+00
α_2	1.22E-03	5.54E-03	4.80E-03	1.24E-02	2.86E-03	2.407E+00	4.325E+02
α_3	7.31E-04	4.38E-03	3.64E-03	1.05E-02	4.77E-03	1.903E+00	4.330E+02
α_4	3.08E-04	3.12E-03	2.40E-03	8.39E-03	4.77E-03	1.356E+00	4.335E+02
α_5	3.38E-05	1.68E-03	1.00E-03	5.62E-03	2.86E-03	7.294E-01	4.342E+02
α_6	8.08E-09	5.66E-04	9.61E-05	2.75E-03	9.54E-04	2.463E-01	4.346E+02
α_7	3.94E-34	9.80E-05	1.15E-10	4.87E-04	1.36E-04	4.261E-02	4.348E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9753048	0.9854917	0.9861857	0.9933028	0.9852462	4.545E+02	6.690E+00
α_2	8.87E-04	4.61E-03	3.92E-03	1.07E-02	1.67E-03	2.127E+00	4.590E+02
α_3	4.59E-04	3.49E-03	2.80E-03	8.87E-03	3.35E-03	1.609E+00	4.595E+02
α_4	2.78E-04	2.90E-03	2.22E-03	7.84E-03	4.18E-03	1.336E+00	4.598E+02
α_5	8.30E-05	2.00E-03	1.34E-03	6.16E-03	3.35E-03	9.213E-01	4.602E+02
α_6	2.45E-06	9.96E-04	4.19E-04	3.94E-03	1.67E-03	4.591E-01	4.607E+02
α_7	6.01E-13	3.02E-04	9.33E-06	1.68E-03	4.78E-04	1.391E-01	4.610E+02
α_8	8.39E-17	2.14E-04	1.17E-06	1.24E-03	5.97E-05	9.860E-02	4.610E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.81E-01	9.79E-01	9.82E-01	9.83E-01	9.85E-01	9.85E-01
α_2	1.81E-02	1.46E-02	1.30E-02	9.50E-03	6.95E-03	5.54E-03	4.61E-03
α_3		4.78E-03	5.19E-03	5.78E-03	5.46E-03	4.38E-03	3.49E-03
α_4			2.34E-03	2.29E-03	2.98E-03	3.12E-03	2.90E-03
α_5				4.59E-04	1.13E-03	1.68E-03	2.00E-03
α_6					4.51E-04	5.66E-04	9.96E-04
α_7						9.80E-05	3.02E-04
α_8							2.14E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.81E-01	9.79E-01	9.82E-01	9.83E-01	9.85E-01	9.85E-01
Beta	1.81E-02	1.94E-02	2.05E-02	1.80E-02	1.70E-02	1.54E-02	1.45E-02
Gamma		2.47E-01	3.67E-01	4.73E-01	5.90E-01	6.40E-01	6.82E-01
Delta			3.11E-01	3.22E-01	4.55E-01	5.55E-01	6.47E-01
Epsilon				1.67E-01	3.46E-01	4.29E-01	5.48E-01
Mu					2.85E-01	2.84E-01	4.31E-01
Omega						1.48E-01	3.41E-01
Sigma							4.15E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	16.10	24.15	32.20	40.25	48.30	56.35	64.40
N₁	0.5000	0.3750	0.2500	0.1563	0.0938	0.0547	0.0313
N₂	0.2500	0.3750	0.3750	0.3125	0.2344	0.1641	0.1094
N₃		0.1250	0.2500	0.3125	0.3125	0.2734	0.2188
N₄			0.0625	0.1563	0.2344	0.2734	0.2734
N₅				0.0313	0.0938	0.1641	0.2188
N₆					0.0156	0.0547	0.1094
N₇						0.0078	0.0313
N₈							0.0039

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 1.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.095

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9661661	0.9912654	0.9961012	0.9999710	5.486E+01	4.834E-01	--
α_2	2.90E-05	8.73E-03	3.90E-03	3.38E-02	4.834E-01	5.486E+01	0.830

CCCG = 3, Gamma = 0.096

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9780443	0.9921004	0.9940902	0.9993554	1.539E+02	1.226E+00	--
α_2	3.06E-04	6.30E-03	4.34E-03	1.90E-02	9.769E-01	1.542E+02	0.859
α_3	2.56E-08	1.60E-03	2.78E-04	7.78E-03	2.487E-01	1.548E+02	0.860

CCCG = 4, Gamma = 0.097

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9777861	0.9905122	0.9919731	0.9982435	2.147E+02	2.057E+00	--
α_2	7.16E-04	6.49E-03	5.08E-03	1.71E-02	1.442E+00	2.206E+02	0.843
α_3	2.59E-06	2.07E-03	7.77E-04	8.50E-03	4.114E-01	1.985E+02	0.941
α_4	1.22E-09	9.26E-04	1.01E-04	4.75E-03	2.036E-01	2.196E+02	0.852

CCCG = 5, Gamma = 0.097

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9821654	0.9909717	0.9917609	0.9970817	4.043E+02	3.683E+00	--
α_2	1.10E-03	5.37E-03	4.60E-03	1.23E-02	2.243E+00	4.154E+02	0.858
α_3	1.24E-04	2.47E-03	1.71E-03	7.41E-03	9.912E-01	4.002E+02	0.893
α_4	6.78E-07	9.95E-04	3.36E-04	4.22E-03	3.765E-01	3.781E+02	0.947
α_5	1.67E-21	1.93E-04	1.10E-07	1.11E-03	7.237E-02	3.754E+02	0.954

CCCG = 6, Gamma = 0.097

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9829525	0.9910989	0.9917929	0.9968749	4.609E+02	4.139E+00	--
α_2	8.43E-04	4.39E-03	3.73E-03	1.02E-02	2.128E+00	4.830E+02	0.844
α_3	1.69E-04	2.45E-03	1.78E-03	7.02E-03	1.134E+00	4.613E+02	0.885
α_4	8.26E-06	1.26E-03	6.27E-04	4.68E-03	5.533E-01	4.373E+02	0.935
α_5	2.00E-09	5.13E-04	6.85E-05	2.57E-03	2.210E-01	4.305E+02	0.950
α_6	3.64E-16	2.86E-04	1.99E-06	1.66E-03	1.027E-01	3.592E+02	1.139

CCCG = 7, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9861189	0.9919311	0.9923388	0.9963512	7.907E+02	6.432E+00	--
α_2	8.75E-04	3.37E-03	2.98E-03	7.17E-03	2.840E+00	8.403E+02	0.822
α_3	3.35E-04	2.26E-03	1.84E-03	5.58E-03	1.746E+00	7.725E+02	0.895
α_4	8.89E-05	1.43E-03	1.02E-03	4.15E-03	1.084E+00	7.589E+02	0.912
α_5	4.04E-06	7.11E-04	3.44E-04	2.66E-03	5.376E-01	7.557E+02	0.917
α_6	2.38E-10	2.71E-04	2.73E-05	1.40E-03	1.979E-01	7.304E+02	0.949
α_7	8.34E-53	3.72E-05	3.73E-15	1.27E-04	2.656E-02	7.136E+02	0.971

CCCG = 8, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9867890	0.9924109	0.9928146	0.9966544	7.993E+02	6.112E+00	--
α_2	5.81E-04	2.69E-03	2.32E-03	6.04E-03	2.364E+00	8.780E+02	0.788
α_3	2.29E-04	1.92E-03	1.52E-03	4.99E-03	1.512E+00	7.853E+02	0.882
α_4	8.22E-05	1.40E-03	9.93E-04	4.12E-03	1.056E+00	7.522E+02	0.921
α_5	1.35E-05	8.92E-04	5.08E-04	3.08E-03	6.745E-01	7.555E+02	0.917
α_6	5.39E-08	4.01E-04	1.02E-04	1.82E-03	3.076E-01	7.664E+02	0.905
α_7	1.09E-15	1.55E-04	1.53E-06	8.95E-04	1.093E-01	7.044E+02	0.985
α_8	2.04E-18	1.32E-04	3.67E-07	7.70E-04	8.885E-02	6.729E+02	1.031

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.92E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01
α_2	8.73E-03	6.30E-03	6.49E-03	5.37E-03	4.39E-03	3.37E-03	2.69E-03
α_3		1.60E-03	2.07E-03	2.47E-03	2.45E-03	2.26E-03	1.92E-03
α_4			9.26E-04	9.95E-04	1.26E-03	1.43E-03	1.40E-03
α_5				1.93E-04	5.13E-04	7.11E-04	8.92E-04
α_6					2.86E-04	2.71E-04	4.01E-04
α_7						3.72E-05	1.55E-04
α_8							1.32E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.92E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01
Beta	8.73E-03	7.90E-03	9.49E-03	9.03E-03	8.90E-03	8.07E-03	7.59E-03
Gamma		2.03E-01	3.16E-01	4.05E-01	5.07E-01	5.83E-01	6.46E-01
Delta			3.09E-01	3.25E-01	4.57E-01	5.20E-01	6.08E-01
Epsilon				1.62E-01	3.87E-01	4.17E-01	5.30E-01
Mu					3.58E-01	3.02E-01	4.36E-01
Omega						1.21E-01	4.17E-01
Sigma							4.60E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.60	2.40	3.20	4.00	4.80	5.60	6.40
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 4.5

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.312

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8994658	0.9700053	0.9820492	0.9994598	2.263E+01	6.998E-01	--
α_2	5.40E-04	3.00E-02	1.80E-02	1.01E-01	6.998E-01	2.263E+01	0.830

CCCG = 3, Gamma = 0.305

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9178344	0.9667476	0.9727124	0.9952349	4.879E+01	1.678E+00	--
α_2	2.47E-03	2.60E-02	2.01E-02	7.00E-02	1.314E+00	4.916E+01	0.859
α_3	3.94E-06	7.23E-03	2.37E-03	3.09E-02	3.646E-01	5.009E+01	0.860

CCCG = 4, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9219695	0.9638667	0.9681076	0.9912512	6.898E+01	2.586E+00	--
α_2	3.15E-03	2.25E-02	1.84E-02	5.61E-02	1.660E+00	7.206E+01	0.843
α_3	1.23E-04	9.73E-03	5.42E-03	3.40E-02	6.427E-01	6.539E+01	0.941
α_4	2.43E-07	3.88E-03	8.66E-04	1.81E-02	2.832E-01	7.267E+01	0.852

CCCG = 5, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9409781	0.9686027	0.9708496	0.9885480	1.332E+02	4.318E+00	--
α_2	3.46E-03	1.63E-02	1.41E-02	3.67E-02	2.305E+00	1.391E+02	0.858
α_3	1.06E-03	1.02E-02	7.95E-03	2.72E-02	1.391E+00	1.345E+02	0.893
α_4	1.95E-05	4.05E-03	1.92E-03	1.53E-02	5.195E-01	1.276E+02	0.947
α_5	1.38E-15	8.16E-04	6.03E-06	4.73E-03	1.037E-01	1.270E+02	0.954

CCCG = 6, Gamma = 0.294

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9461015	0.9701477	0.9719691	0.9879707	1.654E+02	5.090E+00	--
α_2	2.41E-03	1.22E-02	1.04E-02	2.80E-02	2.175E+00	1.766E+02	0.844
α_3	1.32E-03	9.65E-03	7.81E-03	2.43E-02	1.645E+00	1.688E+02	0.885
α_4	1.77E-04	5.28E-03	3.43E-03	1.67E-02	8.525E-01	1.605E+02	0.935
α_5	4.46E-07	2.05E-03	5.68E-04	9.12E-03	3.251E-01	1.584E+02	0.950
α_6	3.89E-17	6.98E-04	2.54E-06	4.08E-03	9.247E-02	1.323E+02	1.139

CCCG = 7, Gamma = 0.292

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9548575	0.9729831	0.9741650	0.9870722	2.579E+02	7.160E+00	--
α_2	2.59E-03	1.00E-02	8.87E-03	2.13E-02	2.818E+00	2.790E+02	0.822
α_3	1.26E-03	7.41E-03	6.19E-03	1.78E-02	1.918E+00	2.568E+02	0.895
α_4	5.64E-04	5.47E-03	4.24E-03	1.46E-02	1.388E+00	2.526E+02	0.912
α_5	7.29E-05	3.04E-03	1.87E-03	9.98E-03	7.675E-01	2.520E+02	0.917
α_6	7.02E-09	9.53E-04	1.43E-04	4.71E-03	2.327E-01	2.439E+02	0.949
α_7	2.37E-40	1.47E-04	6.63E-12	6.52E-04	3.515E-02	2.385E+02	0.971

CCCG = 8, Gamma = 0.290

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9569146	0.9741836	0.9753079	0.9876130	2.721E+02	7.211E+00	--
α_2	2.05E-03	8.53E-03	7.48E-03	1.86E-02	2.613E+00	3.038E+02	0.788
α_3	8.10E-04	5.98E-03	4.83E-03	1.51E-02	1.638E+00	2.722E+02	0.882
α_4	4.53E-04	4.96E-03	3.77E-03	1.35E-02	1.300E+00	2.609E+02	0.921
α_5	1.64E-04	3.62E-03	2.46E-03	1.10E-02	9.525E-01	2.623E+02	0.917
α_6	8.04E-06	1.90E-03	8.77E-04	7.25E-03	5.069E-01	2.664E+02	0.905
α_7	2.41E-15	4.42E-04	4.15E-06	2.55E-03	1.083E-01	2.451E+02	0.985
α_8	1.50E-17	3.90E-04	1.31E-06	2.28E-03	9.140E-02	2.342E+02	1.031

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.70E-01	9.67E-01	9.64E-01	9.69E-01	9.70E-01	9.73E-01	9.74E-01
α_2	3.00E-02	2.60E-02	2.25E-02	1.63E-02	1.22E-02	1.00E-02	8.53E-03
α_3		7.23E-03	9.73E-03	1.02E-02	9.65E-03	7.41E-03	5.98E-03
α_4			3.88E-03	4.05E-03	5.28E-03	5.47E-03	4.96E-03
α_5				8.16E-04	2.05E-03	3.04E-03	3.62E-03
α_6					6.98E-04	9.53E-04	1.90E-03
α_7						1.47E-04	4.42E-04
α_8							3.90E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.70E-01	9.67E-01	9.64E-01	9.69E-01	9.70E-01	9.73E-01	9.74E-01
Beta	3.00E-02	3.33E-02	3.61E-02	3.14E-02	2.99E-02	2.70E-02	2.58E-02
Gamma		2.17E-01	3.77E-01	4.81E-01	5.92E-01	6.30E-01	6.70E-01
Delta			2.85E-01	3.22E-01	4.54E-01	5.64E-01	6.54E-01
Epsilon				1.68E-01	3.42E-01	4.31E-01	5.61E-01
Mu					2.54E-01	2.66E-01	4.30E-01
Omega						1.34E-01	3.05E-01
Sigma							4.69E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.50	6.75	9.00	11.25	13.50	15.75	18.00
N_1	0.5000	0.3750	0.2500	0.1563	0.0938	0.0547	0.0313
N_2	0.2500	0.3750	0.3750	0.3125	0.2344	0.1641	0.1094
N_3		0.1250	0.2500	0.3125	0.3125	0.2734	0.2188

N₄			0.0625	0.1563	0.2344	0.2734	0.2734
N₅				0.0313	0.0938	0.1641	0.2188
N₆					0.0156	0.0547	0.1094
N₇						0.0078	0.0313
N₈							0.0039

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.059

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7964662	0.9509027	0.9817866	0.9999608	7.362E+00	3.801E-01	--
α_2	3.92E-05	4.91E-02	1.82E-02	2.04E-01	3.801E-01	7.362E+00	0.830

CCCG = 3, Gamma = 0.060

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8383148	0.9452175	0.9612122	0.9973213	1.656E+01	9.600E-01	--
α_2	5.80E-04	3.81E-02	2.23E-02	1.29E-01	6.673E-01	1.686E+01	0.859
α_3	1.48E-06	1.67E-02	4.05E-03	7.69E-02	2.927E-01	1.722E+01	0.860

CCCG = 4, Gamma = 0.060

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8567838	0.9414190	0.9514925	0.9915115	2.682E+01	1.669E+00	--
α_2	2.07E-03	3.55E-02	2.55E-02	1.03E-01	1.039E+00	2.827E+01	0.843
α_3	1.30E-05	1.48E-02	5.32E-03	6.18E-02	3.887E-01	2.587E+01	0.941
α_4	9.64E-08	8.32E-03	1.38E-03	4.07E-02	2.414E-01	2.876E+01	0.852

CCCG = 5, Gamma = 0.061

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8997783	0.9492312	0.9535448	0.9839257	6.520E+01	3.487E+00	--
α_2	3.96E-03	2.53E-02	2.10E-02	6.16E-02	1.791E+00	6.887E+01	0.858
α_3	1.42E-03	1.78E-02	1.33E-02	4.94E-02	1.207E+00	6.667E+01	0.893
α_4	1.20E-05	6.78E-03	2.72E-03	2.73E-02	4.340E-01	6.360E+01	0.947
α_5	1.92E-26	8.65E-04	3.08E-08	4.77E-03	5.493E-02	6.347E+01	0.954

CCCG = 6, Gamma = 0.061

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9118626	0.9540800	0.9576043	0.9842447	8.113E+01	3.905E+00	--
α_2	1.44E-03	1.49E-02	1.15E-02	4.01E-02	1.335E+00	8.826E+01	0.844
α_3	2.20E-03	1.79E-02	1.43E-02	4.60E-02	1.531E+00	8.387E+01	0.885
α_4	1.72E-04	8.89E-03	5.30E-03	2.98E-02	7.191E-01	8.013E+01	0.935
α_5	4.54E-08	3.10E-03	5.31E-04	1.51E-02	2.467E-01	7.930E+01	0.950
α_6	1.21E-20	1.10E-03	6.61E-07	6.37E-03	7.279E-02	6.628E+01	1.139

CCCG = 7, Gamma = 0.061

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9285111	0.9590693	0.9612252	0.9822609	1.352E+02	5.770E+00	--
α_2	1.27E-03	1.02E-02	8.16E-03	2.62E-02	1.549E+00	1.501E+02	0.822
α_3	2.54E-03	1.43E-02	1.20E-02	3.37E-02	1.989E+00	1.373E+02	0.895
α_4	8.47E-04	9.42E-03	7.15E-03	2.57E-02	1.287E+00	1.354E+02	0.912
α_5	8.49E-05	5.08E-03	2.95E-03	1.73E-02	6.913E-01	1.353E+02	0.917
α_6	1.31E-08	1.77E-03	2.67E-04	8.76E-03	2.327E-01	1.312E+02	0.949
α_7	1.12E-64	1.65E-04	2.49E-17	4.14E-04	2.112E-02	1.283E+02	0.971

CCCG = 8, Gamma = 0.061

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9377805	0.9628211	0.9644465	0.9823100	1.817E+02	7.016E+00	--
α_2	9.66E-04	7.51E-03	6.02E-03	1.92E-02	1.583E+00	2.091E+02	0.788
α_3	1.87E-03	1.05E-02	8.87E-03	2.50E-02	1.986E+00	1.863E+02	0.882
α_4	1.30E-03	9.27E-03	7.53E-03	2.32E-02	1.672E+00	1.786E+02	0.921
α_5	2.96E-04	5.59E-03	3.90E-03	1.66E-02	1.011E+00	1.800E+02	0.917
α_6	2.36E-05	3.11E-03	1.58E-03	1.14E-02	5.709E-01	1.829E+02	0.905
α_7	2.46E-10	1.07E-03	8.41E-05	5.67E-03	1.809E-01	1.684E+02	0.985
α_8	1.12E-107	7.73E-05	2.34E-27	5.79E-05	1.245E-02	1.611E+02	1.031

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.51E-01	9.45E-01	9.41E-01	9.49E-01	9.54E-01	9.59E-01	9.63E-01
α_2	4.91E-02	3.81E-02	3.55E-02	2.53E-02	1.49E-02	1.02E-02	7.51E-03
α_3		1.67E-02	1.48E-02	1.78E-02	1.79E-02	1.43E-02	1.05E-02
α_4			8.32E-03	6.78E-03	8.89E-03	9.42E-03	9.27E-03
α_5				8.65E-04	3.10E-03	5.08E-03	5.59E-03
α_6					1.10E-03	1.77E-03	3.11E-03
α_7						1.65E-04	1.07E-03
α_8							7.73E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.51E-01	9.45E-01	9.41E-01	9.49E-01	9.54E-01	9.59E-01	9.63E-01
Beta	4.91E-02	5.48E-02	5.86E-02	5.08E-02	4.59E-02	4.09E-02	3.72E-02
Gamma		3.05E-01	3.95E-01	5.01E-01	6.76E-01	7.50E-01	7.98E-01
Delta			3.60E-01	3.01E-01	4.22E-01	5.35E-01	6.45E-01
Epsilon				1.13E-01	3.21E-01	4.27E-01	5.15E-01
Mu					2.61E-01	2.76E-01	4.33E-01
Omega						8.50E-02	2.70E-01
Sigma							6.72E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.50	2.00	2.50	3.00	3.50	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 5.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.326

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9492894	0.9870095	0.9943110	0.9999625	3.576E+01	4.706E-01	--
α_2	3.75E-05	1.30E-02	5.69E-03	5.07E-02	4.706E-01	3.576E+01	0.830

CCCG = 3, Gamma = 0.330

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9614201	0.9865821	0.9902749	0.9991217	8.106E+01	1.103E+00	--
α_2	2.84E-04	9.86E-03	6.27E-03	3.17E-02	8.104E-01	8.137E+01	0.859
α_3	2.99E-07	3.56E-03	8.36E-04	1.64E-02	2.921E-01	8.184E+01	0.860

CCCG = 4, Gamma = 0.332

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9680264	0.9865422	0.9887054	0.9976595	1.431E+02	1.953E+00	--
α_2	8.21E-04	8.81E-03	6.73E-03	2.39E-02	1.312E+00	1.477E+02	0.843
α_3	5.43E-06	3.23E-03	1.28E-03	1.31E-02	4.307E-01	1.330E+02	0.941
α_4	2.83E-09	1.42E-03	1.68E-04	7.25E-03	2.099E-01	1.472E+02	0.852

CCCG = 5, Gamma = 0.334

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9748060	0.9878179	0.9890686	0.9965553	2.519E+02	3.107E+00	--
α_2	9.06E-04	6.42E-03	5.22E-03	1.60E-02	1.684E+00	2.607E+02	0.858
α_3	1.65E-04	3.74E-03	2.54E-03	1.14E-02	9.426E-01	2.511E+02	0.893
α_4	1.21E-06	1.61E-03	5.52E-04	6.77E-03	3.816E-01	2.374E+02	0.947
α_5	1.67E-16	4.18E-04	2.29E-06	2.43E-03	9.865E-02	2.358E+02	0.954

CCCG = 6, Gamma = 0.335

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9776862	0.9885815	0.9895396	0.9962034	3.309E+02	3.822E+00	--
α_2	7.06E-04	4.88E-03	3.98E-03	1.21E-02	1.714E+00	3.497E+02	0.844
α_3	2.17E-04	3.31E-03	2.39E-03	9.54E-03	1.108E+00	3.339E+02	0.885
α_4	2.71E-05	2.05E-03	1.14E-03	7.17E-03	6.509E-01	3.165E+02	0.935
α_5	1.61E-08	8.13E-04	1.46E-04	3.92E-03	2.536E-01	3.117E+02	0.950
α_6	5.96E-17	3.68E-04	1.67E-06	2.14E-03	9.572E-02	2.602E+02	1.139

CCCG = 7, Gamma = 0.336

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9808934	0.9894297	0.9900862	0.9957238	4.863E+02	5.195E+00	--
α_2	7.64E-04	4.03E-03	3.42E-03	9.39E-03	2.105E+00	5.203E+02	0.822
α_3	2.58E-04	2.75E-03	2.10E-03	7.47E-03	1.320E+00	4.784E+02	0.895
α_4	1.08E-04	2.12E-03	1.47E-03	6.34E-03	9.967E-01	4.699E+02	0.912
α_5	5.66E-06	1.12E-03	5.32E-04	4.23E-03	5.249E-01	4.680E+02	0.917
α_6	3.21E-10	4.32E-04	4.23E-05	2.24E-03	1.956E-01	4.525E+02	0.949
α_7	3.41E-28	1.20E-04	2.71E-09	6.49E-04	5.291E-02	4.421E+02	0.971

CCCG = 8, Gamma = 0.336

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9824276	0.9900080	0.9905622	0.9956961	5.778E+02	5.832E+00	--
α_2	7.07E-04	3.49E-03	2.98E-03	7.98E-03	2.229E+00	6.372E+02	0.788
α_3	1.89E-04	2.21E-03	1.66E-03	6.09E-03	1.260E+00	5.701E+02	0.882
α_4	1.08E-04	1.90E-03	1.34E-03	5.62E-03	1.042E+00	5.460E+02	0.921
α_5	3.26E-05	1.39E-03	8.50E-04	4.58E-03	7.626E-01	5.484E+02	0.917
α_6	1.34E-07	5.87E-04	1.64E-04	2.61E-03	3.271E-01	5.565E+02	0.905
α_7	2.54E-13	2.63E-04	7.04E-06	1.48E-03	1.344E-01	5.115E+02	0.985
α_8	1.42E-20	1.57E-04	1.47E-07	9.12E-04	7.682E-02	4.887E+02	1.031

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01
α_2	1.30E-02	9.86E-03	8.81E-03	6.42E-03	4.88E-03	4.03E-03	3.49E-03
α_3		3.56E-03	3.23E-03	3.74E-03	3.31E-03	2.75E-03	2.21E-03
α_4			1.42E-03	1.61E-03	2.05E-03	2.12E-03	1.90E-03
α_5				4.18E-04	8.13E-04	1.12E-03	1.39E-03
α_6					3.68E-04	4.32E-04	5.87E-04
α_7						1.20E-04	2.63E-04
α_8							1.57E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01
Beta	1.30E-02	1.34E-02	1.35E-02	1.22E-02	1.14E-02	1.06E-02	9.99E-03
Gamma		2.65E-01	3.46E-01	4.73E-01	5.73E-01	6.19E-01	6.51E-01
Delta			3.06E-01	3.51E-01	4.94E-01	5.79E-01	6.61E-01
Epsilon				2.07E-01	3.65E-01	4.41E-01	5.57E-01
Mu					3.12E-01	3.30E-01	4.20E-01
Omega						2.17E-01	4.17E-01
Sigma							3.74E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.50	8.25	11.00	13.75	16.50	19.25	22.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 3.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.208

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9859778	0.9963619	0.9983574	0.9999866	1.351E+02	4.932E-01	--
α_2	1.34E-05	3.64E-03	1.64E-03	1.40E-02	4.932E-01	1.351E+02	0.830

CCCG = 3, Gamma = 0.210

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9894634	0.9964040	0.9974458	0.9997871	2.936E+02	1.059E+00	--
α_2	4.53E-05	2.42E-03	1.43E-03	8.18E-03	7.137E-01	2.940E+02	0.859
α_3	4.22E-07	1.17E-03	3.55E-04	5.12E-03	3.458E-01	2.942E+02	0.860

CCCG = 4, Gamma = 0.211

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9914325	0.9963183	0.9968760	0.9992979	5.722E+02	2.115E+00	--
α_2	3.29E-04	2.65E-03	2.11E-03	6.83E-03	1.549E+00	5.820E+02	0.843
α_3	1.58E-08	5.06E-04	9.90E-05	2.41E-03	2.646E-01	5.225E+02	0.941
α_4	5.76E-08	5.21E-04	1.28E-04	2.38E-03	3.010E-01	5.772E+02	0.852

CCCG = 5, Gamma = 0.212

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940754	0.9967102	0.9969124	0.9986544	1.613E+03	5.325E+00	--
α_2	7.03E-04	2.21E-03	2.01E-03	4.39E-03	3.632E+00	1.642E+03	0.858
α_3	8.41E-05	8.56E-04	6.57E-04	2.31E-03	1.354E+00	1.580E+03	0.893
α_4	1.88E-08	1.99E-04	4.74E-05	9.12E-04	2.961E-01	1.491E+03	0.947
α_5	8.53E-35	2.87E-05	3.16E-11	1.42E-04	4.243E-02	1.480E+03	0.954

CCCG = 6, Gamma = 0.213

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9938056	0.9966236	0.9968472	0.9986779	1.457E+03	4.936E+00	--
α_2	5.12E-04	1.92E-03	1.71E-03	4.07E-03	2.915E+00	1.513E+03	0.844
α_3	7.42E-05	8.70E-04	6.54E-04	2.41E-03	1.257E+00	1.443E+03	0.885
α_4	1.50E-06	3.68E-04	1.68E-04	1.41E-03	5.031E-01	1.367E+03	0.935
α_5	2.49E-15	8.58E-05	1.13E-06	4.92E-04	1.155E-01	1.345E+03	0.950
α_6	6.05E-13	1.29E-04	4.73E-06	7.16E-04	1.451E-01	1.122E+03	1.139

CCCG = 7, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9952030	0.9969645	0.9970680	0.9983726	3.171E+03	9.654E+00	--
α_2	5.63E-04	1.45E-03	1.36E-03	2.68E-03	4.851E+00	3.333E+03	0.822
α_3	2.34E-04	9.14E-04	8.08E-04	1.96E-03	2.800E+00	3.062E+03	0.895
α_4	4.70E-05	4.60E-04	3.55E-04	1.23E-03	1.384E+00	3.007E+03	0.912
α_5	5.79E-07	1.64E-04	7.32E-05	6.33E-04	4.902E-01	2.993E+03	0.917
α_6	9.42E-16	3.96E-05	5.02E-07	2.27E-04	1.146E-01	2.892E+03	0.949
α_7	2.73E-93	5.18E-06	5.51E-25	6.16E-06	1.464E-02	2.825E+03	0.971

CCCG = 8, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9950400	0.9970522	0.9971877	0.9986019	2.418E+03	7.148E+00	--
α_2	3.06E-04	1.13E-03	1.00E-03	2.37E-03	2.980E+00	2.640E+03	0.788
α_3	1.44E-04	8.30E-04	6.94E-04	1.98E-03	1.960E+00	2.360E+03	0.882
α_4	3.77E-05	5.16E-04	3.78E-04	1.46E-03	1.166E+00	2.260E+03	0.921
α_5	1.34E-06	2.37E-04	1.15E-04	8.86E-04	5.375E-01	2.269E+03	0.917
α_6	1.73E-11	7.84E-05	6.08E-06	4.15E-04	1.805E-01	2.301E+03	0.905
α_7	1.01E-35	1.96E-05	1.46E-11	9.57E-05	4.139E-02	2.115E+03	0.985
α_8	8.53E-09	1.40E-04	3.09E-05	6.52E-04	2.827E-01	2.020E+03	1.031

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	3.64E-03	2.42E-03	2.65E-03	2.21E-03	1.92E-03	1.45E-03	1.13E-03
α_3		1.17E-03	5.06E-04	8.56E-04	8.70E-04	9.14E-04	8.30E-04
α_4			5.21E-04	1.99E-04	3.68E-04	4.60E-04	5.16E-04
α_5				2.87E-05	8.58E-05	1.64E-04	2.37E-04
α_6					1.29E-04	3.96E-05	7.84E-05
α_7						5.18E-06	1.96E-05
α_8							1.40E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	3.64E-03	3.60E-03	3.68E-03	3.29E-03	3.38E-03	3.04E-03	2.95E-03
Gamma		3.26E-01	2.79E-01	3.29E-01	4.30E-01	5.21E-01	6.17E-01
Delta			5.07E-01	2.10E-01	4.01E-01	4.23E-01	5.44E-01
Epsilon				1.26E-01	3.69E-01	3.12E-01	4.79E-01
Mu					6.01E-01	2.15E-01	5.01E-01
Omega						1.16E-01	6.70E-01
Sigma							8.77E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.50	5.25	7.00	8.75	10.50	12.25	14.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.10 PWR Residual Heat Removal Pumps

2.1.10.1 PWR-RHR-MDP-FS: PWR RHR Motor-Driven Pumps Fail to Start

Generic CCF Parameters

Plant Type:	PWR
System Group:	Clean Water
System:	Residual Heat Removal (LCI in BWRs; LPI in PWRs)
Component Group:	Pump
Component Type:	Motor Driven Pump
Component Subtype:	Centrifugal
Failure Mode:	Fail to Start
Date Range:	2006 through 2020
Prior:	Default 2015

Total Number of Independent Failure Events: 16.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9528639	0.9879498	0.9947483	0.9999634	1.0000000	3.841E+01	4.685E-01
α_2	3.38E-05	1.21E-02	5.25E-03	4.71E-02	0.00E+00	4.685E-01	3.841E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9571920	0.9849809	0.9890158	0.9989621	1.0000000	7.398E+01	1.128E+00
α_2	3.80E-04	1.13E-02	7.39E-03	3.57E-02	0.00E+00	8.512E-01	7.426E+01
α_3	1.84E-07	3.69E-03	7.89E-04	1.73E-02	0.00E+00	2.768E-01	7.483E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9582301	0.9825585	0.9854279	0.9970799	1.0000000	1.067E+02	1.894E+00
α_2	1.00E-03	1.16E-02	8.77E-03	3.19E-02	0.00E+00	1.260E+00	1.073E+02
α_3	4.03E-06	3.71E-03	1.36E-03	1.53E-02	0.00E+00	4.024E-01	1.082E+02
α_4	1.48E-08	2.13E-03	3.18E-04	1.06E-02	0.00E+00	2.315E-01	1.083E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9672200	0.9836774	0.9851839	0.9949847	1.0000000	2.068E+02	3.432E+00
α_2	1.56E-03	9.15E-03	7.65E-03	2.19E-02	0.00E+00	1.924E+00	2.083E+02
α_3	2.89E-04	4.99E-03	3.53E-03	1.47E-02	0.00E+00	1.049E+00	2.092E+02
α_4	1.38E-06	1.82E-03	6.27E-04	7.67E-03	0.00E+00	3.822E-01	2.099E+02
α_5	3.17E-20	3.65E-04	3.40E-07	2.12E-03	0.00E+00	7.674E-02	2.102E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
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α_1	0.9694933	0.9843507	0.9856473	0.9947758	1.0000000	2.412E+02	3.835E+00
α_2	9.95E-04	6.94E-03	5.65E-03	1.73E-02	0.00E+00	1.701E+00	2.434E+02
α_3	3.89E-04	4.93E-03	3.66E-03	1.38E-02	0.00E+00	1.207E+00	2.438E+02
α_4	2.23E-05	2.43E-03	1.28E-03	8.76E-03	0.00E+00	5.960E-01	2.445E+02
α_5	3.53E-09	9.02E-04	1.21E-04	4.53E-03	0.00E+00	2.211E-01	2.448E+02
α_6	3.52E-15	4.48E-04	4.54E-06	2.58E-03	0.00E+00	1.098E-01	2.449E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9742614	0.9853960	0.9862084	0.9937495	1.0000000	3.878E+02	5.747E+00
α_2	1.17E-03	5.70E-03	4.89E-03	1.30E-02	0.00E+00	2.243E+00	3.913E+02
α_3	5.56E-04	4.14E-03	3.34E-03	1.05E-02	0.00E+00	1.630E+00	3.919E+02
α_4	1.71E-04	2.75E-03	1.97E-03	8.00E-03	0.00E+00	1.083E+00	3.925E+02
α_5	1.04E-05	1.44E-03	7.25E-04	5.28E-03	0.00E+00	5.654E-01	3.930E+02
α_6	2.67E-10	4.87E-04	4.50E-05	2.54E-03	0.00E+00	1.916E-01	3.934E+02
α_7	6.06E-41	8.84E-05	3.29E-12	3.88E-04	0.00E+00	3.480E-02	3.935E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9754657	0.9860944	0.9868721	0.9940574	1.0000000	4.060E+02	5.726E+00
α_2	8.84E-04	4.90E-03	4.13E-03	1.16E-02	0.00E+00	2.018E+00	4.097E+02
α_3	3.49E-04	3.38E-03	2.62E-03	9.01E-03	0.00E+00	1.391E+00	4.104E+02
α_4	1.53E-04	2.58E-03	1.83E-03	7.56E-03	0.00E+00	1.062E+00	4.107E+02
α_5	3.01E-05	1.71E-03	9.97E-04	5.80E-03	0.00E+00	7.026E-01	4.110E+02
α_6	3.33E-07	8.49E-04	2.61E-04	3.69E-03	0.00E+00	3.497E-01	4.114E+02
α_7	1.28E-15	2.62E-04	2.40E-06	1.51E-03	0.00E+00	1.078E-01	4.116E+02
α_8	2.68E-17	2.30E-04	9.74E-07	1.34E-03	0.00E+00	9.469E-02	4.117E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.85E-01	9.83E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.21E-02	1.13E-02	1.16E-02	9.15E-03	6.94E-03	5.70E-03	4.90E-03
α_3		3.69E-03	3.71E-03	4.99E-03	4.93E-03	4.14E-03	3.38E-03
α_4			2.13E-03	1.82E-03	2.43E-03	2.75E-03	2.58E-03
α_5				3.65E-04	9.02E-04	1.44E-03	1.71E-03
α_6					4.48E-04	4.87E-04	8.49E-04
α_7						8.84E-05	2.62E-04
α_8							2.30E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.85E-01	9.83E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.21E-02	1.50E-02	1.74E-02	1.63E-02	1.56E-02	1.46E-02	1.39E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01

Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	16.00	16.00	16.00	16.00	16.00	16.00	16.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9731894	0.9930840	0.9969204	0.9999771	6.941E+01	4.834E-01	--
α_2	2.29E-05	6.92E-03	3.08E-03	2.68E-02	4.834E-01	6.941E+01	0.677

CCCG = 3, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804083	0.9929539	0.9947312	0.9994255	1.727E+02	1.226E+00	--
α_2	2.78E-04	5.71E-03	3.94E-03	1.72E-02	9.769E-01	1.701E+02	0.783
α_3	2.13E-08	1.34E-03	2.32E-04	6.48E-03	2.487E-01	1.859E+02	0.719

CCCG = 4, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9789981	0.9910319	0.9924140	0.9983403	2.273E+02	2.057E+00	--
α_2	6.98E-04	6.32E-03	4.95E-03	1.66E-02	1.442E+00	2.266E+02	0.820
α_3	2.24E-06	1.78E-03	6.70E-04	7.34E-03	4.114E-01	2.301E+02	0.811
α_4	1.13E-09	8.59E-04	9.36E-05	4.41E-03	2.036E-01	2.368E+02	0.789

CCCG = 5, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9824229	0.9911025	0.9918805	0.9971241	4.103E+02	3.683E+00	--
α_2	1.12E-03	5.47E-03	4.69E-03	1.25E-02	2.243E+00	4.082E+02	0.871
α_3	1.17E-04	2.32E-03	1.61E-03	6.97E-03	9.912E-01	4.257E+02	0.837
α_4	6.20E-07	9.09E-04	3.07E-04	3.86E-03	3.765E-01	4.137E+02	0.863
α_5	1.74E-21	2.00E-04	1.14E-07	1.16E-03	7.237E-02	3.613E+02	0.989

CCCG = 6, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9828086	0.9910236	0.9917233	0.9968483	4.570E+02	4.139E+00	--
α_2	9.07E-04	4.72E-03	4.01E-03	1.10E-02	2.128E+00	4.487E+02	0.904
α_3	1.60E-04	2.31E-03	1.68E-03	6.63E-03	1.134E+00	4.889E+02	0.831
α_4	7.58E-06	1.16E-03	5.75E-04	4.30E-03	5.533E-01	4.764E+02	0.854
α_5	1.86E-09	4.78E-04	6.38E-05	2.40E-03	2.210E-01	4.618E+02	0.882
α_6	3.87E-16	3.04E-04	2.11E-06	1.76E-03	1.027E-01	3.380E+02	1.205

CCCG = 7, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9856788	0.9916746	0.9920951	0.9962349	7.662E+02	6.432E+00	--
α_2	9.93E-04	3.82E-03	3.39E-03	8.13E-03	2.840E+00	7.405E+02	0.929
α_3	3.22E-04	2.17E-03	1.77E-03	5.37E-03	1.746E+00	8.032E+02	0.858
α_4	8.49E-05	1.36E-03	9.75E-04	3.96E-03	1.084E+00	7.945E+02	0.868
α_5	3.83E-06	6.73E-04	3.26E-04	2.52E-03	5.376E-01	7.978E+02	0.865
α_6	2.25E-10	2.56E-04	2.58E-05	1.32E-03	1.979E-01	7.727E+02	0.893
α_7	9.79E-53	4.37E-05	4.38E-15	1.49E-04	2.656E-02	6.079E+02	1.136

CCCG = 8, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9861292	0.9920310	0.9924545	0.9964864	7.609E+02	6.112E+00	--
α_2	6.93E-04	3.20E-03	2.77E-03	7.20E-03	2.364E+00	7.359E+02	0.935
α_3	2.26E-04	1.90E-03	1.51E-03	4.94E-03	1.512E+00	7.930E+02	0.869
α_4	7.73E-05	1.32E-03	9.34E-04	3.87E-03	1.056E+00	8.001E+02	0.862
α_5	1.30E-05	8.60E-04	4.89E-04	2.96E-03	6.745E-01	7.840E+02	0.880
α_6	5.07E-08	3.77E-04	9.59E-05	1.71E-03	3.076E-01	8.147E+02	0.847
α_7	1.00E-15	1.43E-04	1.41E-06	8.25E-04	1.093E-01	7.637E+02	0.904
α_8	2.56E-18	1.66E-04	4.60E-07	9.66E-04	8.885E-02	5.363E+02	1.287

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01
α_2	6.92E-03	5.71E-03	6.32E-03	5.47E-03	4.72E-03	3.82E-03	3.20E-03
α_3		1.34E-03	1.78E-03	2.32E-03	2.31E-03	2.17E-03	1.90E-03
α_4			8.59E-04	9.09E-04	1.16E-03	1.36E-03	1.32E-03
α_5				2.00E-04	4.78E-04	6.73E-04	8.60E-04
α_6					3.04E-04	2.56E-04	3.77E-04
α_7						4.37E-05	1.43E-04
α_8							1.66E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01
Beta	6.92E-03	7.05E-03	8.97E-03	8.90E-03	8.98E-03	8.33E-03	7.97E-03
Gamma		1.90E-01	2.95E-01	3.86E-01	4.74E-01	5.41E-01	5.98E-01
Delta			3.25E-01	3.23E-01	4.56E-01	5.19E-01	6.01E-01
Epsilon				1.81E-01	4.03E-01	4.17E-01	5.40E-01
Mu					3.88E-01	3.08E-01	4.44E-01
Omega						1.46E-01	4.50E-01
Sigma							5.37E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9295321	0.9822008	0.9924853	0.9999601	2.482E+01	4.498E-01	--
α_2	3.99E-05	1.78E-02	7.51E-03	7.05E-02	4.498E-01	2.482E+01	0.677

CCCG = 3, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9345538	0.9765873	0.9825515	0.9982134	4.915E+01	1.178E+00	--
α_2	8.42E-04	1.90E-02	1.30E-02	5.75E-02	9.387E-01	4.856E+01	0.783
α_3	4.68E-08	4.45E-03	7.19E-04	2.18E-02	2.396E-01	5.363E+01	0.719

CCCG = 4, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9332818	0.9719825	0.9764900	0.9952547	6.586E+01	1.898E+00	--
α_2	1.73E-03	1.91E-02	1.46E-02	5.19E-02	1.285E+00	6.603E+01	0.820
α_3	5.33E-06	5.77E-03	2.07E-03	2.41E-02	3.927E-01	6.764E+01	0.811
α_4	1.22E-08	3.15E-03	4.23E-04	1.58E-02	2.207E-01	6.973E+01	0.789

CCCG = 5, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9463892	0.9730457	0.9754355	0.9915323	1.266E+02	3.506E+00	--
α_2	2.76E-03	1.55E-02	1.30E-02	3.65E-02	1.992E+00	1.268E+02	0.871
α_3	4.98E-04	8.05E-03	5.77E-03	2.34E-02	1.078E+00	1.328E+02	0.837
α_4	1.47E-06	2.80E-03	9.05E-04	1.20E-02	3.632E-01	1.296E+02	0.863
α_5	5.91E-21	6.39E-04	3.70E-07	3.70E-03	7.248E-02	1.133E+02	0.989

CCCG = 6, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9498116	0.9735371	0.9755030	0.9905442	1.545E+02	4.199E+00	--
α_2	2.17E-03	1.26E-02	1.06E-02	3.00E-02	1.941E+00	1.522E+02	0.904
α_3	7.62E-04	7.95E-03	6.10E-03	2.15E-02	1.332E+00	1.662E+02	0.831
α_4	4.07E-05	3.79E-03	2.04E-03	1.35E-02	6.181E-01	1.624E+02	0.854
α_5	1.01E-08	1.46E-03	2.18E-04	7.25E-03	2.313E-01	1.577E+02	0.882
α_6	6.07E-20	6.65E-04	6.27E-07	3.87E-03	7.684E-02	1.155E+02	1.205

CCCG = 7, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9560283	0.9745027	0.9757888	0.9885845	2.378E+02	6.223E+00	--
α_2	2.77E-03	1.13E-02	9.96E-03	2.45E-02	2.654E+00	2.319E+02	0.929
α_3	8.83E-04	6.48E-03	5.23E-03	1.63E-02	1.645E+00	2.524E+02	0.858
α_4	2.96E-04	4.44E-03	3.21E-03	1.28E-02	1.115E+00	2.500E+02	0.868
α_5	2.32E-05	2.39E-03	1.27E-03	8.59E-03	6.034E-01	2.513E+02	0.865
α_6	1.30E-10	7.30E-04	5.44E-05	3.87E-03	1.780E-01	2.437E+02	0.893
α_7	7.76E-51	1.43E-04	2.93E-14	5.04E-04	2.734E-02	1.918E+02	1.136

CCCG = 8, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9570175	0.9750595	0.9763143	0.9888156	2.442E+02	6.246E+00	--
α_2	2.40E-03	1.04E-02	9.06E-03	2.29E-02	2.504E+00	2.386E+02	0.935
α_3	5.86E-04	5.47E-03	4.26E-03	1.45E-02	1.419E+00	2.581E+02	0.869
α_4	2.16E-04	3.92E-03	2.76E-03	1.16E-02	1.027E+00	2.607E+02	0.862
α_5	5.90E-05	2.86E-03	1.72E-03	9.57E-03	7.337E-01	2.556E+02	0.880
α_6	1.49E-06	1.49E-03	5.39E-04	6.21E-03	3.975E-01	2.658E+02	0.847
α_7	3.09E-20	3.09E-04	2.96E-07	1.79E-03	7.703E-02	2.494E+02	0.904
α_8	4.64E-18	4.99E-04	1.25E-06	2.91E-03	8.749E-02	1.751E+02	1.287

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.77E-01	9.72E-01	9.73E-01	9.74E-01	9.75E-01	9.75E-01
α_2	1.78E-02	1.90E-02	1.91E-02	1.55E-02	1.26E-02	1.13E-02	1.04E-02
α_3		4.45E-03	5.77E-03	8.05E-03	7.95E-03	6.48E-03	5.47E-03
α_4			3.15E-03	2.80E-03	3.79E-03	4.44E-03	3.92E-03
α_5				6.39E-04	1.46E-03	2.39E-03	2.86E-03
α_6					6.65E-04	7.30E-04	1.49E-03
α_7						1.43E-04	3.09E-04
α_8							4.99E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.77E-01	9.72E-01	9.73E-01	9.74E-01	9.75E-01	9.75E-01
Beta	1.78E-02	2.34E-02	2.80E-02	2.70E-02	2.65E-02	2.55E-02	2.49E-02
Gamma		1.90E-01	3.19E-01	4.26E-01	5.24E-01	5.56E-01	5.84E-01
Delta			3.53E-01	2.99E-01	4.27E-01	5.43E-01	6.24E-01
Epsilon				1.86E-01	3.60E-01	4.24E-01	5.68E-01
Mu					3.12E-01	2.67E-01	4.46E-01
Omega						1.63E-01	3.51E-01
Sigma							6.18E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8552974	0.9653359	0.9874593	0.9999731	1.059E+01	3.801E-01	--
α_2	2.69E-05	3.47E-02	1.25E-02	1.45E-01	3.801E-01	1.059E+01	0.677

CCCG = 3, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8603697	0.9528965	0.9668278	0.9977153	1.942E+01	9.600E-01	--
α_2	5.09E-04	3.36E-02	1.96E-02	1.14E-01	6.673E-01	1.921E+01	0.783
α_3	1.19E-06	1.35E-02	3.26E-03	6.23E-02	2.927E-01	2.134E+01	0.719

CCCG = 4, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8653771	0.9450333	0.9545514	0.9920572	2.870E+01	1.669E+00	--
α_2	2.01E-03	3.45E-02	2.48E-02	1.00E-01	1.039E+00	2.909E+01	0.820
α_3	1.11E-05	1.28E-02	4.57E-03	5.33E-02	3.887E-01	3.006E+01	0.811
α_4	8.92E-08	7.71E-03	1.28E-03	3.77E-02	2.414E-01	3.107E+01	0.789

CCCG = 5, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9015038	0.9501222	0.9543679	0.9842150	6.642E+01	3.487E+00	--
α_2	4.06E-03	2.59E-02	2.15E-02	6.30E-02	1.791E+00	6.727E+01	0.871
α_3	1.34E-03	1.68E-02	1.26E-02	4.68E-02	1.207E+00	7.059E+01	0.837
α_4	1.10E-05	6.23E-03	2.49E-03	2.51E-02	4.340E-01	6.925E+01	0.863
α_5	2.01E-26	9.03E-04	3.22E-08	4.98E-03	5.493E-02	6.075E+01	0.989

CCCG = 6, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9125063	0.9544210	0.9579215	0.9843642	8.176E+01	3.905E+00	--
α_2	1.57E-03	1.62E-02	1.25E-02	4.35E-02	1.335E+00	8.118E+01	0.904
α_3	2.10E-03	1.71E-02	1.36E-02	4.38E-02	1.531E+00	8.816E+01	0.831
α_4	1.59E-04	8.24E-03	4.91E-03	2.77E-02	7.191E-01	8.658E+01	0.854
α_5	4.27E-08	2.92E-03	5.00E-04	1.42E-02	2.467E-01	8.431E+01	0.882
α_6	1.30E-20	1.18E-03	7.10E-07	6.83E-03	7.279E-02	6.181E+01	1.205

CCCG = 7, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9278010	0.9586575	0.9608332	0.9820796	1.338E+02	5.770E+00	--
α_2	1.46E-03	1.17E-02	9.33E-03	2.99E-02	1.549E+00	1.310E+02	0.929
α_3	2.47E-03	1.39E-02	1.17E-02	3.27E-02	1.989E+00	1.416E+02	0.858
α_4	8.16E-04	9.07E-03	6.89E-03	2.48E-02	1.287E+00	1.406E+02	0.868
α_5	8.10E-05	4.85E-03	2.82E-03	1.66E-02	6.913E-01	1.417E+02	0.865
α_6	1.25E-08	1.69E-03	2.54E-04	8.35E-03	2.327E-01	1.376E+02	0.893
α_7	1.32E-64	1.95E-04	2.95E-17	4.91E-04	2.112E-02	1.084E+02	1.136

CCCG = 8, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9367703	0.9622110	0.9638609	0.9820160	1.787E+02	7.016E+00	--
α_2	1.16E-03	9.02E-03	7.24E-03	2.30E-02	1.583E+00	1.739E+02	0.935
α_3	1.87E-03	1.05E-02	8.85E-03	2.49E-02	1.986E+00	1.868E+02	0.869
α_4	1.23E-03	8.78E-03	7.13E-03	2.20E-02	1.672E+00	1.887E+02	0.862
α_5	2.87E-04	5.42E-03	3.79E-03	1.61E-02	1.011E+00	1.855E+02	0.880
α_6	2.23E-05	2.95E-03	1.50E-03	1.08E-02	5.709E-01	1.931E+02	0.847
α_7	2.29E-10	9.97E-04	7.81E-05	5.27E-03	1.809E-01	1.813E+02	0.904
α_8	1.41E-107	9.77E-05	2.96E-27	7.32E-05	1.245E-02	1.275E+02	1.287

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.65E-01	9.53E-01	9.45E-01	9.50E-01	9.54E-01	9.59E-01	9.62E-01
α_2	3.47E-02	3.36E-02	3.45E-02	2.59E-02	1.62E-02	1.17E-02	9.02E-03
α_3		1.35E-02	1.28E-02	1.68E-02	1.71E-02	1.39E-02	1.05E-02
α_4			7.71E-03	6.23E-03	8.24E-03	9.07E-03	8.78E-03
α_5				9.03E-04	2.92E-03	4.85E-03	5.42E-03
α_6					1.18E-03	1.69E-03	2.95E-03
α_7						1.95E-04	9.97E-04
α_8							9.77E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.65E-01	9.53E-01	9.45E-01	9.50E-01	9.54E-01	9.59E-01	9.62E-01
Beta	3.47E-02	4.71E-02	5.50E-02	4.99E-02	4.56E-02	4.13E-02	3.78E-02
Gamma		2.87E-01	3.73E-01	4.80E-01	6.45E-01	7.17E-01	7.61E-01
Delta			3.77E-01	2.98E-01	4.19E-01	5.33E-01	6.34E-01
Epsilon				1.27E-01	3.32E-01	4.26E-01	5.19E-01
Mu					2.87E-01	2.79E-01	4.27E-01
Omega						1.03E-01	2.71E-01
Sigma							8.93E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9548420	0.9884392	0.9949470	0.9999667	4.024E+01	4.706E-01	--
α_2	3.33E-05	1.16E-02	5.05E-03	4.52E-02	4.706E-01	4.024E+01	0.677

CCCG = 3, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9628404	0.9870794	0.9906381	0.9991546	8.423E+01	1.103E+00	--
α_2	2.80E-04	9.71E-03	6.17E-03	3.12E-02	8.104E-01	8.268E+01	0.783
α_3	2.70E-07	3.21E-03	7.55E-04	1.48E-02	2.921E-01	9.058E+01	0.719

CCCG = 4, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9678520	0.9864683	0.9886432	0.9976466	1.423E+02	1.953E+00	--
α_2	8.54E-04	9.15E-03	6.99E-03	2.48E-02	1.312E+00	1.421E+02	0.820
α_3	4.99E-06	2.97E-03	1.17E-03	1.20E-02	4.307E-01	1.445E+02	0.811
α_4	2.80E-09	1.41E-03	1.66E-04	7.17E-03	2.099E-01	1.488E+02	0.789

CCCG = 5, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9741215	0.9874853	0.9887694	0.9964606	2.451E+02	3.107E+00	--
α_2	9.66E-04	6.84E-03	5.56E-03	1.71E-02	1.684E+00	2.445E+02	0.871
α_3	1.63E-04	3.68E-03	2.50E-03	1.12E-02	9.426E-01	2.550E+02	0.837
α_4	1.15E-06	1.54E-03	5.28E-04	6.48E-03	3.816E-01	2.480E+02	0.863
α_5	1.82E-16	4.55E-04	2.49E-06	2.65E-03	9.865E-02	2.167E+02	0.989

CCCG = 6, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9767593	0.9881052	0.9891024	0.9960441	3.175E+02	3.822E+00	--
α_2	7.93E-04	5.48E-03	4.46E-03	1.36E-02	1.714E+00	3.113E+02	0.904
α_3	2.14E-04	3.26E-03	2.35E-03	9.39E-03	1.108E+00	3.392E+02	0.831
α_4	2.60E-05	1.97E-03	1.10E-03	6.86E-03	6.509E-01	3.305E+02	0.854
α_5	1.57E-08	7.91E-04	1.42E-04	3.81E-03	2.536E-01	3.205E+02	0.882
α_6	6.61E-17	4.08E-04	1.85E-06	2.37E-03	9.572E-02	2.347E+02	1.205

CCCG = 7, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9796980	0.9887660	0.9894629	0.9954541	4.573E+02	5.195E+00	--
α_2	8.98E-04	4.73E-03	4.01E-03	1.10E-02	2.105E+00	4.427E+02	0.929
α_3	2.57E-04	2.74E-03	2.09E-03	7.44E-03	1.320E+00	4.804E+02	0.858
α_4	1.07E-04	2.09E-03	1.45E-03	6.27E-03	9.967E-01	4.750E+02	0.868
α_5	5.56E-06	1.10E-03	5.22E-04	4.15E-03	5.249E-01	4.772E+02	0.865
α_6	3.14E-10	4.23E-04	4.14E-05	2.19E-03	1.956E-01	4.623E+02	0.893
α_7	4.15E-28	1.45E-04	3.30E-09	7.89E-04	5.291E-02	3.637E+02	1.136

CCCG = 8, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9809777	0.9891809	0.9897800	0.9953384	5.332E+02	5.832E+00	--
α_2	8.72E-04	4.30E-03	3.68E-03	9.84E-03	2.229E+00	5.163E+02	0.935
α_3	1.94E-04	2.26E-03	1.70E-03	6.23E-03	1.260E+00	5.567E+02	0.869
α_4	1.05E-04	1.85E-03	1.31E-03	5.46E-03	1.042E+00	5.616E+02	0.862
α_5	3.25E-05	1.38E-03	8.47E-04	4.56E-03	7.626E-01	5.503E+02	0.880
α_6	1.31E-07	5.71E-04	1.59E-04	2.54E-03	3.271E-01	5.720E+02	0.847
α_7	2.43E-13	2.51E-04	6.71E-06	1.41E-03	1.344E-01	5.363E+02	0.904
α_8	1.84E-20	2.04E-04	1.91E-07	1.18E-03	7.682E-02	3.766E+02	1.287

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.87E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01	9.89E-01
α_2	1.16E-02	9.71E-03	9.15E-03	6.84E-03	5.48E-03	4.73E-03	4.30E-03
α_3		3.21E-03	2.97E-03	3.68E-03	3.26E-03	2.74E-03	2.26E-03
α_4			1.41E-03	1.54E-03	1.97E-03	2.09E-03	1.85E-03
α_5				4.55E-04	7.91E-04	1.10E-03	1.38E-03
α_6					4.08E-04	4.23E-04	5.71E-04
α_7						1.45E-04	2.51E-04
α_8							2.04E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.87E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01	9.89E-01
Beta	1.16E-02	1.29E-02	1.35E-02	1.25E-02	1.19E-02	1.12E-02	1.08E-02
Gamma		2.49E-01	3.24E-01	4.53E-01	5.40E-01	5.79E-01	6.03E-01
Delta			3.22E-01	3.51E-01	4.93E-01	5.78E-01	6.54E-01
Epsilon				2.29E-01	3.79E-01	4.43E-01	5.65E-01
Mu					3.40E-01	3.41E-01	4.26E-01
Omega						2.56E-01	4.43E-01
Sigma							4.49E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 5.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.313

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9887060	0.9970707	0.9986786	0.9999892	1.679E+02	4.932E-01	--
α_2	1.08E-05	2.93E-03	1.32E-03	1.13E-02	4.932E-01	1.679E+02	0.677

CCCG = 3, Gamma = 0.313

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9906453	0.9968080	0.9977334	0.9998111	3.309E+02	1.059E+00	--
α_2	4.13E-05	2.21E-03	1.30E-03	7.46E-03	7.137E-01	3.224E+02	0.783
α_3	3.53E-07	9.83E-04	2.97E-04	4.29E-03	3.458E-01	3.513E+02	0.719

CCCG = 4, Gamma = 0.313

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9918178	0.9964841	0.9970168	0.9993296	5.993E+02	2.115E+00	--
α_2	3.21E-04	2.59E-03	2.06E-03	6.67E-03	1.549E+00	5.958E+02	0.820
α_3	1.37E-08	4.38E-04	8.57E-05	2.09E-03	2.646E-01	6.036E+02	0.811
α_4	5.36E-08	4.85E-04	1.19E-04	2.22E-03	3.010E-01	6.206E+02	0.789

CCCG = 5, Gamma = 0.313

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941268	0.9967388	0.9969392	0.9986661	1.627E+03	5.325E+00	--
α_2	7.16E-04	2.25E-03	2.04E-03	4.46E-03	3.632E+00	1.614E+03	0.871
α_3	7.91E-05	8.05E-04	6.18E-04	2.17E-03	1.354E+00	1.681E+03	0.837
α_4	1.72E-08	1.81E-04	4.33E-05	8.33E-04	2.961E-01	1.632E+03	0.863
α_5	8.87E-35	2.98E-05	3.28E-11	1.48E-04	4.243E-02	1.424E+03	0.989

CCCG = 6, Gamma = 0.313

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9936788	0.9965544	0.9967826	0.9986508	1.428E+03	4.936E+00	--
α_2	5.50E-04	2.07E-03	1.84E-03	4.38E-03	2.915E+00	1.406E+03	0.904
α_3	7.00E-05	8.21E-04	6.17E-04	2.27E-03	1.257E+00	1.530E+03	0.831
α_4	1.37E-06	3.38E-04	1.55E-04	1.29E-03	5.031E-01	1.490E+03	0.854
α_5	2.32E-15	8.00E-05	1.06E-06	4.59E-04	1.155E-01	1.443E+03	0.882
α_6	6.42E-13	1.37E-04	5.03E-06	7.61E-04	1.451E-01	1.056E+03	1.205

CCCG = 7, Gamma = 0.313

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9950037	0.9968382	0.9969460	0.9983049	3.044E+03	9.654E+00	--
α_2	6.38E-04	1.65E-03	1.54E-03	3.04E-03	4.851E+00	2.941E+03	0.929
α_3	2.25E-04	8.78E-04	7.76E-04	1.88E-03	2.800E+00	3.187E+03	0.858
α_4	4.48E-05	4.39E-04	3.39E-04	1.17E-03	1.384E+00	3.151E+03	0.868
α_5	5.48E-07	1.55E-04	6.93E-05	5.99E-04	4.902E-01	3.163E+03	0.865
α_6	8.90E-16	3.74E-05	4.74E-07	2.15E-04	1.146E-01	3.063E+03	0.893
α_7	3.20E-93	6.08E-06	6.46E-25	7.22E-06	1.464E-02	2.409E+03	1.136

CCCG = 8, Gamma = 0.313

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9947084	0.9968550	0.9969995	0.9985082	2.266E+03	7.148E+00	--
α_2	3.64E-04	1.34E-03	1.20E-03	2.82E-03	2.980E+00	2.215E+03	0.935
α_3	1.42E-04	8.21E-04	6.87E-04	1.96E-03	1.960E+00	2.384E+03	0.869
α_4	3.54E-05	4.85E-04	3.55E-04	1.38E-03	1.166E+00	2.405E+03	0.862
α_5	1.29E-06	2.28E-04	1.10E-04	8.54E-04	5.375E-01	2.356E+03	0.880
α_6	1.63E-11	7.37E-05	5.72E-06	3.90E-04	1.805E-01	2.448E+03	0.847
α_7	9.33E-36	1.80E-05	1.35E-11	8.82E-05	4.139E-02	2.294E+03	0.904
α_8	1.07E-08	1.75E-04	3.87E-05	8.18E-04	2.827E-01	1.611E+03	1.287

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	2.93E-03	2.21E-03	2.59E-03	2.25E-03	2.07E-03	1.65E-03	1.34E-03
α_3		9.83E-04	4.38E-04	8.05E-04	8.21E-04	8.78E-04	8.21E-04
α_4			4.85E-04	1.81E-04	3.38E-04	4.39E-04	4.85E-04
α_5				2.98E-05	8.00E-05	1.55E-04	2.28E-04
α_6					1.37E-04	3.74E-05	7.37E-05
α_7						6.08E-06	1.80E-05
α_8							1.75E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	2.93E-03	3.19E-03	3.52E-03	3.26E-03	3.45E-03	3.16E-03	3.15E-03
Gamma		3.08E-01	2.63E-01	3.12E-01	3.99E-01	4.79E-01	5.73E-01
Delta			5.25E-01	2.08E-01	4.03E-01	4.21E-01	5.44E-01
Epsilon				1.41E-01	3.92E-01	3.11E-01	5.05E-01
Mu					6.32E-01	2.19E-01	5.40E-01
Omega						1.40E-01	7.24E-01
Sigma							9.07E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.00	5.00	5.00	5.00	5.00	5.00	5.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.10.2 PWR-RHR-MDP-FH: PWR RHR Motor-Driven Pumps Fail to Run Less Than One Hour

Generic CCF Parameters

Plant Type: PWR
 System Group: Clean Water
 System: Residual Heat Removal (LCI in BWRs; LPI in PWRs)
 Component Group: Pump
 Component Type: Motor Driven Pump
 Component Subtype: Centrifugal
 Failure Mode: Fail to Run < 1H
 Date Range: 2006 through 2020
 Prior: Default 2015

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9293809	0.9818971	0.9920474	0.9999453	1.0000000	2.541E+01	4.685E-01
α_2	5.13E-05	1.81E-02	7.95E-03	7.06E-02	0.00E+00	4.685E-01	2.541E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9483145	0.9818372	0.9866969	0.9987453	1.0000000	6.098E+01	1.128E+00
α_2	4.60E-04	1.37E-02	8.95E-03	4.32E-02	0.00E+00	8.512E-01	6.126E+01
α_3	2.23E-07	4.46E-03	9.56E-04	2.09E-02	0.00E+00	2.768E-01	6.183E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9525994	0.9801860	0.9834318	0.9966772	1.0000000	9.368E+01	1.894E+00
α_2	1.14E-03	1.32E-02	9.97E-03	3.62E-02	0.00E+00	1.260E+00	9.431E+01
α_3	4.58E-06	4.21E-03	1.55E-03	1.74E-02	0.00E+00	4.024E-01	9.517E+01
α_4	1.68E-08	2.42E-03	3.61E-04	1.20E-02	0.00E+00	2.315E-01	9.534E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9650736	0.9826018	0.9842043	0.9946508	1.0000000	1.938E+02	3.432E+00
α_2	1.66E-03	9.75E-03	8.15E-03	2.33E-02	0.00E+00	1.924E+00	1.953E+02
α_3	3.08E-04	5.32E-03	3.77E-03	1.56E-02	0.00E+00	1.049E+00	1.962E+02
α_4	1.47E-06	1.94E-03	6.68E-04	8.17E-03	0.00E+00	3.822E-01	1.969E+02
α_5	3.38E-20	3.89E-04	3.63E-07	2.26E-03	0.00E+00	7.674E-02	1.972E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9677940	0.9834740	0.9848410	0.9944760	1.0000000	2.282E+02	3.835E+00

α_2	1.05E-03	7.33E-03	5.97E-03	1.83E-02	0.00E+00	1.701E+00	2.304E+02
α_3	4.10E-04	5.20E-03	3.87E-03	1.46E-02	0.00E+00	1.207E+00	2.308E+02
α_4	2.35E-05	2.57E-03	1.35E-03	9.25E-03	0.00E+00	5.960E-01	2.315E+02
α_5	3.73E-09	9.53E-04	1.27E-04	4.78E-03	0.00E+00	2.211E-01	2.318E+02
α_6	3.72E-15	4.73E-04	4.79E-06	2.73E-03	0.00E+00	1.098E-01	2.319E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9733872	0.9848971	0.9857364	0.9935299	1.0000000	3.748E+02	5.747E+00
α_2	1.21E-03	5.89E-03	5.05E-03	1.35E-02	0.00E+00	2.243E+00	3.783E+02
α_3	5.75E-04	4.28E-03	3.45E-03	1.08E-02	0.00E+00	1.630E+00	3.789E+02
α_4	1.77E-04	2.85E-03	2.04E-03	8.28E-03	0.00E+00	1.083E+00	3.795E+02
α_5	1.07E-05	1.49E-03	7.49E-04	5.46E-03	0.00E+00	5.654E-01	3.800E+02
α_6	2.76E-10	5.03E-04	4.65E-05	2.62E-03	0.00E+00	1.916E-01	3.804E+02
α_7	6.26E-41	9.14E-05	3.40E-12	4.01E-04	0.00E+00	3.480E-02	3.805E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9746696	0.9856411	0.9864433	0.9938665	1.0000000	3.930E+02	5.726E+00
α_2	9.13E-04	5.06E-03	4.26E-03	1.19E-02	0.00E+00	2.018E+00	3.967E+02
α_3	3.60E-04	3.49E-03	2.70E-03	9.30E-03	0.00E+00	1.391E+00	3.974E+02
α_4	1.58E-04	2.66E-03	1.89E-03	7.80E-03	0.00E+00	1.062E+00	3.977E+02
α_5	3.11E-05	1.76E-03	1.03E-03	5.98E-03	0.00E+00	7.026E-01	3.980E+02
α_6	3.44E-07	8.77E-04	2.69E-04	3.81E-03	0.00E+00	3.497E-01	3.984E+02
α_7	1.32E-15	2.70E-04	2.48E-06	1.56E-03	0.00E+00	1.078E-01	3.986E+02
α_8	2.76E-17	2.37E-04	1.01E-06	1.38E-03	0.00E+00	9.469E-02	3.987E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.81E-02	1.37E-02	1.32E-02	9.75E-03	7.33E-03	5.89E-03	5.06E-03
α_3		4.46E-03	4.21E-03	5.32E-03	5.20E-03	4.28E-03	3.49E-03
α_4			2.42E-03	1.94E-03	2.57E-03	2.85E-03	2.66E-03
α_5				3.89E-04	9.53E-04	1.49E-03	1.76E-03
α_6					4.73E-04	5.03E-04	8.77E-04
α_7						9.14E-05	2.70E-04
α_8							2.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.81E-02	1.82E-02	1.98E-02	1.74E-02	1.65E-02	1.51E-02	1.44E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.667

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9063838	0.9758957	0.9892814	0.9999292	1.905E+01	4.706E-01	--
α_2	7.08E-05	2.41E-02	1.07E-02	9.36E-02	4.706E-01	1.905E+01	1.360

CCCG = 3, Gamma = 0.667

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9306467	0.9757442	0.9823052	0.9983960	4.435E+01	1.103E+00	--
α_2	5.37E-04	1.85E-02	1.18E-02	5.90E-02	8.104E-01	4.310E+01	1.466
α_3	4.90E-07	5.80E-03	1.37E-03	2.67E-02	2.921E-01	5.008E+01	1.278

CCCG = 4, Gamma = 0.667

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9378728	0.9736985	0.9778296	0.9953857	7.229E+01	1.953E+00	--
α_2	1.63E-03	1.73E-02	1.33E-02	4.68E-02	1.312E+00	7.444E+01	1.539
α_3	9.93E-06	5.88E-03	2.34E-03	2.38E-02	4.307E-01	7.278E+01	1.592
α_4	6.20E-09	3.10E-03	3.68E-04	1.58E-02	2.099E-01	6.750E+01	1.721

CCCG = 5, Gamma = 0.667

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9524813	0.9769267	0.9792473	0.9934381	1.315E+02	3.107E+00	--
α_2	1.78E-03	1.26E-02	1.02E-02	3.13E-02	1.684E+00	1.323E+02	1.592
α_3	3.19E-04	7.19E-03	4.89E-03	2.19E-02	9.426E-01	1.301E+02	1.627
α_4	2.07E-06	2.74E-03	9.46E-04	1.16E-02	3.816E-01	1.387E+02	1.534
α_5	2.26E-16	5.65E-04	3.10E-06	3.29E-03	9.865E-02	1.745E+02	1.222

CCCG = 6, Gamma = 0.667

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577630	0.9783073	0.9800919	0.9927522	1.724E+02	3.822E+00	--
α_2	1.34E-03	9.25E-03	7.55E-03	2.30E-02	1.714E+00	1.836E+02	1.521
α_3	4.56E-04	6.93E-03	5.01E-03	2.00E-02	1.108E+00	1.588E+02	1.763
α_4	4.70E-05	3.55E-03	1.98E-03	1.24E-02	6.509E-01	1.828E+02	1.537
α_5	2.70E-08	1.36E-03	2.45E-04	6.56E-03	2.536E-01	1.862E+02	1.512
α_6	9.86E-17	6.07E-04	2.76E-06	3.54E-03	9.572E-02	1.575E+02	1.789

CCCG = 7, Gamma = 0.667

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9641827	0.9801268	0.9813389	0.9919305	2.562E+02	5.195E+00	--
α_2	1.43E-03	7.53E-03	6.39E-03	1.75E-02	2.105E+00	2.773E+02	1.475
α_3	5.21E-04	5.54E-03	4.23E-03	1.50E-02	1.320E+00	2.371E+02	1.729
α_4	1.97E-04	3.86E-03	2.68E-03	1.16E-02	9.967E-01	2.570E+02	1.598
α_5	1.05E-05	2.08E-03	9.90E-04	7.85E-03	5.249E-01	2.516E+02	1.635
α_6	5.38E-10	7.23E-04	7.08E-05	3.75E-03	1.956E-01	2.703E+02	1.524
α_7	3.83E-28	1.34E-04	3.05E-09	7.29E-04	5.291E-02	3.937E+02	1.047

CCCG = 8, Gamma = 0.667

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9669489	0.9811567	0.9821838	0.9918566	3.037E+02	5.832E+00	--
α_2	1.33E-03	6.57E-03	5.63E-03	1.50E-02	2.229E+00	3.373E+02	1.425
α_3	3.80E-04	4.43E-03	3.33E-03	1.22E-02	1.260E+00	2.834E+02	1.699
α_4	2.01E-04	3.53E-03	2.49E-03	1.04E-02	1.042E+00	2.939E+02	1.640
α_5	5.74E-05	2.44E-03	1.50E-03	8.05E-03	7.626E-01	3.115E+02	1.549
α_6	2.83E-07	1.24E-03	3.45E-04	5.50E-03	3.271E-01	2.643E+02	1.828
α_7	3.80E-13	3.92E-04	1.05E-05	2.20E-03	1.344E-01	3.431E+02	1.409
α_8	2.25E-20	2.49E-04	2.34E-07	1.45E-03	7.682E-02	3.084E+02	1.568

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.76E-01	9.76E-01	9.74E-01	9.77E-01	9.78E-01	9.80E-01	9.81E-01
α_2	2.41E-02	1.85E-02	1.73E-02	1.26E-02	9.25E-03	7.53E-03	6.57E-03
α_3		5.80E-03	5.88E-03	7.19E-03	6.93E-03	5.54E-03	4.43E-03
α_4			3.10E-03	2.74E-03	3.55E-03	3.86E-03	3.53E-03
α_5				5.65E-04	1.36E-03	2.08E-03	2.44E-03
α_6					6.07E-04	7.23E-04	1.24E-03
α_7						1.34E-04	3.92E-04
α_8							2.49E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.76E-01	9.76E-01	9.74E-01	9.77E-01	9.78E-01	9.80E-01	9.81E-01
Beta	2.41E-02	2.43E-02	2.63E-02	2.31E-02	2.17E-02	1.99E-02	1.88E-02
Gamma		2.39E-01	3.42E-01	4.55E-01	5.74E-01	6.21E-01	6.52E-01
Delta			3.45E-01	3.15E-01	4.43E-01	5.51E-01	6.40E-01
Epsilon				1.71E-01	3.57E-01	4.32E-01	5.50E-01
Mu					3.09E-01	2.92E-01	4.35E-01
Omega						1.57E-01	3.41E-01
Sigma							3.89E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9765132	0.9938999	0.9972369	0.9999775	8.036E+01	4.932E-01	--
α_2	2.25E-05	6.10E-03	2.76E-03	2.35E-02	4.932E-01	8.036E+01	1.360

CCCG = 3, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825080	0.9940230	0.9957485	0.9996454	1.762E+02	1.059E+00	--
α_2	7.87E-05	4.20E-03	2.48E-03	1.42E-02	7.137E-01	1.691E+02	1.466
α_3	6.39E-07	1.77E-03	5.37E-04	7.74E-03	3.458E-01	1.945E+02	1.278

CCCG = 4, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9841068	0.9931609	0.9941911	0.9986932	3.071E+02	2.115E+00	--
α_2	6.08E-04	4.91E-03	3.91E-03	1.26E-02	1.549E+00	3.142E+02	1.539
α_3	2.71E-08	8.67E-04	1.70E-04	4.13E-03	2.646E-01	3.049E+02	1.592
α_4	1.18E-07	1.07E-03	2.62E-04	4.87E-03	3.010E-01	2.819E+02	1.721

CCCG = 5, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9891175	0.9939520	0.9943218	0.9975236	8.750E+02	5.325E+00	--
α_2	1.31E-03	4.12E-03	3.75E-03	8.18E-03	3.632E+00	8.782E+02	1.592
α_3	1.54E-04	1.57E-03	1.21E-03	4.23E-03	1.354E+00	8.615E+02	1.627
α_4	3.07E-08	3.23E-04	7.72E-05	1.49E-03	2.961E-01	9.150E+02	1.534
α_5	1.10E-34	3.69E-05	4.07E-11	1.83E-04	4.243E-02	1.149E+03	1.222

CCCG = 6, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9886495	0.9938076	0.9942156	0.9975725	7.921E+02	4.936E+00	--
α_2	9.30E-04	3.49E-03	3.11E-03	7.38E-03	2.915E+00	8.312E+02	1.521
α_3	1.49E-04	1.75E-03	1.31E-03	4.83E-03	1.257E+00	7.185E+02	1.763
α_4	2.48E-06	6.09E-04	2.79E-04	2.33E-03	5.031E-01	8.253E+02	1.537
α_5	3.99E-15	1.38E-04	1.82E-06	7.89E-04	1.155E-01	8.390E+02	1.512
α_6	9.57E-13	2.05E-04	7.49E-06	1.13E-03	1.451E-01	7.092E+02	1.789

CCCG = 7, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9912154	0.9944377	0.9946265	0.9970158	1.726E+03	9.654E+00	--
α_2	1.01E-03	2.62E-03	2.44E-03	4.83E-03	4.851E+00	1.848E+03	1.475
α_3	4.54E-04	1.77E-03	1.57E-03	3.79E-03	2.800E+00	1.578E+03	1.729
α_4	8.27E-05	8.09E-04	6.25E-04	2.17E-03	1.384E+00	1.709E+03	1.598
α_5	1.04E-06	2.93E-04	1.31E-04	1.13E-03	4.902E-01	1.671E+03	1.635
α_6	1.52E-15	6.39E-05	8.10E-07	3.67E-04	1.146E-01	1.793E+03	1.524
α_7	2.95E-93	5.61E-06	5.97E-25	6.66E-06	1.464E-02	2.610E+03	1.047

CCCG = 8, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9909364	0.9946098	0.9948564	0.9974414	1.319E+03	7.148E+00	--
α_2	5.57E-04	2.05E-03	1.83E-03	4.31E-03	2.980E+00	1.449E+03	1.425
α_3	2.79E-04	1.61E-03	1.35E-03	3.84E-03	1.960E+00	1.216E+03	1.699
α_4	6.76E-05	9.24E-04	6.78E-04	2.62E-03	1.166E+00	1.260E+03	1.640
α_5	2.28E-06	4.02E-04	1.95E-04	1.51E-03	5.375E-01	1.335E+03	1.549
α_6	3.53E-11	1.59E-04	1.24E-05	8.43E-04	1.805E-01	1.132E+03	1.828
α_7	1.46E-35	2.82E-05	2.11E-11	1.38E-04	4.139E-02	1.468E+03	1.409
α_8	1.31E-08	2.14E-04	4.73E-05	9.99E-04	2.827E-01	1.319E+03	1.568

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.94E-01	9.93E-01	9.94E-01	9.94E-01	9.94E-01	9.95E-01
α_2	6.10E-03	4.20E-03	4.91E-03	4.12E-03	3.49E-03	2.62E-03	2.05E-03
α_3		1.77E-03	8.67E-04	1.57E-03	1.75E-03	1.77E-03	1.61E-03
α_4			1.07E-03	3.23E-04	6.09E-04	8.09E-04	9.24E-04
α_5				3.69E-05	1.38E-04	2.93E-04	4.02E-04
α_6					2.05E-04	6.39E-05	1.59E-04
α_7						5.61E-06	2.82E-05
α_8							2.14E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.94E-01	9.93E-01	9.94E-01	9.94E-01	9.94E-01	9.95E-01
Beta	6.10E-03	5.98E-03	6.84E-03	6.05E-03	6.19E-03	5.56E-03	5.39E-03
Gamma		2.97E-01	2.83E-01	3.19E-01	4.36E-01	5.29E-01	6.19E-01
Delta			5.52E-01	1.87E-01	3.53E-01	3.98E-01	5.18E-01
Epsilon				1.02E-01	3.60E-01	3.10E-01	4.65E-01
Mu					5.98E-01	1.92E-01	5.00E-01
Omega						8.07E-02	6.03E-01
Sigma							8.84E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.10.3 PWR-RHR-MDP-FHRH: PWR RHR Motor-Driven Pumps Fail to Run Less Than or Greater Than One Hour

Generic CCF Parameters

Plant Type: PWR
 System Group: Clean Water
 System: Residual Heat Removal (LCI in BWRs; LPI in PWRs)
 Component Group: Pump
 Component Type: Motor Driven Pump
 Component Subtype: Centrifugal
 Failure Mode: Fail to Run < 1H, Fail to Run > 1H
 Date Range: 2006 through 2020
 Prior: Default 2015

Total Number of Independent Failure Events: 7.7

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9401582	0.9846793	0.9932995	0.9999536	1.0000000	3.011E+01	4.685E-01
α_2	4.33E-05	1.53E-02	6.70E-03	5.98E-02	0.00E+00	4.685E-01	3.011E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9519189	0.9831150	0.9876374	0.9988361	1.0000000	6.568E+01	1.128E+00
α_2	4.28E-04	1.27E-02	8.31E-03	4.02E-02	0.00E+00	8.512E-01	6.596E+01
α_3	2.07E-07	4.14E-03	8.88E-04	1.94E-02	0.00E+00	2.768E-01	6.653E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9548021	0.9811147	0.9842136	0.9968350	1.0000000	9.838E+01	1.894E+00
α_2	1.09E-03	1.26E-02	9.50E-03	3.45E-02	0.00E+00	1.260E+00	9.901E+01
α_3	4.36E-06	4.01E-03	1.48E-03	1.66E-02	0.00E+00	4.024E-01	9.987E+01
α_4	1.60E-08	2.31E-03	3.44E-04	1.14E-02	0.00E+00	2.315E-01	1.000E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9658813	0.9830067	0.9845731	0.9947766	1.0000000	1.985E+02	3.432E+00
α_2	1.62E-03	9.53E-03	7.96E-03	2.28E-02	0.00E+00	1.924E+00	2.000E+02
α_3	3.01E-04	5.19E-03	3.68E-03	1.53E-02	0.00E+00	1.049E+00	2.009E+02
α_4	1.44E-06	1.89E-03	6.52E-04	7.98E-03	0.00E+00	3.822E-01	2.016E+02
α_5	3.30E-20	3.80E-04	3.54E-07	2.21E-03	0.00E+00	7.674E-02	2.019E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9684298	0.9838021	0.9851427	0.9945909	1.0000000	2.329E+02	3.835E+00

α_2	1.03E-03	7.19E-03	5.85E-03	1.79E-02	0.00E+00	1.701E+00	2.351E+02
α_3	4.02E-04	5.10E-03	3.79E-03	1.43E-02	0.00E+00	1.207E+00	2.355E+02
α_4	2.31E-05	2.52E-03	1.32E-03	9.07E-03	0.00E+00	5.960E-01	2.362E+02
α_5	3.66E-09	9.34E-04	1.25E-04	4.68E-03	0.00E+00	2.211E-01	2.365E+02
α_6	3.65E-15	4.64E-04	4.69E-06	2.67E-03	0.00E+00	1.098E-01	2.366E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9737141	0.9850814	0.9859108	0.9936094	1.0000000	3.795E+02	5.747E+00
α_2	1.19E-03	5.82E-03	4.99E-03	1.33E-02	0.00E+00	2.243E+00	3.830E+02
α_3	5.68E-04	4.23E-03	3.41E-03	1.07E-02	0.00E+00	1.630E+00	3.836E+02
α_4	1.75E-04	2.81E-03	2.01E-03	8.18E-03	0.00E+00	1.083E+00	3.842E+02
α_5	1.06E-05	1.47E-03	7.40E-04	5.39E-03	0.00E+00	5.654E-01	3.847E+02
α_6	2.73E-10	4.97E-04	4.59E-05	2.59E-03	0.00E+00	1.916E-01	3.851E+02
α_7	6.19E-41	9.03E-05	3.36E-12	3.96E-04	0.00E+00	3.480E-02	3.852E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9749631	0.9858083	0.9866015	0.9939336	1.0000000	3.977E+02	5.726E+00
α_2	9.02E-04	5.00E-03	4.21E-03	1.18E-02	0.00E+00	2.018E+00	4.014E+02
α_3	3.56E-04	3.45E-03	2.67E-03	9.19E-03	0.00E+00	1.391E+00	4.021E+02
α_4	1.57E-04	2.63E-03	1.87E-03	7.71E-03	0.00E+00	1.062E+00	4.024E+02
α_5	3.07E-05	1.74E-03	1.02E-03	5.91E-03	0.00E+00	7.026E-01	4.027E+02
α_6	3.40E-07	8.67E-04	2.66E-04	3.77E-03	0.00E+00	3.497E-01	4.031E+02
α_7	1.31E-15	2.67E-04	2.45E-06	1.54E-03	0.00E+00	1.078E-01	4.033E+02
α_8	2.73E-17	2.35E-04	9.94E-07	1.37E-03	0.00E+00	9.469E-02	4.034E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.83E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.53E-02	1.27E-02	1.26E-02	9.53E-03	7.19E-03	5.82E-03	5.00E-03
α_3		4.14E-03	4.01E-03	5.19E-03	5.10E-03	4.23E-03	3.45E-03
α_4			2.31E-03	1.89E-03	2.52E-03	2.81E-03	2.63E-03
α_5				3.80E-04	9.34E-04	1.47E-03	1.74E-03
α_6					4.64E-04	4.97E-04	8.67E-04
α_7						9.03E-05	2.67E-04
α_8							2.35E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.83E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.53E-02	1.69E-02	1.89E-02	1.70E-02	1.62E-02	1.49E-02	1.42E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.70	7.70	7.70	7.70	7.70	7.70	7.70
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.260

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9596344	0.9895714	0.9953346	0.9999652	4.587E+01	4.834E-01	--
α_2	3.48E-05	1.04E-02	4.67E-03	4.04E-02	4.834E-01	4.587E+01	0.999

CCCG = 3, Gamma = 0.260

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9718414	0.9898573	0.9924030	0.9991707	1.196E+02	1.226E+00	--
α_2	3.91E-04	8.03E-03	5.54E-03	2.42E-02	9.769E-01	1.207E+02	1.092
α_3	3.38E-08	2.11E-03	3.67E-04	1.03E-02	2.487E-01	1.173E+02	1.130

CCCG = 4, Gamma = 0.260

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9700079	0.9871713	0.9891348	0.9976198	1.583E+02	2.057E+00	--
α_2	9.73E-04	8.80E-03	6.90E-03	2.31E-02	1.442E+00	1.623E+02	1.135
α_3	3.27E-06	2.61E-03	9.81E-04	1.07E-02	4.114E-01	1.572E+02	1.180
α_4	1.86E-09	1.41E-03	1.54E-04	7.26E-03	2.036E-01	1.437E+02	1.292

CCCG = 5, Gamma = 0.260

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9760805	0.9878780	0.9889315	0.9960759	3.001E+02	3.683E+00	--
α_2	1.49E-03	7.30E-03	6.26E-03	1.67E-02	2.243E+00	3.050E+02	1.159
α_3	1.69E-04	3.36E-03	2.33E-03	1.01E-02	9.912E-01	2.937E+02	1.209
α_4	8.51E-07	1.25E-03	4.22E-04	5.29E-03	3.765E-01	3.014E+02	1.181
α_5	1.83E-21	2.11E-04	1.20E-07	1.22E-03	7.237E-02	3.424E+02	1.040

CCCG = 6, Gamma = 0.260

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9772452	0.9881068	0.9890287	0.9958187	3.439E+02	4.139E+00	--
α_2	1.11E-03	5.79E-03	4.92E-03	1.34E-02	2.128E+00	3.657E+02	1.105
α_3	2.42E-04	3.50E-03	2.55E-03	1.00E-02	1.134E+00	3.230E+02	1.254
α_4	1.06E-05	1.62E-03	8.01E-04	5.98E-03	5.533E-01	3.419E+02	1.187
α_5	2.43E-09	6.26E-04	8.35E-05	3.14E-03	2.210E-01	3.531E+02	1.150
α_6	4.69E-16	3.68E-04	2.56E-06	2.14E-03	1.027E-01	2.788E+02	1.457

CCCG = 7, Gamma = 0.260

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9814322	0.9891983	0.9897412	0.9951107	5.890E+02	6.432E+00	--
α_2	1.15E-03	4.41E-03	3.91E-03	9.39E-03	2.840E+00	6.406E+02	1.072
α_3	4.72E-04	3.18E-03	2.60E-03	7.86E-03	1.746E+00	5.476E+02	1.255
α_4	1.18E-04	1.89E-03	1.35E-03	5.50E-03	1.084E+00	5.723E+02	1.202
α_5	5.34E-06	9.39E-04	4.55E-04	3.52E-03	5.376E-01	5.717E+02	1.205
α_6	3.00E-10	3.41E-04	3.44E-05	1.76E-03	1.979E-01	5.803E+02	1.188
α_7	8.80E-53	3.93E-05	3.94E-15	1.34E-04	2.656E-02	6.760E+02	1.020

CCCG = 8, Gamma = 0.260

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9822722	0.9898084	0.9903478	0.9955028	5.936E+02	6.112E+00	--
α_2	7.70E-04	3.56E-03	3.07E-03	8.00E-03	2.364E+00	6.625E+02	1.037
α_3	3.20E-04	2.69E-03	2.13E-03	6.97E-03	1.512E+00	5.611E+02	1.225
α_4	1.11E-04	1.89E-03	1.34E-03	5.56E-03	1.056E+00	5.569E+02	1.235
α_5	1.73E-05	1.14E-03	6.51E-04	3.94E-03	6.745E-01	5.896E+02	1.168
α_6	7.47E-08	5.56E-04	1.41E-04	2.52E-03	3.076E-01	5.533E+02	1.245
α_7	1.33E-15	1.91E-04	1.88E-06	1.10E-03	1.093E-01	5.736E+02	1.201
α_8	2.58E-18	1.67E-04	4.64E-07	9.74E-04	8.885E-02	5.318E+02	1.296

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.90E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01	9.90E-01
α_2	1.04E-02	8.03E-03	8.80E-03	7.30E-03	5.79E-03	4.41E-03	3.56E-03
α_3		2.11E-03	2.61E-03	3.36E-03	3.50E-03	3.18E-03	2.69E-03
α_4			1.41E-03	1.25E-03	1.62E-03	1.89E-03	1.89E-03
α_5				2.11E-04	6.26E-04	9.39E-04	1.14E-03
α_6					3.68E-04	3.41E-04	5.56E-04
α_7						3.93E-05	1.91E-04
α_8							1.67E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.90E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01	9.90E-01
Beta	1.04E-02	1.01E-02	1.28E-02	1.21E-02	1.19E-02	1.08E-02	1.02E-02
Gamma		2.09E-01	3.14E-01	3.98E-01	5.14E-01	5.91E-01	6.51E-01
Delta			3.51E-01	3.03E-01	4.27E-01	5.02E-01	5.95E-01
Epsilon				1.45E-01	3.81E-01	4.11E-01	5.21E-01
Mu					3.71E-01	2.88E-01	4.44E-01
Omega						1.03E-01	3.92E-01
Sigma							4.67E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8836294	0.9704461	0.9873090	0.9999325	1.477E+01	4.498E-01	--
α_2	6.75E-05	2.96E-02	1.27E-02	1.16E-01	4.498E-01	1.477E+01	0.999

CCCG = 3, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9022694	0.9648229	0.9736096	0.9972867	3.232E+01	1.178E+00	--
α_2	1.25E-03	2.78E-02	1.92E-02	8.40E-02	9.387E-01	3.279E+01	1.092
α_3	7.79E-08	7.35E-03	1.20E-03	3.61E-02	2.396E-01	3.236E+01	1.130

CCCG = 4, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9019718	0.9585771	0.9650772	0.9929181	4.393E+01	1.898E+00	--
α_2	2.49E-03	2.74E-02	2.10E-02	7.41E-02	1.285E+00	4.565E+01	1.135
α_3	8.08E-06	8.69E-03	3.13E-03	3.62E-02	3.927E-01	4.478E+01	1.180
α_4	2.07E-08	5.35E-03	7.21E-04	2.69E-02	2.207E-01	4.103E+01	1.292

CCCG = 5, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9259821	0.9626407	0.9658855	0.9882026	9.033E+01	3.506E+00	--
α_2	3.76E-03	2.10E-02	1.77E-02	4.93E-02	1.992E+00	9.306E+01	1.159
α_3	7.34E-04	1.18E-02	8.50E-03	3.43E-02	1.078E+00	9.007E+01	1.209
α_4	2.05E-06	3.89E-03	1.26E-03	1.67E-02	3.632E-01	9.297E+01	1.181
α_5	6.33E-21	6.84E-04	3.96E-07	3.96E-03	7.248E-02	1.059E+02	1.040

CCCG = 6, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9322180	0.9641438	0.9667579	0.9871333	1.129E+02	4.199E+00	--
α_2	2.70E-03	1.56E-02	1.31E-02	3.71E-02	1.941E+00	1.224E+02	1.105
α_3	1.17E-03	1.22E-02	9.34E-03	3.28E-02	1.332E+00	1.082E+02	1.254
α_4	5.74E-05	5.34E-03	2.88E-03	1.90E-02	6.181E-01	1.152E+02	1.187
α_5	1.33E-08	1.94E-03	2.88E-04	9.59E-03	2.313E-01	1.192E+02	1.150
α_6	7.45E-20	8.15E-04	7.69E-07	4.74E-03	7.684E-02	9.422E+01	1.457

CCCG = 7, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9425289	0.9665972	0.9682552	0.9850019	1.801E+02	6.223E+00	--
α_2	3.23E-03	1.32E-02	1.16E-02	2.85E-02	2.654E+00	1.989E+02	1.072
α_3	1.31E-03	9.56E-03	7.74E-03	2.40E-02	1.645E+00	1.705E+02	1.255
α_4	4.14E-04	6.21E-03	4.50E-03	1.78E-02	1.115E+00	1.785E+02	1.202
α_5	3.26E-05	3.37E-03	1.78E-03	1.21E-02	6.034E-01	1.787E+02	1.205
α_6	1.74E-10	9.79E-04	7.30E-05	5.19E-03	1.780E-01	1.817E+02	1.188
α_7	7.03E-51	1.29E-04	2.65E-14	4.56E-04	2.734E-02	2.118E+02	1.020

CCCG = 8, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9449153	0.9679705	0.9695589	0.9855996	1.888E+02	6.246E+00	--
α_2	2.68E-03	1.16E-02	1.01E-02	2.56E-02	2.504E+00	2.131E+02	1.037
α_3	8.35E-04	7.78E-03	6.07E-03	2.06E-02	1.419E+00	1.811E+02	1.225
α_4	3.12E-04	5.67E-03	3.99E-03	1.68E-02	1.027E+00	1.799E+02	1.235
α_5	7.91E-05	3.83E-03	2.30E-03	1.28E-02	7.337E-01	1.907E+02	1.168
α_6	2.21E-06	2.21E-03	8.00E-04	9.21E-03	3.975E-01	1.792E+02	1.245
α_7	4.14E-20	4.14E-04	3.98E-07	2.41E-03	7.703E-02	1.860E+02	1.201
α_8	4.71E-18	5.07E-04	1.27E-06	2.96E-03	8.749E-02	1.724E+02	1.296

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.70E-01	9.65E-01	9.59E-01	9.63E-01	9.64E-01	9.67E-01	9.68E-01
α_2	2.96E-02	2.78E-02	2.74E-02	2.10E-02	1.56E-02	1.32E-02	1.16E-02
α_3		7.35E-03	8.69E-03	1.18E-02	1.22E-02	9.56E-03	7.78E-03
α_4			5.35E-03	3.89E-03	5.34E-03	6.21E-03	5.67E-03
α_5				6.84E-04	1.94E-03	3.37E-03	3.83E-03
α_6					8.15E-04	9.79E-04	2.21E-03
α_7						1.29E-04	4.14E-04
α_8							5.07E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.70E-01	9.65E-01	9.59E-01	9.63E-01	9.64E-01	9.67E-01	9.68E-01
Beta	2.96E-02	3.52E-02	4.14E-02	3.74E-02	3.59E-02	3.34E-02	3.20E-02
Gamma		2.09E-01	3.39E-01	4.39E-01	5.65E-01	6.06E-01	6.37E-01
Delta			3.81E-01	2.79E-01	4.00E-01	5.28E-01	6.19E-01
Epsilon				1.50E-01	3.40E-01	4.19E-01	5.51E-01
Mu					2.96E-01	2.48E-01	4.50E-01
Omega						1.17E-01	2.94E-01
Sigma							5.51E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.10	1.10	1.10	1.10	1.10	1.10	1.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 3.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.468

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9349148	0.9832995	0.9926490	0.9999516	2.771E+01	4.706E-01	--
α_2	4.84E-05	1.67E-02	7.35E-03	6.51E-02	4.706E-01	2.771E+01	0.999

CCCG = 3, Gamma = 0.468

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9471565	0.9815742	0.9866051	0.9987882	5.873E+01	1.103E+00	--
α_2	3.88E-04	1.34E-02	8.56E-03	4.30E-02	8.104E-01	5.958E+01	1.092
α_3	4.23E-07	5.01E-03	1.18E-03	2.31E-02	2.921E-01	5.806E+01	1.130

CCCG = 4, Gamma = 0.468

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9544942	0.9807970	0.9838522	0.9966473	9.973E+01	1.953E+00	--
α_2	1.18E-03	1.26E-02	9.65E-03	3.42E-02	1.312E+00	1.027E+02	1.135
α_3	7.24E-06	4.30E-03	1.70E-03	1.74E-02	4.307E-01	9.973E+01	1.180
α_4	4.58E-09	2.29E-03	2.72E-04	1.17E-02	2.099E-01	9.125E+01	1.292

CCCG = 5, Gamma = 0.468

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9649840	0.9830376	0.9847635	0.9951915	1.801E+02	3.107E+00	--
α_2	1.29E-03	9.09E-03	7.39E-03	2.27E-02	1.684E+00	1.837E+02	1.159
α_3	2.35E-04	5.30E-03	3.60E-03	1.62E-02	9.426E-01	1.768E+02	1.209
α_4	1.58E-06	2.10E-03	7.21E-04	8.85E-03	3.816E-01	1.816E+02	1.181
α_5	1.91E-16	4.78E-04	2.62E-06	2.78E-03	9.865E-02	2.065E+02	1.040

CCCG = 6, Gamma = 0.468

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9691216	0.9841741	0.9854910	0.9947270	2.377E+02	3.822E+00	--
α_2	9.68E-04	6.68E-03	5.45E-03	1.66E-02	1.714E+00	2.549E+02	1.105
α_3	3.22E-04	4.90E-03	3.54E-03	1.41E-02	1.108E+00	2.250E+02	1.254
α_4	3.60E-05	2.72E-03	1.52E-03	9.51E-03	6.509E-01	2.383E+02	1.187
α_5	2.04E-08	1.03E-03	1.85E-04	4.96E-03	2.536E-01	2.462E+02	1.150
α_6	7.98E-17	4.92E-04	2.24E-06	2.87E-03	9.572E-02	1.945E+02	1.457

CCCG = 7, Gamma = 0.468

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9736936	0.9854283	0.9863263	0.9940957	3.513E+02	5.195E+00	--
α_2	1.04E-03	5.45E-03	4.62E-03	1.27E-02	2.105E+00	3.841E+02	1.072
α_3	3.76E-04	4.00E-03	3.06E-03	1.09E-02	1.320E+00	3.284E+02	1.255
α_4	1.48E-04	2.90E-03	2.01E-03	8.67E-03	9.967E-01	3.431E+02	1.202
α_5	7.73E-06	1.53E-03	7.26E-04	5.77E-03	5.249E-01	3.429E+02	1.205
α_6	4.17E-10	5.61E-04	5.49E-05	2.91E-03	1.956E-01	3.482E+02	1.188
α_7	3.72E-28	1.30E-04	2.96E-09	7.08E-04	5.291E-02	4.056E+02	1.020

CCCG = 8, Gamma = 0.468

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9757496	0.9861951	0.9869551	0.9940453	4.166E+02	5.832E+00	--
α_2	9.66E-04	4.76E-03	4.08E-03	1.09E-02	2.229E+00	4.660E+02	1.037
α_3	2.73E-04	3.18E-03	2.39E-03	8.78E-03	1.260E+00	3.949E+02	1.225
α_4	1.51E-04	2.65E-03	1.87E-03	7.82E-03	1.042E+00	3.919E+02	1.235
α_5	4.31E-05	1.83E-03	1.12E-03	6.05E-03	7.626E-01	4.149E+02	1.168
α_6	1.92E-07	8.39E-04	2.34E-04	3.73E-03	3.271E-01	3.895E+02	1.245
α_7	3.22E-13	3.33E-04	8.92E-06	1.87E-03	1.344E-01	4.038E+02	1.201
α_8	1.85E-20	2.05E-04	1.92E-07	1.19E-03	7.682E-02	3.745E+02	1.296

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.67E-02	1.34E-02	1.26E-02	9.09E-03	6.68E-03	5.45E-03	4.76E-03
α_3		5.01E-03	4.30E-03	5.30E-03	4.90E-03	4.00E-03	3.18E-03
α_4			2.29E-03	2.10E-03	2.72E-03	2.90E-03	2.65E-03
α_5				4.78E-04	1.03E-03	1.53E-03	1.83E-03
α_6					4.92E-04	5.61E-04	8.39E-04
α_7						1.30E-04	3.33E-04
α_8							2.05E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.67E-02	1.84E-02	1.92E-02	1.70E-02	1.58E-02	1.46E-02	1.38E-02
Gamma		2.72E-01	3.43E-01	4.64E-01	5.78E-01	6.26E-01	6.55E-01
Delta			3.48E-01	3.27E-01	4.64E-01	5.61E-01	6.48E-01
Epsilon				1.86E-01	3.58E-01	4.34E-01	5.48E-01
Mu					3.23E-01	3.12E-01	4.29E-01
Omega						1.89E-01	3.91E-01
Sigma							3.81E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.60	3.60	3.60	3.60	3.60	3.60	3.60
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.130

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9827350	0.9955190	0.9979745	0.9999835	1.096E+02	4.932E-01	--
α_2	1.65E-05	4.48E-03	2.03E-03	1.73E-02	4.932E-01	1.096E+02	0.999

CCCG = 3, Gamma = 0.130

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9862318	0.9952985	0.9966583	0.9997214	2.243E+02	1.059E+00	--
α_2	5.86E-05	3.13E-03	1.85E-03	1.06E-02	7.137E-01	2.272E+02	1.092
α_3	5.65E-07	1.57E-03	4.75E-04	6.85E-03	3.458E-01	2.199E+02	1.130

CCCG = 4, Gamma = 0.130

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9882249	0.9949369	0.9957020	0.9990336	4.155E+02	2.115E+00	--
α_2	4.49E-04	3.62E-03	2.88E-03	9.31E-03	1.549E+00	4.263E+02	1.135
α_3	2.01E-08	6.42E-04	1.26E-04	3.06E-03	2.646E-01	4.116E+02	1.180
α_4	8.85E-08	8.00E-04	1.96E-04	3.66E-03	3.010E-01	3.758E+02	1.292

CCCG = 5, Gamma = 0.130

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9919983	0.9955552	0.9958279	0.9981812	1.193E+03	5.325E+00	--
α_2	9.56E-04	3.00E-03	2.73E-03	5.96E-03	3.632E+00	1.208E+03	1.159
α_3	1.15E-04	1.17E-03	8.95E-04	3.14E-03	1.354E+00	1.160E+03	1.209
α_4	2.36E-08	2.49E-04	5.94E-05	1.14E-03	2.961E-01	1.189E+03	1.181
α_5	9.36E-35	3.14E-05	3.46E-11	1.56E-04	4.243E-02	1.350E+03	1.040

CCCG = 6, Gamma = 0.130

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9917063	0.9954777	0.9957766	0.9982284	1.086E+03	4.936E+00	--
α_2	6.75E-04	2.54E-03	2.26E-03	5.37E-03	2.915E+00	1.146E+03	1.105
α_3	1.06E-04	1.24E-03	9.33E-04	3.43E-03	1.257E+00	1.011E+03	1.254
α_4	1.91E-06	4.71E-04	2.15E-04	1.80E-03	5.031E-01	1.069E+03	1.187
α_5	3.03E-15	1.05E-04	1.38E-06	6.00E-04	1.155E-01	1.103E+03	1.150
α_6	7.79E-13	1.67E-04	6.10E-06	9.23E-04	1.451E-01	8.707E+02	1.457

CCCG = 7, Gamma = 0.130

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9935718	0.9959313	0.9960697	0.9978180	2.363E+03	9.654E+00	--
α_2	7.37E-04	1.90E-03	1.77E-03	3.51E-03	4.851E+00	2.545E+03	1.072
α_3	3.29E-04	1.29E-03	1.14E-03	2.75E-03	2.800E+00	2.174E+03	1.255
α_4	6.22E-05	6.09E-04	4.70E-04	1.63E-03	1.384E+00	2.271E+03	1.202
α_5	7.65E-07	2.16E-04	9.66E-05	8.36E-04	4.902E-01	2.267E+03	1.205
α_6	1.18E-15	4.98E-05	6.31E-07	2.86E-04	1.146E-01	2.301E+03	1.188
α_7	2.87E-93	5.46E-06	5.81E-25	6.49E-06	1.464E-02	2.679E+03	1.020

CCCG = 8, Gamma = 0.130

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9933346	0.9960376	0.9962194	0.9981200	1.797E+03	7.148E+00	--
α_2	4.05E-04	1.49E-03	1.33E-03	3.14E-03	2.980E+00	1.993E+03	1.037
α_3	2.01E-04	1.16E-03	9.71E-04	2.77E-03	1.960E+00	1.687E+03	1.225
α_4	5.09E-05	6.96E-04	5.10E-04	1.98E-03	1.166E+00	1.674E+03	1.235
α_5	1.72E-06	3.03E-04	1.47E-04	1.14E-03	5.375E-01	1.772E+03	1.168
α_6	2.40E-11	1.09E-04	8.43E-06	5.74E-04	1.805E-01	1.662E+03	1.245
α_7	1.24E-35	2.40E-05	1.80E-11	1.18E-04	4.139E-02	1.722E+03	1.201
α_8	1.08E-08	1.77E-04	3.90E-05	8.25E-04	2.827E-01	1.597E+03	1.296

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.95E-01	9.95E-01	9.96E-01	9.95E-01	9.96E-01	9.96E-01
α_2	4.48E-03	3.13E-03	3.62E-03	3.00E-03	2.54E-03	1.90E-03	1.49E-03
α_3		1.57E-03	6.42E-04	1.17E-03	1.24E-03	1.29E-03	1.16E-03
α_4			8.00E-04	2.49E-04	4.71E-04	6.09E-04	6.96E-04
α_5				3.14E-05	1.05E-04	2.16E-04	3.03E-04
α_6					1.67E-04	4.98E-05	1.09E-04
α_7						5.46E-06	2.40E-05
α_8							1.77E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.95E-01	9.95E-01	9.96E-01	9.95E-01	9.96E-01	9.96E-01
Beta	4.48E-03	4.70E-03	5.06E-03	4.44E-03	4.52E-03	4.07E-03	3.96E-03
Gamma		3.34E-01	2.85E-01	3.25E-01	4.39E-01	5.32E-01	6.23E-01
Delta			5.55E-01	1.94E-01	3.74E-01	4.06E-01	5.30E-01
Epsilon				1.12E-01	3.66E-01	3.08E-01	4.68E-01
Mu					6.14E-01	2.04E-01	5.05E-01
Omega						9.89E-02	6.49E-01
Sigma							8.80E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.10.4 PWR-RHR-MDP-RH: PWR RHR Motor-Driven Pumps Fail to Run Greater Than One Hour

Generic CCF Parameters

Plant Type:	PWR
System Group:	Clean Water
System:	Residual Heat Removal (LCI in BWRs; LPI in PWRs)
Component Group:	Pump
Component Type:	Motor Driven Pump
Component Subtype:	Centrifugal
Failure Mode:	Fail to Run > 1H
Date Range:	2006 through 2020
Prior:	Default 2015

Total Number of Independent Failure Events: 4.7

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9336996	0.9830129	0.9925539	0.9999486	1.0000000	2.711E+01	4.685E-01
α_2	4.81E-05	1.70E-02	7.45E-03	6.63E-02	0.00E+00	4.685E-01	2.711E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9496789	0.9823211	0.9870501	0.9987797	1.0000000	6.268E+01	1.128E+00
α_2	4.48E-04	1.33E-02	8.71E-03	4.20E-02	0.00E+00	8.512E-01	6.296E+01
α_3	2.17E-07	4.34E-03	9.30E-04	2.04E-02	0.00E+00	2.768E-01	6.353E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9534205	0.9805323	0.9837234	0.9967361	1.0000000	9.538E+01	1.894E+00
α_2	1.12E-03	1.30E-02	9.80E-03	3.56E-02	0.00E+00	1.260E+00	9.601E+01
α_3	4.50E-06	4.14E-03	1.52E-03	1.71E-02	0.00E+00	4.024E-01	9.687E+01
α_4	1.65E-08	2.38E-03	3.55E-04	1.18E-02	0.00E+00	2.315E-01	9.704E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9653701	0.9827504	0.9843397	0.9946970	1.0000000	1.955E+02	3.432E+00
α_2	1.65E-03	9.67E-03	8.08E-03	2.31E-02	0.00E+00	1.924E+00	1.970E+02
α_3	3.05E-04	5.27E-03	3.73E-03	1.55E-02	0.00E+00	1.049E+00	1.979E+02
α_4	1.46E-06	1.92E-03	6.62E-04	8.10E-03	0.00E+00	3.822E-01	1.986E+02
α_5	3.35E-20	3.86E-04	3.59E-07	2.24E-03	0.00E+00	7.674E-02	1.989E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9680270	0.9835942	0.9849515	0.9945163	1.0000000	2.299E+02	3.835E+00

α_2	1.04E-03	7.28E-03	5.93E-03	1.81E-02	0.00E+00	1.701E+00	2.321E+02
α_3	4.07E-04	5.16E-03	3.84E-03	1.44E-02	0.00E+00	1.207E+00	2.325E+02
α_4	2.34E-05	2.55E-03	1.34E-03	9.19E-03	0.00E+00	5.960E-01	2.332E+02
α_5	3.70E-09	9.46E-04	1.26E-04	4.74E-03	0.00E+00	2.211E-01	2.335E+02
α_6	3.69E-15	4.70E-04	4.76E-06	2.71E-03	0.00E+00	1.098E-01	2.336E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9735096	0.9849643	0.9858000	0.9935588	1.0000000	3.765E+02	5.747E+00
α_2	1.20E-03	5.87E-03	5.03E-03	1.34E-02	0.00E+00	2.243E+00	3.800E+02
α_3	5.72E-04	4.26E-03	3.44E-03	1.08E-02	0.00E+00	1.630E+00	3.806E+02
α_4	1.76E-04	2.83E-03	2.03E-03	8.24E-03	0.00E+00	1.083E+00	3.812E+02
α_5	1.07E-05	1.48E-03	7.46E-04	5.43E-03	0.00E+00	5.654E-01	3.817E+02
α_6	2.75E-10	5.01E-04	4.63E-05	2.61E-03	0.00E+00	1.916E-01	3.821E+02
α_7	6.24E-41	9.10E-05	3.39E-12	3.99E-04	0.00E+00	3.480E-02	3.822E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9747765	0.9857020	0.9865009	0.9938924	1.0000000	3.947E+02	5.726E+00
α_2	9.09E-04	5.04E-03	4.24E-03	1.19E-02	0.00E+00	2.018E+00	3.984E+02
α_3	3.59E-04	3.47E-03	2.69E-03	9.26E-03	0.00E+00	1.391E+00	3.991E+02
α_4	1.58E-04	2.65E-03	1.88E-03	7.77E-03	0.00E+00	1.062E+00	3.994E+02
α_5	3.10E-05	1.75E-03	1.03E-03	5.96E-03	0.00E+00	7.026E-01	3.997E+02
α_6	3.43E-07	8.73E-04	2.68E-04	3.80E-03	0.00E+00	3.497E-01	4.001E+02
α_7	1.32E-15	2.69E-04	2.47E-06	1.56E-03	0.00E+00	1.078E-01	4.003E+02
α_8	2.75E-17	2.36E-04	1.00E-06	1.38E-03	0.00E+00	9.469E-02	4.004E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.70E-02	1.33E-02	1.30E-02	9.67E-03	7.28E-03	5.87E-03	5.04E-03
α_3		4.34E-03	4.14E-03	5.27E-03	5.16E-03	4.26E-03	3.47E-03
α_4			2.38E-03	1.92E-03	2.55E-03	2.83E-03	2.65E-03
α_5				3.86E-04	9.46E-04	1.48E-03	1.75E-03
α_6					4.70E-04	5.01E-04	8.73E-04
α_7						9.10E-05	2.69E-04
α_8							2.36E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.70E-02	1.77E-02	1.95E-02	1.72E-02	1.64E-02	1.50E-02	1.43E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.70	4.70	4.70	4.70	4.70	4.70	4.70
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.426

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9607553	0.9898623	0.9954664	0.9999662	4.720E+01	4.834E-01	--
α_2	3.38E-05	1.01E-02	4.53E-03	3.92E-02	4.834E-01	4.720E+01	0.971

CCCG = 3, Gamma = 0.426

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738630	0.9905888	0.9929537	0.9992310	1.290E+02	1.226E+00	--
α_2	3.56E-04	7.32E-03	5.05E-03	2.20E-02	9.769E-01	1.326E+02	0.995
α_3	3.35E-08	2.10E-03	3.64E-04	1.02E-02	2.487E-01	1.184E+02	1.120

CCCG = 4, Gamma = 0.426

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9732072	0.9885467	0.9903040	0.9978769	1.775E+02	2.057E+00	--
α_2	8.67E-04	7.85E-03	6.15E-03	2.07E-02	1.442E+00	1.822E+02	1.013
α_3	2.92E-06	2.33E-03	8.76E-04	9.58E-03	4.114E-01	1.762E+02	1.053
α_4	1.67E-09	1.27E-03	1.39E-04	6.52E-03	2.036E-01	1.600E+02	1.161

CCCG = 5, Gamma = 0.426

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9790899	0.9894089	0.9903320	0.9965740	3.441E+02	3.683E+00	--
α_2	1.30E-03	6.34E-03	5.44E-03	1.45E-02	2.243E+00	3.515E+02	1.007
α_3	1.48E-04	2.95E-03	2.04E-03	8.84E-03	9.912E-01	3.356E+02	1.059
α_4	7.56E-07	1.11E-03	3.75E-04	4.70E-03	3.765E-01	3.392E+02	1.049
α_5	1.71E-21	1.97E-04	1.12E-07	1.14E-03	7.237E-02	3.677E+02	0.969

CCCG = 6, Gamma = 0.426

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9802173	0.9896657	0.9904692	0.9963693	3.964E+02	4.139E+00	--
α_2	9.63E-04	5.01E-03	4.26E-03	1.16E-02	2.128E+00	4.227E+02	0.957
α_3	2.07E-04	3.00E-03	2.19E-03	8.60E-03	1.134E+00	3.764E+02	1.077
α_4	9.38E-06	1.43E-03	7.12E-04	5.31E-03	5.533E-01	3.851E+02	1.054
α_5	2.15E-09	5.52E-04	7.36E-05	2.77E-03	2.210E-01	4.003E+02	1.015
α_6	4.27E-16	3.35E-04	2.33E-06	1.94E-03	1.027E-01	3.064E+02	1.326

CCCG = 7, Gamma = 0.426

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839556	0.9906702	0.9911404	0.9957792	6.830E+02	6.432E+00	--
α_2	9.87E-04	3.80E-03	3.36E-03	8.08E-03	2.840E+00	7.454E+02	0.922
α_3	4.05E-04	2.73E-03	2.23E-03	6.76E-03	1.746E+00	6.373E+02	1.079
α_4	1.03E-04	1.65E-03	1.18E-03	4.80E-03	1.084E+00	6.563E+02	1.049
α_5	4.62E-06	8.12E-04	3.93E-04	3.04E-03	5.376E-01	6.612E+02	1.042
α_6	2.65E-10	3.02E-04	3.05E-05	1.56E-03	1.979E-01	6.556E+02	1.051
α_7	8.75E-53	3.91E-05	3.91E-15	1.33E-04	2.656E-02	6.797E+02	1.014

CCCG = 8, Gamma = 0.426

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9846779	0.9911950	0.9916622	0.9961166	6.881E+02	6.112E+00	--
α_2	6.62E-04	3.06E-03	2.64E-03	6.88E-03	2.364E+00	7.705E+02	0.892
α_3	2.74E-04	2.30E-03	1.82E-03	5.98E-03	1.512E+00	6.548E+02	1.050
α_4	9.68E-05	1.65E-03	1.17E-03	4.85E-03	1.056E+00	6.385E+02	1.078
α_5	1.51E-05	9.97E-04	5.68E-04	3.44E-03	6.745E-01	6.757E+02	1.019
α_6	6.26E-08	4.66E-04	1.18E-04	2.11E-03	3.076E-01	6.598E+02	1.044
α_7	1.23E-15	1.76E-04	1.74E-06	1.01E-03	1.093E-01	6.213E+02	1.109
α_8	2.35E-18	1.52E-04	4.22E-07	8.86E-04	8.885E-02	5.845E+02	1.179

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.91E-01	9.89E-01	9.89E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.01E-02	7.32E-03	7.85E-03	6.34E-03	5.01E-03	3.80E-03	3.06E-03
α_3		2.10E-03	2.33E-03	2.95E-03	3.00E-03	2.73E-03	2.30E-03
α_4			1.27E-03	1.11E-03	1.43E-03	1.65E-03	1.65E-03
α_5				1.97E-04	5.52E-04	8.12E-04	9.97E-04
α_6					3.35E-04	3.02E-04	4.66E-04
α_7						3.91E-05	1.76E-04
α_8							1.52E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.91E-01	9.89E-01	9.89E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.01E-02	9.41E-03	1.15E-02	1.06E-02	1.03E-02	9.33E-03	8.81E-03
Gamma		2.23E-01	3.14E-01	4.01E-01	5.15E-01	5.93E-01	6.53E-01
Delta			3.53E-01	3.07E-01	4.36E-01	5.06E-01	5.99E-01
Epsilon				1.51E-01	3.82E-01	4.12E-01	5.20E-01
Mu					3.78E-01	2.96E-01	4.43E-01
Omega						1.15E-01	4.13E-01
Sigma							4.64E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8868302	0.9712704	0.9876777	0.9999345	1.521E+01	4.498E-01	--
α_2	6.55E-05	2.87E-02	1.23E-02	1.13E-01	4.498E-01	1.521E+01	0.971

CCCG = 3, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9091942	0.9673590	0.9755472	0.9974882	3.492E+01	1.178E+00	--
α_2	1.13E-03	2.54E-02	1.74E-02	7.67E-02	9.387E-01	3.608E+01	0.995
α_3	7.72E-08	7.28E-03	1.19E-03	3.57E-02	2.396E-01	3.265E+01	1.120

CCCG = 4, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9122870	0.9630127	0.9688654	0.9936961	4.943E+01	1.898E+00	--
α_2	2.22E-03	2.44E-02	1.87E-02	6.62E-02	1.285E+00	5.134E+01	1.013
α_3	7.20E-06	7.76E-03	2.79E-03	3.24E-02	3.927E-01	5.021E+01	1.053
α_4	1.86E-08	4.81E-03	6.47E-04	2.41E-02	2.207E-01	4.569E+01	1.161

CCCG = 5, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9351903	0.9673459	0.9702088	0.9897126	1.039E+02	3.506E+00	--
α_2	3.26E-03	1.82E-02	1.54E-02	4.29E-02	1.992E+00	1.074E+02	1.007
α_3	6.42E-04	1.04E-02	7.43E-03	3.01E-02	1.078E+00	1.030E+02	1.059
α_4	1.82E-06	3.46E-03	1.12E-03	1.48E-02	3.632E-01	1.047E+02	1.049
α_5	5.89E-21	6.37E-04	3.69E-07	3.69E-03	7.248E-02	1.137E+02	0.969

CCCG = 6, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9410317	0.9688573	0.9711494	0.9888485	1.306E+02	4.199E+00	--
α_2	2.33E-03	1.35E-02	1.13E-02	3.22E-02	1.941E+00	1.417E+02	0.957
α_3	1.00E-03	1.04E-02	8.01E-03	2.82E-02	1.332E+00	1.263E+02	1.077
α_4	5.09E-05	4.74E-03	2.56E-03	1.68E-02	6.181E-01	1.298E+02	1.054
α_5	1.17E-08	1.71E-03	2.54E-04	8.46E-03	2.313E-01	1.352E+02	1.015
α_6	6.78E-20	7.42E-04	7.00E-07	4.32E-03	7.684E-02	1.035E+02	1.326

CCCG = 7, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9502834	0.9711430	0.9725886	0.9870644	2.094E+02	6.223E+00	--
α_2	2.77E-03	1.13E-02	9.96E-03	2.45E-02	2.654E+00	2.318E+02	0.922
α_3	1.12E-03	8.22E-03	6.65E-03	2.07E-02	1.645E+00	1.986E+02	1.079
α_4	3.61E-04	5.41E-03	3.92E-03	1.56E-02	1.115E+00	2.048E+02	1.049
α_5	2.82E-05	2.91E-03	1.54E-03	1.04E-02	6.034E-01	2.067E+02	1.042
α_6	1.54E-10	8.66E-04	6.46E-05	4.60E-03	1.780E-01	2.053E+02	1.051
α_7	6.99E-51	1.28E-04	2.64E-14	4.54E-04	2.734E-02	2.129E+02	1.014

CCCG = 8, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9523842	0.9723490	0.9737326	0.9875879	2.196E+02	6.246E+00	--
α_2	2.31E-03	9.99E-03	8.72E-03	2.20E-02	2.504E+00	2.482E+02	0.892
α_3	7.15E-04	6.67E-03	5.20E-03	1.76E-02	1.419E+00	2.115E+02	1.050
α_4	2.72E-04	4.95E-03	3.48E-03	1.47E-02	1.027E+00	2.064E+02	1.078
α_5	6.90E-05	3.34E-03	2.01E-03	1.12E-02	7.337E-01	2.186E+02	1.019
α_6	1.85E-06	1.86E-03	6.70E-04	7.73E-03	3.975E-01	2.137E+02	1.044
α_7	3.83E-20	3.82E-04	3.67E-07	2.22E-03	7.703E-02	2.015E+02	1.109
α_8	4.29E-18	4.61E-04	1.15E-06	2.69E-03	8.749E-02	1.895E+02	1.179

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.71E-01	9.67E-01	9.63E-01	9.67E-01	9.69E-01	9.71E-01	9.72E-01
α_2	2.87E-02	2.54E-02	2.44E-02	1.82E-02	1.35E-02	1.13E-02	9.99E-03
α_3		7.28E-03	7.76E-03	1.04E-02	1.04E-02	8.22E-03	6.67E-03
α_4			4.81E-03	3.46E-03	4.74E-03	5.41E-03	4.95E-03
α_5				6.37E-04	1.71E-03	2.91E-03	3.34E-03
α_6					7.42E-04	8.66E-04	1.86E-03
α_7						1.28E-04	3.82E-04
α_8							4.61E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.71E-01	9.67E-01	9.63E-01	9.67E-01	9.69E-01	9.71E-01	9.72E-01
Beta	2.87E-02	3.26E-02	3.70E-02	3.27E-02	3.11E-02	2.89E-02	2.77E-02
Gamma		2.23E-01	3.40E-01	4.42E-01	5.66E-01	6.08E-01	6.39E-01
Delta			3.82E-01	2.83E-01	4.08E-01	5.31E-01	6.23E-01
Epsilon				1.56E-01	3.41E-01	4.19E-01	5.50E-01
Mu					3.03E-01	2.55E-01	4.47E-01
Omega						1.29E-01	3.12E-01
Sigma							5.47E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.10	1.10	1.10	1.10	1.10	1.10	1.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 1.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.340

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9319171	0.9825242	0.9922996	0.9999492	2.646E+01	4.706E-01	--
α_2	5.08E-05	1.75E-02	7.70E-03	6.81E-02	4.706E-01	2.646E+01	0.971

CCCG = 3, Gamma = 0.340

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9491419	0.9822728	0.9871184	0.9988349	6.109E+01	1.103E+00	--
α_2	3.65E-04	1.26E-02	8.04E-03	4.05E-02	8.104E-01	6.345E+01	0.995
α_3	4.32E-07	5.12E-03	1.21E-03	2.36E-02	2.921E-01	5.680E+01	1.120

CCCG = 4, Gamma = 0.340

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9586368	0.9825590	0.9853427	0.9969586	1.100E+02	1.953E+00	--
α_2	1.07E-03	1.14E-02	8.75E-03	3.10E-02	1.312E+00	1.134E+02	1.013
α_3	6.57E-06	3.91E-03	1.55E-03	1.58E-02	4.307E-01	1.099E+02	1.053
α_4	4.18E-09	2.10E-03	2.48E-04	1.07E-02	2.099E-01	9.987E+01	1.161

CCCG = 5, Gamma = 0.340

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9690486	0.9850179	0.9865481	0.9957573	2.043E+02	3.107E+00	--
α_2	1.13E-03	7.97E-03	6.48E-03	1.99E-02	1.684E+00	2.097E+02	1.007
α_3	2.07E-04	4.69E-03	3.18E-03	1.43E-02	9.426E-01	2.002E+02	1.059
α_4	1.41E-06	1.88E-03	6.47E-04	7.94E-03	3.816E-01	2.026E+02	1.049
α_5	1.79E-16	4.49E-04	2.46E-06	2.61E-03	9.865E-02	2.197E+02	0.969

CCCG = 6, Gamma = 0.340

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9729316	0.9861365	0.9872944	0.9953851	2.719E+02	3.822E+00	--
α_2	8.44E-04	5.82E-03	4.75E-03	1.45E-02	1.714E+00	2.926E+02	0.957
α_3	2.78E-04	4.24E-03	3.06E-03	1.22E-02	1.108E+00	2.604E+02	1.077
α_4	3.22E-05	2.44E-03	1.36E-03	8.50E-03	6.509E-01	2.665E+02	1.054
α_5	1.81E-08	9.14E-04	1.65E-04	4.41E-03	2.536E-01	2.772E+02	1.015
α_6	7.31E-17	4.51E-04	2.05E-06	2.63E-03	9.572E-02	2.122E+02	1.326

CCCG = 7, Gamma = 0.340

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9771205	0.9873341	0.9881176	0.9948718	4.050E+02	5.195E+00	--
α_2	8.94E-04	4.71E-03	4.00E-03	1.10E-02	2.105E+00	4.448E+02	0.922
α_3	3.25E-04	3.46E-03	2.64E-03	9.39E-03	1.320E+00	3.803E+02	1.079
α_4	1.29E-04	2.54E-03	1.76E-03	7.60E-03	9.967E-01	3.916E+02	1.049
α_5	6.72E-06	1.33E-03	6.31E-04	5.01E-03	5.249E-01	3.947E+02	1.042
α_6	3.71E-10	4.99E-04	4.89E-05	2.59E-03	1.956E-01	3.914E+02	1.051
α_7	3.72E-28	1.30E-04	2.95E-09	7.07E-04	5.291E-02	4.059E+02	1.014

CCCG = 8, Gamma = 0.340

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9789369	0.9880161	0.9886782	0.9948342	4.808E+02	5.832E+00	--
α_2	8.34E-04	4.11E-03	3.52E-03	9.41E-03	2.229E+00	5.397E+02	0.892
α_3	2.35E-04	2.74E-03	2.06E-03	7.56E-03	1.260E+00	4.590E+02	1.050
α_4	1.32E-04	2.32E-03	1.64E-03	6.85E-03	1.042E+00	4.475E+02	1.078
α_5	3.77E-05	1.61E-03	9.84E-04	5.30E-03	7.626E-01	4.735E+02	1.019
α_6	1.62E-07	7.07E-04	1.97E-04	3.14E-03	3.271E-01	4.626E+02	1.044
α_7	2.99E-13	3.08E-04	8.27E-06	1.73E-03	1.344E-01	4.356E+02	1.109
α_8	1.69E-20	1.87E-04	1.76E-07	1.09E-03	7.682E-02	4.099E+02	1.179

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.75E-02	1.26E-02	1.14E-02	7.97E-03	5.82E-03	4.71E-03	4.11E-03
α_3		5.12E-03	3.91E-03	4.69E-03	4.24E-03	3.46E-03	2.74E-03
α_4			2.10E-03	1.88E-03	2.44E-03	2.54E-03	2.32E-03
α_5				4.49E-04	9.14E-04	1.33E-03	1.61E-03
α_6					4.51E-04	4.99E-04	7.07E-04
α_7						1.30E-04	3.08E-04
α_8							1.87E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.75E-02	1.77E-02	1.74E-02	1.50E-02	1.39E-02	1.27E-02	1.20E-02
Gamma		2.89E-01	3.44E-01	4.68E-01	5.80E-01	6.28E-01	6.57E-01
Delta			3.49E-01	3.32E-01	4.73E-01	5.65E-01	6.52E-01
Epsilon				1.93E-01	3.59E-01	4.35E-01	5.47E-01
Mu					3.30E-01	3.22E-01	4.28E-01
Omega						2.07E-01	4.12E-01
Sigma							3.78E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.60	1.60	1.60	1.60	1.60	1.60	1.60
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.11 Component Cooling Water Pumps

2.1.11.1 CCW-MDP-FS: CCW Motor-Driven Pumps Fail to Start

Generic CCF Parameters

System Group: Clean Water
System: Component Cooling Water
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Start
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 38.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9698449	0.9923042	0.9966704	0.9999765	1.0000000	6.041E+01	4.685E-01
α_2	2.15E-05	7.70E-03	3.33E-03	3.02E-02	0.00E+00	4.685E-01	6.041E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9668371	0.9883835	0.9915256	0.9991985	1.0000000	9.598E+01	1.128E+00
α_2	2.93E-04	8.77E-03	5.70E-03	2.77E-02	0.00E+00	8.512E-01	9.626E+01
α_3	1.42E-07	2.85E-03	6.09E-04	1.34E-02	0.00E+00	2.768E-01	9.683E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9652254	0.9854972	0.9878954	0.9975767	1.0000000	1.287E+02	1.894E+00
α_2	8.33E-04	9.65E-03	7.29E-03	2.65E-02	0.00E+00	1.260E+00	1.293E+02
α_3	3.35E-06	3.08E-03	1.13E-03	1.28E-02	0.00E+00	4.024E-01	1.302E+02
α_4	1.23E-08	1.77E-03	2.64E-04	8.78E-03	0.00E+00	2.315E-01	1.303E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9703077	0.9852234	0.9865958	0.9954633	1.0000000	2.288E+02	3.432E+00
α_2	1.41E-03	8.28E-03	6.92E-03	1.98E-02	0.00E+00	1.924E+00	2.303E+02
α_3	2.61E-04	4.52E-03	3.20E-03	1.33E-02	0.00E+00	1.049E+00	2.312E+02
α_4	1.25E-06	1.65E-03	5.67E-04	6.94E-03	0.00E+00	3.822E-01	2.319E+02
α_5	2.87E-20	3.30E-04	3.08E-07	1.92E-03	0.00E+00	7.674E-02	2.322E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9719897	0.9856399	0.9868372	0.9952091	1.0000000	2.632E+02	3.835E+00

α_2	9.13E-04	6.37E-03	5.19E-03	1.59E-02	0.00E+00	1.701E+00	2.654E+02
α_3	3.56E-04	4.52E-03	3.36E-03	1.26E-02	0.00E+00	1.207E+00	2.658E+02
α_4	2.04E-05	2.23E-03	1.17E-03	8.04E-03	0.00E+00	5.960E-01	2.665E+02
α_5	3.24E-09	8.28E-04	1.11E-04	4.15E-03	0.00E+00	2.211E-01	2.668E+02
α_6	3.23E-15	4.11E-04	4.16E-06	2.37E-03	0.00E+00	1.098E-01	2.669E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9756190	0.9861692	0.9869399	0.9940714	1.0000000	4.098E+02	5.747E+00
α_2	1.10E-03	5.40E-03	4.63E-03	1.23E-02	0.00E+00	2.243E+00	4.133E+02
α_3	5.26E-04	3.92E-03	3.16E-03	9.92E-03	0.00E+00	1.630E+00	4.139E+02
α_4	1.62E-04	2.61E-03	1.86E-03	7.58E-03	0.00E+00	1.083E+00	4.145E+02
α_5	9.83E-06	1.36E-03	6.86E-04	5.00E-03	0.00E+00	5.654E-01	4.150E+02
α_6	2.53E-10	4.61E-04	4.26E-05	2.40E-03	0.00E+00	1.916E-01	4.154E+02
α_7	5.74E-41	8.37E-05	3.11E-12	3.67E-04	0.00E+00	3.480E-02	4.155E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9767059	0.9867997	0.9875438	0.9943600	1.0000000	4.280E+02	5.726E+00
α_2	8.39E-04	4.65E-03	3.92E-03	1.10E-02	0.00E+00	2.018E+00	4.317E+02
α_3	3.31E-04	3.21E-03	2.48E-03	8.55E-03	0.00E+00	1.391E+00	4.324E+02
α_4	1.46E-04	2.45E-03	1.74E-03	7.17E-03	0.00E+00	1.062E+00	4.327E+02
α_5	2.86E-05	1.62E-03	9.46E-04	5.50E-03	0.00E+00	7.026E-01	4.330E+02
α_6	3.17E-07	8.06E-04	2.47E-04	3.51E-03	0.00E+00	3.497E-01	4.334E+02
α_7	1.22E-15	2.49E-04	2.28E-06	1.44E-03	0.00E+00	1.078E-01	4.336E+02
α_8	2.54E-17	2.18E-04	9.25E-07	1.27E-03	0.00E+00	9.469E-02	4.337E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.88E-01	9.85E-01	9.85E-01	9.86E-01	9.86E-01	9.87E-01
α_2	7.70E-03	8.77E-03	9.65E-03	8.28E-03	6.37E-03	5.40E-03	4.65E-03
α_3		2.85E-03	3.08E-03	4.52E-03	4.52E-03	3.92E-03	3.21E-03
α_4			1.77E-03	1.65E-03	2.23E-03	2.61E-03	2.45E-03
α_5				3.30E-04	8.28E-04	1.36E-03	1.62E-03
α_6					4.11E-04	4.61E-04	8.06E-04
α_7						8.37E-05	2.49E-04
α_8							2.18E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.88E-01	9.85E-01	9.85E-01	9.86E-01	9.86E-01	9.87E-01
Beta	7.70E-03	1.16E-02	1.45E-02	1.48E-02	1.44E-02	1.38E-02	1.32E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	38.00	38.00	38.00	38.00	38.00	38.00	38.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 18.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.474

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9796593	0.9947567	0.9976704	0.9999827	9.171E+01	4.834E-01	--
α_2	1.73E-05	5.24E-03	2.33E-03	2.03E-02	4.834E-01	9.171E+01	0.676

CCCG = 3, Gamma = 0.474

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9796670	0.9926863	0.9945303	0.9994035	1.664E+02	1.226E+00	--
α_2	2.77E-04	5.70E-03	3.93E-03	1.72E-02	9.769E-01	1.703E+02	0.870
α_3	2.57E-08	1.61E-03	2.79E-04	7.80E-03	2.487E-01	1.543E+02	0.964

CCCG = 4, Gamma = 0.474

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9767116	0.9900513	0.9915819	0.9981576	2.047E+02	2.057E+00	--
α_2	7.49E-04	6.79E-03	5.32E-03	1.79E-02	1.442E+00	2.109E+02	0.951
α_3	2.57E-06	2.05E-03	7.69E-04	8.42E-03	4.114E-01	2.005E+02	1.005
α_4	1.46E-09	1.11E-03	1.21E-04	5.70E-03	2.036E-01	1.831E+02	1.102

CCCG = 5, Gamma = 0.474

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9791868	0.9894582	0.9903771	0.9965900	3.457E+02	3.683E+00	--
α_2	1.28E-03	6.25E-03	5.36E-03	1.43E-02	2.243E+00	3.565E+02	1.038
α_3	1.50E-04	2.97E-03	2.06E-03	8.92E-03	9.912E-01	3.323E+02	1.117
α_4	7.61E-07	1.12E-03	3.77E-04	4.73E-03	3.765E-01	3.369E+02	1.104
α_5	1.73E-21	1.99E-04	1.14E-07	1.15E-03	7.237E-02	3.631E+02	1.025

CCCG = 6, Gamma = 0.474

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9800014	0.9895525	0.9903646	0.9963294	3.920E+02	4.139E+00	--
α_2	9.60E-04	4.99E-03	4.24E-03	1.16E-02	2.128E+00	4.241E+02	0.991
α_3	2.13E-04	3.09E-03	2.25E-03	8.84E-03	1.134E+00	3.662E+02	1.150
α_4	9.62E-06	1.47E-03	7.30E-04	5.45E-03	5.533E-01	3.752E+02	1.124
α_5	2.21E-09	5.67E-04	7.57E-05	2.84E-03	2.210E-01	3.896E+02	1.084
α_6	4.18E-16	3.28E-04	2.28E-06	1.90E-03	1.027E-01	3.130E+02	1.349

CCCG = 7, Gamma = 0.474

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9828478	0.9900241	0.9905263	0.9954859	6.383E+02	6.432E+00	--
α_2	1.05E-03	4.03E-03	3.57E-03	8.58E-03	2.840E+00	7.017E+02	1.001
α_3	4.32E-04	2.91E-03	2.38E-03	7.20E-03	1.746E+00	5.985E+02	1.175
α_4	1.11E-04	1.78E-03	1.27E-03	5.18E-03	1.084E+00	6.080E+02	1.158
α_5	5.05E-06	8.88E-04	4.30E-04	3.32E-03	5.376E-01	6.047E+02	1.166
α_6	2.86E-10	3.25E-04	3.28E-05	1.68E-03	1.979E-01	6.086E+02	1.159
α_7	9.52E-53	4.25E-05	4.26E-15	1.45E-04	2.656E-02	6.247E+02	1.129

CCCG = 8, Gamma = 0.474

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9835687	0.9905558	0.9910564	0.9958338	6.411E+02	6.112E+00	--
α_2	7.12E-04	3.29E-03	2.84E-03	7.40E-03	2.364E+00	7.163E+02	0.981
α_3	2.91E-04	2.44E-03	1.93E-03	6.34E-03	1.512E+00	6.169E+02	1.140
α_4	1.04E-04	1.77E-03	1.25E-03	5.19E-03	1.056E+00	5.968E+02	1.180
α_5	1.64E-05	1.08E-03	6.18E-04	3.74E-03	6.745E-01	6.213E+02	1.134
α_6	6.95E-08	5.17E-04	1.31E-04	2.35E-03	3.076E-01	5.948E+02	1.185
α_7	1.30E-15	1.86E-04	1.84E-06	1.07E-03	1.093E-01	5.876E+02	1.200
α_8	2.41E-18	1.56E-04	4.34E-07	9.11E-04	8.885E-02	5.686E+02	1.240

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.93E-01	9.90E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01
α_2	5.24E-03	5.70E-03	6.79E-03	6.25E-03	4.99E-03	4.03E-03	3.29E-03
α_3		1.61E-03	2.05E-03	2.97E-03	3.09E-03	2.91E-03	2.44E-03
α_4			1.11E-03	1.12E-03	1.47E-03	1.78E-03	1.77E-03
α_5				1.99E-04	5.67E-04	8.88E-04	1.08E-03
α_6					3.28E-04	3.25E-04	5.17E-04
α_7						4.25E-05	1.86E-04
α_8							1.56E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.93E-01	9.90E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01
Beta	5.24E-03	7.31E-03	9.95E-03	1.05E-02	1.04E-02	9.98E-03	9.44E-03
Gamma		2.20E-01	3.17E-01	4.07E-01	5.22E-01	5.96E-01	6.52E-01
Delta			3.52E-01	3.07E-01	4.34E-01	5.11E-01	6.03E-01
Epsilon				1.51E-01	3.78E-01	4.14E-01	5.24E-01
Mu					3.67E-01	2.93E-01	4.42E-01
Omega						1.16E-01	3.98E-01
Sigma							4.57E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	18.00	18.00	18.00	18.00	18.00	18.00	18.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 6.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.158

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9400677	0.9848797	0.9936407	0.9999663	2.930E+01	4.498E-01	--
α_2	3.37E-05	1.51E-02	6.36E-03	5.99E-02	4.498E-01	2.930E+01	0.676

CCCG = 3, Gamma = 0.158

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9299429	0.9749162	0.9812886	0.9980830	4.580E+01	1.178E+00	--
α_2	8.69E-04	1.96E-02	1.34E-02	5.93E-02	9.387E-01	4.707E+01	0.870
α_3	5.83E-08	5.53E-03	8.96E-04	2.71E-02	2.396E-01	4.309E+01	0.964

CCCG = 4, Gamma = 0.158

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9240220	0.9680358	0.9731411	0.9945713	5.749E+01	1.898E+00	--
α_2	1.90E-03	2.10E-02	1.60E-02	5.71E-02	1.285E+00	5.990E+01	0.951
α_3	6.28E-06	6.78E-03	2.43E-03	2.83E-02	3.927E-01	5.750E+01	1.005
α_4	1.61E-08	4.18E-03	5.61E-04	2.10E-02	2.207E-01	5.259E+01	1.102

CCCG = 5, Gamma = 0.158

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9353983	0.9674521	0.9703062	0.9897466	1.042E+02	3.506E+00	--
α_2	3.21E-03	1.80E-02	1.51E-02	4.23E-02	1.992E+00	1.089E+02	1.038
α_3	6.49E-04	1.05E-02	7.51E-03	3.04E-02	1.078E+00	1.020E+02	1.117
α_4	1.83E-06	3.48E-03	1.13E-03	1.49E-02	3.632E-01	1.039E+02	1.104
α_5	5.97E-21	6.45E-04	3.74E-07	3.74E-03	7.248E-02	1.122E+02	1.025

CCCG = 6, Gamma = 0.158

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9400671	0.9683422	0.9706698	0.9886614	1.284E+02	4.199E+00	--
α_2	2.33E-03	1.35E-02	1.13E-02	3.22E-02	1.941E+00	1.416E+02	0.991
α_3	1.03E-03	1.08E-02	8.27E-03	2.90E-02	1.332E+00	1.224E+02	1.150
α_4	5.25E-05	4.88E-03	2.64E-03	1.73E-02	6.181E-01	1.260E+02	1.124
α_5	1.21E-08	1.76E-03	2.62E-04	8.72E-03	2.313E-01	1.311E+02	1.084
α_6	6.66E-20	7.29E-04	6.88E-07	4.24E-03	7.684E-02	1.054E+02	1.349

CCCG = 7, Gamma = 0.158

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9468173	0.9691126	0.9706536	0.9861440	1.952E+02	6.223E+00	--
α_2	2.95E-03	1.20E-02	1.06E-02	2.60E-02	2.654E+00	2.179E+02	1.001
α_3	1.20E-03	8.75E-03	7.08E-03	2.20E-02	1.645E+00	1.863E+02	1.175
α_4	3.90E-04	5.85E-03	4.23E-03	1.68E-02	1.115E+00	1.896E+02	1.158
α_5	3.08E-05	3.18E-03	1.69E-03	1.14E-02	6.034E-01	1.889E+02	1.166
α_6	1.66E-10	9.34E-04	6.96E-05	4.96E-03	1.780E-01	1.904E+02	1.159
α_7	7.61E-51	1.40E-04	2.87E-14	4.94E-04	2.734E-02	1.956E+02	1.129

CCCG = 8, Gamma = 0.158

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9488442	0.9702752	0.9717563	0.9866470	2.039E+02	6.246E+00	--
α_2	2.48E-03	1.08E-02	9.39E-03	2.37E-02	2.504E+00	2.303E+02	0.981
α_3	7.60E-04	7.08E-03	5.52E-03	1.87E-02	1.419E+00	1.989E+02	1.140
α_4	2.92E-04	5.30E-03	3.73E-03	1.57E-02	1.027E+00	1.926E+02	1.180
α_5	7.51E-05	3.64E-03	2.19E-03	1.22E-02	7.337E-01	2.008E+02	1.134
α_6	2.06E-06	2.06E-03	7.45E-04	8.58E-03	3.975E-01	1.924E+02	1.185
α_7	4.05E-20	4.05E-04	3.89E-07	2.35E-03	7.703E-02	1.903E+02	1.200
α_8	4.41E-18	4.75E-04	1.19E-06	2.77E-03	8.749E-02	1.841E+02	1.240

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.75E-01	9.68E-01	9.67E-01	9.68E-01	9.69E-01	9.70E-01
α_2	1.51E-02	1.96E-02	2.10E-02	1.80E-02	1.35E-02	1.20E-02	1.08E-02
α_3		5.53E-03	6.78E-03	1.05E-02	1.08E-02	8.75E-03	7.08E-03
α_4			4.18E-03	3.48E-03	4.88E-03	5.85E-03	5.30E-03
α_5				6.45E-04	1.76E-03	3.18E-03	3.64E-03
α_6					7.29E-04	9.34E-04	2.06E-03
α_7						1.40E-04	4.05E-04
α_8							4.75E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.75E-01	9.68E-01	9.67E-01	9.68E-01	9.69E-01	9.70E-01
Beta	1.51E-02	2.51E-02	3.20E-02	3.25E-02	3.17E-02	3.09E-02	2.97E-02
Gamma		2.20E-01	3.43E-01	4.48E-01	5.73E-01	6.10E-01	6.38E-01
Delta			3.81E-01	2.83E-01	4.06E-01	5.36E-01	6.27E-01
Epsilon				1.56E-01	3.38E-01	4.21E-01	5.54E-01
Mu					2.93E-01	2.52E-01	4.47E-01
Omega						1.30E-01	2.99E-01
Sigma							5.40E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.00	6.00	6.00	6.00	6.00	6.00	6.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 11.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.289

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9650161	0.9910539	0.9961038	0.9999744	5.213E+01	4.706E-01	--
α_2	2.56E-05	8.95E-03	3.90E-03	3.50E-02	4.706E-01	5.213E+01	0.676

CCCG = 3, Gamma = 0.289

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9613482	0.9865570	0.9902565	0.9991200	8.091E+01	1.103E+00	--
α_2	2.77E-04	9.61E-03	6.11E-03	3.09E-02	8.104E-01	8.355E+01	0.870
α_3	3.23E-07	3.84E-03	9.02E-04	1.77E-02	2.921E-01	7.585E+01	0.964

CCCG = 4, Gamma = 0.289

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9638493	0.9847720	0.9872121	0.9973485	1.263E+02	1.953E+00	--
α_2	9.28E-04	9.94E-03	7.60E-03	2.70E-02	1.312E+00	1.307E+02	0.951
α_3	5.80E-06	3.45E-03	1.36E-03	1.39E-02	4.307E-01	1.245E+02	1.005
α_4	3.67E-09	1.84E-03	2.18E-04	9.38E-03	2.099E-01	1.137E+02	1.102

CCCG = 5, Gamma = 0.289

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9691214	0.9850534	0.9865800	0.9957675	2.048E+02	3.107E+00	--
α_2	1.11E-03	7.86E-03	6.39E-03	1.96E-02	1.684E+00	2.125E+02	1.038
α_3	2.10E-04	4.74E-03	3.21E-03	1.45E-02	9.426E-01	1.981E+02	1.117
α_4	1.42E-06	1.89E-03	6.52E-04	8.00E-03	3.816E-01	2.010E+02	1.104
α_5	1.82E-16	4.55E-04	2.49E-06	2.65E-03	9.865E-02	2.168E+02	1.025

CCCG = 6, Gamma = 0.289

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9724269	0.9858767	0.9870557	0.9952980	2.668E+02	3.822E+00	--
α_2	8.46E-04	5.84E-03	4.76E-03	1.45E-02	1.714E+00	2.918E+02	0.991
α_3	2.88E-04	4.38E-03	3.16E-03	1.26E-02	1.108E+00	2.519E+02	1.150
α_4	3.32E-05	2.52E-03	1.40E-03	8.78E-03	6.509E-01	2.581E+02	1.124
α_5	1.87E-08	9.45E-04	1.70E-04	4.55E-03	2.536E-01	2.682E+02	1.084
α_6	7.20E-17	4.44E-04	2.02E-06	2.59E-03	9.572E-02	2.155E+02	1.349

CCCG = 7, Gamma = 0.289

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9755071	0.9864371	0.9872746	0.9945067	3.778E+02	5.195E+00	--
α_2	9.50E-04	5.00E-03	4.25E-03	1.17E-02	2.105E+00	4.185E+02	1.001
α_3	3.46E-04	3.68E-03	2.81E-03	1.00E-02	1.320E+00	3.570E+02	1.175
α_4	1.40E-04	2.74E-03	1.90E-03	8.21E-03	9.967E-01	3.626E+02	1.158
α_5	7.35E-06	1.45E-03	6.90E-04	5.48E-03	5.249E-01	3.608E+02	1.166
α_6	4.00E-10	5.38E-04	5.27E-05	2.79E-03	1.956E-01	3.632E+02	1.159
α_7	4.05E-28	1.42E-04	3.22E-09	7.70E-04	5.291E-02	3.729E+02	1.129

CCCG = 8, Gamma = 0.289

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9773126	0.9870883	0.9878004	0.9944324	4.458E+02	5.832E+00	--
α_2	9.01E-04	4.44E-03	3.80E-03	1.02E-02	2.229E+00	4.999E+02	0.981
α_3	2.50E-04	2.92E-03	2.19E-03	8.05E-03	1.260E+00	4.308E+02	1.140
α_4	1.42E-04	2.49E-03	1.76E-03	7.36E-03	1.042E+00	4.166E+02	1.180
α_5	4.12E-05	1.75E-03	1.07E-03	5.79E-03	7.626E-01	4.338E+02	1.134
α_6	1.80E-07	7.87E-04	2.20E-04	3.50E-03	3.271E-01	4.155E+02	1.185
α_7	3.17E-13	3.27E-04	8.77E-06	1.84E-03	1.344E-01	4.105E+02	1.200
α_8	1.74E-20	1.93E-04	1.81E-07	1.12E-03	7.682E-02	3.973E+02	1.240

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.87E-01	9.85E-01	9.85E-01	9.86E-01	9.86E-01	9.87E-01
α_2	8.95E-03	9.61E-03	9.94E-03	7.86E-03	5.84E-03	5.00E-03	4.44E-03
α_3		3.84E-03	3.45E-03	4.74E-03	4.38E-03	3.68E-03	2.92E-03
α_4			1.84E-03	1.89E-03	2.52E-03	2.74E-03	2.49E-03
α_5				4.55E-04	9.45E-04	1.45E-03	1.75E-03
α_6					4.44E-04	5.38E-04	7.87E-04
α_7						1.42E-04	3.27E-04
α_8							1.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.87E-01	9.85E-01	9.85E-01	9.86E-01	9.86E-01	9.87E-01
Beta	8.95E-03	1.34E-02	1.52E-02	1.49E-02	1.41E-02	1.36E-02	1.29E-02
Gamma		2.85E-01	3.47E-01	4.74E-01	5.87E-01	6.31E-01	6.56E-01
Delta			3.48E-01	3.32E-01	4.71E-01	5.70E-01	6.56E-01
Epsilon				1.94E-01	3.56E-01	4.38E-01	5.51E-01
Mu					3.20E-01	3.19E-01	4.27E-01
Omega						2.09E-01	3.98E-01
Sigma							3.71E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	11.00	11.00	11.00	11.00	11.00	11.00	11.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.079

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9885224	0.9970230	0.9986570	0.9999891	1.652E+02	4.932E-01	--
α_2	1.09E-05	2.98E-03	1.34E-03	1.15E-02	4.932E-01	1.652E+02	0.676

CCCG = 3, Gamma = 0.079

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9888643	0.9961991	0.9973000	0.9997750	2.777E+02	1.059E+00	--
α_2	4.62E-05	2.47E-03	1.46E-03	8.35E-03	7.137E-01	2.879E+02	0.870
α_3	4.77E-07	1.33E-03	4.02E-04	5.79E-03	3.458E-01	2.601E+02	0.964

CCCG = 4, Gamma = 0.079

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9901243	0.9957551	0.9963975	0.9991902	4.960E+02	2.115E+00	--
α_2	3.74E-04	3.02E-03	2.40E-03	7.77E-03	1.549E+00	5.114E+02	0.951
α_3	1.70E-08	5.45E-04	1.07E-04	2.59E-03	2.646E-01	4.850E+02	1.005
α_4	7.51E-08	6.80E-04	1.67E-04	3.11E-03	3.010E-01	4.424E+02	1.102

CCCG = 5, Gamma = 0.079

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9927643	0.9959812	0.9962279	0.9983558	1.320E+03	5.325E+00	--
α_2	8.55E-04	2.68E-03	2.44E-03	5.33E-03	3.632E+00	1.352E+03	1.038
α_3	1.06E-04	1.08E-03	8.26E-04	2.90E-03	1.354E+00	1.258E+03	1.117
α_4	2.21E-08	2.32E-04	5.55E-05	1.07E-03	2.961E-01	1.274E+03	1.104
α_5	9.20E-35	3.09E-05	3.41E-11	1.53E-04	4.243E-02	1.372E+03	1.025

CCCG = 6, Gamma = 0.079

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9924646	0.9958917	0.9961634	0.9983908	1.196E+03	4.936E+00	--
α_2	6.05E-04	2.27E-03	2.02E-03	4.81E-03	2.915E+00	1.279E+03	0.991
α_3	9.70E-05	1.14E-03	8.54E-04	3.14E-03	1.257E+00	1.104E+03	1.150
α_4	1.81E-06	4.45E-04	2.04E-04	1.71E-03	5.031E-01	1.130E+03	1.124
α_5	2.85E-15	9.85E-05	1.30E-06	5.65E-04	1.155E-01	1.173E+03	1.084
α_6	7.20E-13	1.54E-04	5.64E-06	8.53E-04	1.451E-01	9.418E+02	1.349

CCCG = 7, Gamma = 0.079

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9939488	0.9961701	0.9963005	0.9979463	2.511E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.726E+03	1.001
α_3	3.08E-04	1.20E-03	1.06E-03	2.58E-03	2.800E+00	2.324E+03	1.175
α_4	5.99E-05	5.86E-04	4.53E-04	1.57E-03	1.384E+00	2.359E+03	1.158
α_5	7.40E-07	2.09E-04	9.34E-05	8.08E-04	4.902E-01	2.345E+03	1.166
α_6	1.16E-15	4.86E-05	6.15E-07	2.79E-04	1.146E-01	2.359E+03	1.159
α_7	3.18E-93	6.05E-06	6.43E-25	7.18E-06	1.464E-02	2.422E+03	1.129

CCCG = 8, Gamma = 0.079

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9936986	0.9962542	0.9964261	0.9982229	1.901E+03	7.148E+00	--
α_2	3.83E-04	1.41E-03	1.26E-03	2.97E-03	2.980E+00	2.108E+03	0.981
α_3	1.87E-04	1.08E-03	9.03E-04	2.57E-03	1.960E+00	1.814E+03	1.140
α_4	4.86E-05	6.64E-04	4.87E-04	1.88E-03	1.166E+00	1.755E+03	1.180
α_5	1.67E-06	2.94E-04	1.42E-04	1.10E-03	5.375E-01	1.826E+03	1.134
α_6	2.28E-11	1.03E-04	8.01E-06	5.46E-04	1.805E-01	1.748E+03	1.185
α_7	1.24E-35	2.40E-05	1.79E-11	1.17E-04	4.139E-02	1.726E+03	1.200
α_8	1.03E-08	1.69E-04	3.73E-05	7.89E-04	2.827E-01	1.670E+03	1.240

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	2.98E-03	2.47E-03	3.02E-03	2.68E-03	2.27E-03	1.78E-03	1.41E-03
α_3		1.33E-03	5.45E-04	1.08E-03	1.14E-03	1.20E-03	1.08E-03
α_4			6.80E-04	2.32E-04	4.45E-04	5.86E-04	6.64E-04
α_5				3.09E-05	9.85E-05	2.09E-04	2.94E-04
α_6					1.54E-04	4.86E-05	1.03E-04
α_7						6.05E-06	2.40E-05
α_8							1.69E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	2.98E-03	3.80E-03	4.24E-03	4.02E-03	4.11E-03	3.83E-03	3.75E-03
Gamma		3.49E-01	2.89E-01	3.33E-01	4.47E-01	5.36E-01	6.23E-01
Delta			5.55E-01	1.97E-01	3.80E-01	4.14E-01	5.38E-01
Epsilon				1.17E-01	3.62E-01	3.10E-01	4.71E-01
Mu					6.10E-01	2.07E-01	5.02E-01
Omega						1.11E-01	6.52E-01
Sigma							8.76E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.11.2 CCW-MDP-FR: CCW Motor-Driven Pumps Fail to Run

Generic CCF Parameters

System Group: Clean Water
System: Component Cooling Water
Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 43.3

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9722517	0.9929205	0.9969402	0.9999783	1.0000000	6.571E+01	4.685E-01
α_2	1.97E-05	7.08E-03	3.06E-03	2.78E-02	0.00E+00	4.685E-01	6.571E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9685444	0.9889847	0.9919667	0.9992402	1.0000000	1.013E+02	1.128E+00
α_2	2.78E-04	8.31E-03	5.41E-03	2.63E-02	0.00E+00	8.512E-01	1.016E+02
α_3	1.35E-07	2.70E-03	5.77E-04	1.27E-02	0.00E+00	2.768E-01	1.021E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9665729	0.9860630	0.9883651	0.9976721	1.0000000	1.340E+02	1.894E+00
α_2	8.00E-04	9.27E-03	7.00E-03	2.55E-02	0.00E+00	1.260E+00	1.346E+02
α_3	3.21E-06	2.96E-03	1.09E-03	1.23E-02	0.00E+00	4.024E-01	1.355E+02
α_4	1.18E-08	1.70E-03	2.54E-04	8.44E-03	0.00E+00	2.315E-01	1.356E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9709619	0.9855531	0.9868956	0.9955652	1.0000000	2.341E+02	3.432E+00
α_2	1.38E-03	8.10E-03	6.77E-03	1.94E-02	0.00E+00	1.924E+00	2.356E+02
α_3	2.56E-04	4.42E-03	3.13E-03	1.30E-02	0.00E+00	1.049E+00	2.365E+02
α_4	1.22E-06	1.61E-03	5.54E-04	6.79E-03	0.00E+00	3.822E-01	2.372E+02
α_5	2.80E-20	3.23E-04	3.01E-07	1.88E-03	0.00E+00	7.674E-02	2.375E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9725361	0.9859194	0.9870939	0.9953029	1.0000000	2.685E+02	3.835E+00
α_2	8.95E-04	6.25E-03	5.09E-03	1.56E-02	0.00E+00	1.701E+00	2.707E+02
α_3	3.49E-04	4.43E-03	3.29E-03	1.24E-02	0.00E+00	1.207E+00	2.711E+02

α_4	2.01E-05	2.19E-03	1.15E-03	7.88E-03	0.00E+00	5.960E-01	2.718E+02
α_5	3.18E-09	8.12E-04	1.09E-04	4.07E-03	0.00E+00	2.211E-01	2.721E+02
α_6	3.17E-15	4.03E-04	4.08E-06	2.32E-03	0.00E+00	1.098E-01	2.722E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9759295	0.9863434	0.9871046	0.9941518	1.0000000	4.151E+02	5.747E+00
α_2	1.09E-03	5.33E-03	4.57E-03	1.22E-02	0.00E+00	2.243E+00	4.186E+02
α_3	5.19E-04	3.87E-03	3.12E-03	9.79E-03	0.00E+00	1.630E+00	4.192E+02
α_4	1.60E-04	2.57E-03	1.84E-03	7.49E-03	0.00E+00	1.083E+00	4.198E+02
α_5	9.71E-06	1.34E-03	6.77E-04	4.94E-03	0.00E+00	5.654E-01	4.203E+02
α_6	2.50E-10	4.55E-04	4.21E-05	2.37E-03	0.00E+00	1.916E-01	4.207E+02
α_7	5.66E-41	8.27E-05	3.08E-12	3.63E-04	0.00E+00	3.480E-02	4.208E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9769841	0.9869591	0.9876943	0.9944282	1.0000000	4.333E+02	5.726E+00
α_2	8.28E-04	4.60E-03	3.87E-03	1.08E-02	0.00E+00	2.018E+00	4.370E+02
α_3	3.27E-04	3.17E-03	2.45E-03	8.45E-03	0.00E+00	1.391E+00	4.377E+02
α_4	1.44E-04	2.42E-03	1.72E-03	7.09E-03	0.00E+00	1.062E+00	4.380E+02
α_5	2.82E-05	1.60E-03	9.35E-04	5.44E-03	0.00E+00	7.026E-01	4.383E+02
α_6	3.13E-07	7.97E-04	2.44E-04	3.46E-03	0.00E+00	3.497E-01	4.387E+02
α_7	1.20E-15	2.46E-04	2.25E-06	1.42E-03	0.00E+00	1.078E-01	4.389E+02
α_8	2.51E-17	2.16E-04	9.14E-07	1.26E-03	0.00E+00	9.469E-02	4.390E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.89E-01	9.86E-01	9.86E-01	9.86E-01	9.86E-01	9.87E-01
α_2	7.08E-03	8.31E-03	9.27E-03	8.10E-03	6.25E-03	5.33E-03	4.60E-03
α_3		2.70E-03	2.96E-03	4.42E-03	4.43E-03	3.87E-03	3.17E-03
α_4			1.70E-03	1.61E-03	2.19E-03	2.57E-03	2.42E-03
α_5				3.23E-04	8.12E-04	1.34E-03	1.60E-03
α_6					4.03E-04	4.55E-04	7.97E-04
α_7						8.27E-05	2.46E-04
α_8							2.16E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.89E-01	9.86E-01	9.86E-01	9.86E-01	9.86E-01	9.87E-01
Beta	7.08E-03	1.10E-02	1.39E-02	1.44E-02	1.41E-02	1.37E-02	1.30E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	43.30	43.30	43.30	43.30	43.30	43.30	43.30
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 16.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.372

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9828202	0.9955730	0.9980352	0.9999854	1.087E+02	4.834E-01	--
α_2	1.46E-05	4.43E-03	1.96E-03	1.72E-02	4.834E-01	1.087E+02	0.553

CCCG = 3, Gamma = 0.372

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9828613	0.9938388	0.9953950	0.9994980	1.977E+02	1.226E+00	--
α_2	2.39E-04	4.92E-03	3.39E-03	1.48E-02	9.769E-01	1.976E+02	0.741
α_3	1.98E-08	1.24E-03	2.15E-04	6.01E-03	2.487E-01	2.002E+02	0.733

CCCG = 4, Gamma = 0.372

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9799755	0.9914508	0.9927694	0.9984182	2.386E+02	2.057E+00	--
α_2	6.55E-04	5.94E-03	4.65E-03	1.56E-02	1.442E+00	2.414E+02	0.824
α_3	2.15E-06	1.71E-03	6.43E-04	7.05E-03	4.114E-01	2.397E+02	0.833
α_4	1.18E-09	8.97E-04	9.78E-05	4.60E-03	2.036E-01	2.268E+02	0.881

CCCG = 5, Gamma = 0.372

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9815305	0.9906492	0.9914662	0.9969770	3.902E+02	3.683E+00	--
α_2	1.16E-03	5.67E-03	4.86E-03	1.30E-02	2.243E+00	3.932E+02	0.937
α_3	1.28E-04	2.55E-03	1.76E-03	7.64E-03	9.912E-01	3.884E+02	0.951
α_4	6.49E-07	9.52E-04	3.22E-04	4.04E-03	3.765E-01	3.949E+02	0.937
α_5	1.56E-21	1.80E-04	1.03E-07	1.04E-03	7.237E-02	4.010E+02	0.923

CCCG = 6, Gamma = 0.372

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9819422	0.9905697	0.9913042	0.9966883	4.348E+02	4.139E+00	--
α_2	9.11E-04	4.74E-03	4.03E-03	1.10E-02	2.128E+00	4.470E+02	0.936
α_3	1.82E-04	2.64E-03	1.92E-03	7.56E-03	1.134E+00	4.284E+02	0.979
α_4	8.22E-06	1.26E-03	6.24E-04	4.66E-03	5.533E-01	4.394E+02	0.956
α_5	1.93E-09	4.95E-04	6.61E-05	2.48E-03	2.210E-01	4.459E+02	0.943
α_6	3.81E-16	2.99E-04	2.08E-06	1.74E-03	1.027E-01	3.431E+02	1.225

CCCG = 7, Gamma = 0.372

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9843443	0.9908968	0.9913559	0.9958820	7.001E+02	6.432E+00	--
α_2	1.02E-03	3.92E-03	3.48E-03	8.35E-03	2.840E+00	7.211E+02	0.972
α_3	3.77E-04	2.54E-03	2.08E-03	6.29E-03	1.746E+00	6.856E+02	1.024
α_4	9.67E-05	1.55E-03	1.11E-03	4.52E-03	1.084E+00	6.974E+02	1.007
α_5	4.38E-06	7.70E-04	3.73E-04	2.88E-03	5.376E-01	6.974E+02	1.008
α_6	2.46E-10	2.80E-04	2.82E-05	1.45E-03	1.979E-01	7.074E+02	0.994
α_7	8.53E-53	3.81E-05	3.82E-15	1.30E-04	2.656E-02	6.970E+02	1.009

CCCG = 8, Gamma = 0.372

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9849037	0.9913251	0.9917856	0.9961742	6.985E+02	6.112E+00	--
α_2	7.01E-04	3.24E-03	2.80E-03	7.28E-03	2.364E+00	7.276E+02	0.964
α_3	2.60E-04	2.19E-03	1.73E-03	5.68E-03	1.512E+00	6.897E+02	1.018
α_4	8.95E-05	1.53E-03	1.08E-03	4.48E-03	1.056E+00	6.908E+02	1.017
α_5	1.45E-05	9.57E-04	5.45E-04	3.30E-03	6.745E-01	7.044E+02	0.997
α_6	6.02E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.863E+02	1.024
α_7	1.08E-15	1.54E-04	1.52E-06	8.87E-04	1.093E-01	7.106E+02	0.990
α_8	2.53E-18	1.64E-04	4.55E-07	9.56E-04	8.885E-02	5.416E+02	1.298

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.94E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01
α_2	4.43E-03	4.92E-03	5.94E-03	5.67E-03	4.74E-03	3.92E-03	3.24E-03
α_3		1.24E-03	1.71E-03	2.55E-03	2.64E-03	2.54E-03	2.19E-03
α_4			8.97E-04	9.52E-04	1.26E-03	1.55E-03	1.53E-03
α_5				1.80E-04	4.95E-04	7.70E-04	9.57E-04
α_6					2.99E-04	2.80E-04	4.48E-04
α_7						3.81E-05	1.54E-04
α_8							1.64E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.94E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01
Beta	4.43E-03	6.16E-03	8.55E-03	9.35E-03	9.43E-03	9.10E-03	8.67E-03
Gamma		2.01E-01	3.05E-01	3.93E-01	4.98E-01	5.69E-01	6.27E-01
Delta			3.44E-01	3.08E-01	4.37E-01	5.10E-01	5.98E-01
Epsilon				1.59E-01	3.87E-01	4.12E-01	5.30E-01
Mu					3.77E-01	2.92E-01	4.45E-01
Omega						1.20E-01	4.15E-01
Sigma							5.16E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	16.10	16.10	16.10	16.10	16.10	16.10	16.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 5.2

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9488597	0.9871101	0.9945961	0.9999714	3.445E+01	4.498E-01	--
α_2	2.86E-05	1.29E-02	5.40E-03	5.11E-02	4.498E-01	3.445E+01	0.553

CCCG = 3, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9404832	0.9787319	0.9841689	0.9983802	5.422E+01	1.178E+00	--
α_2	7.53E-04	1.70E-02	1.16E-02	5.16E-02	9.387E-01	5.435E+01	0.741
α_3	4.51E-08	4.29E-03	6.93E-04	2.10E-02	2.396E-01	5.559E+01	0.733

CCCG = 4, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9344057	0.9724605	0.9768950	0.9953372	6.704E+01	1.898E+00	--
α_2	1.67E-03	1.84E-02	1.41E-02	5.02E-02	1.285E+00	6.837E+01	0.824
α_3	5.27E-06	5.70E-03	2.04E-03	2.38E-02	3.927E-01	6.849E+01	0.833
α_4	1.31E-08	3.39E-03	4.54E-04	1.70E-02	2.207E-01	6.490E+01	0.881

CCCG = 5, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9426467	0.9711437	0.9736926	0.9909262	1.180E+02	3.506E+00	--
α_2	2.92E-03	1.63E-02	1.38E-02	3.85E-02	1.992E+00	1.200E+02	0.937
α_3	5.56E-04	8.97E-03	6.43E-03	2.61E-02	1.078E+00	1.191E+02	0.951
α_4	1.57E-06	2.98E-03	9.64E-04	1.28E-02	3.632E-01	1.216E+02	0.937
α_5	5.41E-21	5.86E-04	3.39E-07	3.39E-03	7.248E-02	1.237E+02	0.923

CCCG = 6, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9460949	0.9715580	0.9736626	0.9898279	1.434E+02	4.199E+00	--
α_2	2.22E-03	1.28E-02	1.08E-02	3.06E-02	1.941E+00	1.492E+02	0.936
α_3	8.84E-04	9.22E-03	7.07E-03	2.49E-02	1.332E+00	1.432E+02	0.979
α_4	4.48E-05	4.18E-03	2.25E-03	1.48E-02	6.181E-01	1.474E+02	0.956
α_5	1.06E-08	1.54E-03	2.29E-04	7.63E-03	2.313E-01	1.499E+02	0.943
α_6	6.08E-20	6.65E-04	6.28E-07	3.87E-03	7.684E-02	1.154E+02	1.225

CCCG = 7, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9514665	0.9718354	0.9732484	0.9873780	2.147E+02	6.223E+00	--
α_2	2.87E-03	1.17E-02	1.03E-02	2.54E-02	2.654E+00	2.238E+02	0.972
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.134E+02	1.024
α_4	3.40E-04	5.10E-03	3.69E-03	1.47E-02	1.115E+00	2.174E+02	1.007
α_5	2.67E-05	2.76E-03	1.46E-03	9.91E-03	6.034E-01	2.177E+02	1.008
α_6	1.43E-10	8.04E-04	5.99E-05	4.27E-03	1.780E-01	2.212E+02	0.994
α_7	6.83E-51	1.25E-04	2.58E-14	4.43E-04	2.734E-02	2.180E+02	1.009

CCCG = 8, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9528737	0.9726356	0.9740056	0.9877179	2.220E+02	6.246E+00	--
α_2	2.45E-03	1.06E-02	9.25E-03	2.34E-02	2.504E+00	2.338E+02	0.964
α_3	6.80E-04	6.34E-03	4.95E-03	1.68E-02	1.419E+00	2.223E+02	1.018
α_4	2.52E-04	4.59E-03	3.22E-03	1.36E-02	1.027E+00	2.229E+02	1.017
α_5	6.63E-05	3.21E-03	1.93E-03	1.07E-02	7.337E-01	2.275E+02	0.997
α_6	1.78E-06	1.79E-03	6.46E-04	7.44E-03	3.975E-01	2.218E+02	1.024
α_7	3.35E-20	3.35E-04	3.21E-07	1.95E-03	7.703E-02	2.300E+02	0.990
α_8	4.64E-18	4.99E-04	1.25E-06	2.91E-03	8.749E-02	1.752E+02	1.298

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.79E-01	9.72E-01	9.71E-01	9.72E-01	9.72E-01	9.73E-01
α_2	1.29E-02	1.70E-02	1.84E-02	1.63E-02	1.28E-02	1.17E-02	1.06E-02
α_3		4.29E-03	5.70E-03	8.97E-03	9.22E-03	7.65E-03	6.34E-03
α_4			3.39E-03	2.98E-03	4.18E-03	5.10E-03	4.59E-03
α_5				5.86E-04	1.54E-03	2.76E-03	3.21E-03
α_6					6.65E-04	8.04E-04	1.79E-03
α_7						1.25E-04	3.35E-04
α_8							4.99E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.79E-01	9.72E-01	9.71E-01	9.72E-01	9.72E-01	9.73E-01
Beta	1.29E-02	2.13E-02	2.75E-02	2.89E-02	2.84E-02	2.82E-02	2.74E-02
Gamma		2.02E-01	3.30E-01	4.34E-01	5.48E-01	5.84E-01	6.13E-01
Delta			3.73E-01	2.84E-01	4.09E-01	5.35E-01	6.22E-01
Epsilon				1.64E-01	3.46E-01	4.20E-01	5.60E-01
Mu					3.02E-01	2.52E-01	4.49E-01
Omega						1.35E-01	3.18E-01
Sigma							5.98E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.20	5.20	5.20	5.20	5.20	5.20	5.20
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.046

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8814102	0.9716691	0.9898611	0.9999783	1.304E+01	3.801E-01	--
α_2	2.17E-05	2.83E-02	1.01E-02	1.19E-01	3.801E-01	1.304E+01	0.553

CCCG = 3, Gamma = 0.046

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8648405	0.9544443	0.9679525	0.9977940	2.011E+01	9.600E-01	--
α_2	4.80E-04	3.18E-02	1.85E-02	1.08E-01	6.673E-01	2.034E+01	0.741
α_3	1.21E-06	1.38E-02	3.32E-03	6.35E-02	2.927E-01	2.092E+01	0.733

CCCG = 4, Gamma = 0.046

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8620005	0.9436148	0.9533519	0.9918434	2.793E+01	1.669E+00	--
α_2	2.02E-03	3.47E-02	2.49E-02	1.01E-01	1.039E+00	2.894E+01	0.824
α_3	1.14E-05	1.31E-02	4.70E-03	5.48E-02	3.887E-01	2.926E+01	0.833
α_4	9.99E-08	8.61E-03	1.43E-03	4.22E-02	2.414E-01	2.779E+01	0.881

CCCG = 5, Gamma = 0.046

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8923534	0.9453901	0.9499932	0.9826759	6.036E+01	3.487E+00	--
α_2	4.37E-03	2.79E-02	2.32E-02	6.77E-02	1.791E+00	6.239E+01	0.937
α_3	1.53E-03	1.91E-02	1.43E-02	5.31E-02	1.207E+00	6.200E+01	0.951
α_4	1.20E-05	6.76E-03	2.71E-03	2.72E-02	4.340E-01	6.373E+01	0.937
α_5	1.88E-26	8.44E-04	3.01E-08	4.65E-03	5.493E-02	6.505E+01	0.923

CCCG = 6, Gamma = 0.046

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9034341	0.9496069	0.9534388	0.9826732	7.358E+01	3.905E+00	--
α_2	1.63E-03	1.68E-02	1.29E-02	4.50E-02	1.335E+00	7.831E+01	0.936
α_3	2.48E-03	2.01E-02	1.61E-02	5.15E-02	1.531E+00	7.464E+01	0.979
α_4	1.78E-04	9.22E-03	5.50E-03	3.09E-02	7.191E-01	7.729E+01	0.956
α_5	4.57E-08	3.12E-03	5.34E-04	1.52E-02	2.467E-01	7.887E+01	0.943
α_6	1.32E-20	1.20E-03	7.22E-07	6.95E-03	7.279E-02	6.079E+01	1.225

CCCG = 7, Gamma = 0.046

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9180808	0.9530098	0.9554537	0.9795875	1.170E+02	5.770E+00	--
α_2	1.52E-03	1.22E-02	9.77E-03	3.13E-02	1.549E+00	1.252E+02	0.972
α_3	2.95E-03	1.65E-02	1.39E-02	3.90E-02	1.989E+00	1.183E+02	1.024
α_4	9.48E-04	1.05E-02	8.00E-03	2.87E-02	1.287E+00	1.210E+02	1.007
α_5	9.45E-05	5.66E-03	3.29E-03	1.93E-02	6.913E-01	1.215E+02	1.008
α_6	1.39E-08	1.88E-03	2.83E-04	9.29E-03	2.327E-01	1.236E+02	0.994
α_7	1.18E-64	1.73E-04	2.62E-17	4.36E-04	2.112E-02	1.220E+02	1.009

CCCG = 8, Gamma = 0.046

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9283426	0.9571125	0.9589651	0.9795537	1.566E+02	7.016E+00	--
α_2	1.20E-03	9.30E-03	7.46E-03	2.37E-02	1.583E+00	1.686E+02	0.964
α_3	2.19E-03	1.23E-02	1.04E-02	2.91E-02	1.986E+00	1.592E+02	1.018
α_4	1.45E-03	1.04E-02	8.42E-03	2.59E-02	1.672E+00	1.597E+02	1.017
α_5	3.26E-04	6.15E-03	4.30E-03	1.83E-02	1.011E+00	1.634E+02	0.997
α_6	2.70E-05	3.57E-03	1.82E-03	1.30E-02	5.709E-01	1.595E+02	1.024
α_7	2.51E-10	1.09E-03	8.55E-05	5.77E-03	1.809E-01	1.656E+02	0.990
α_8	1.42E-107	9.86E-05	2.98E-27	7.39E-05	1.245E-02	1.263E+02	1.298

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.72E-01	9.54E-01	9.44E-01	9.45E-01	9.50E-01	9.53E-01	9.57E-01
α_2	2.83E-02	3.18E-02	3.47E-02	2.79E-02	1.68E-02	1.22E-02	9.30E-03
α_3		1.38E-02	1.31E-02	1.91E-02	2.01E-02	1.65E-02	1.23E-02
α_4			8.61E-03	6.76E-03	9.22E-03	1.05E-02	1.04E-02
α_5				8.44E-04	3.12E-03	5.66E-03	6.15E-03
α_6					1.20E-03	1.88E-03	3.57E-03
α_7						1.73E-04	1.09E-03
α_8							9.86E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.72E-01	9.54E-01	9.44E-01	9.45E-01	9.50E-01	9.53E-01	9.57E-01
Beta	2.83E-02	4.56E-02	5.64E-02	5.46E-02	5.04E-02	4.70E-02	4.29E-02
Gamma		3.03E-01	3.85E-01	4.89E-01	6.67E-01	7.40E-01	7.83E-01
Delta			3.96E-01	2.85E-01	4.02E-01	5.25E-01	6.33E-01
Epsilon				1.11E-01	3.19E-01	4.23E-01	5.13E-01
Mu					2.77E-01	2.66E-01	4.36E-01
Omega						8.44E-02	2.50E-01
Sigma							8.28E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 15.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.358

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9745536	0.9934996	0.9971783	0.9999814	7.192E+01	4.706E-01	--
α_2	1.86E-05	6.50E-03	2.82E-03	2.54E-02	4.706E-01	7.192E+01	0.553

CCCG = 3, Gamma = 0.358

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9698818	0.9895408	0.9924327	0.9993172	1.043E+02	1.103E+00	--
α_2	2.22E-04	7.71E-03	4.89E-03	2.48E-02	8.104E-01	1.043E+02	0.741
α_3	2.31E-07	2.75E-03	6.45E-04	1.27E-02	2.921E-01	1.059E+02	0.733

CCCG = 4, Gamma = 0.358

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9703042	0.9875063	0.9895180	0.9978286	1.543E+02	1.953E+00	--
α_2	7.75E-04	8.31E-03	6.35E-03	2.26E-02	1.312E+00	1.565E+02	0.824
α_3	4.64E-06	2.76E-03	1.09E-03	1.12E-02	4.307E-01	1.557E+02	0.833
α_4	2.83E-09	1.42E-03	1.68E-04	7.24E-03	2.099E-01	1.474E+02	0.881

CCCG = 5, Gamma = 0.358

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9733581	0.9871143	0.9884355	0.9963550	2.380E+02	3.107E+00	--
α_2	9.82E-04	6.95E-03	5.65E-03	1.74E-02	1.684E+00	2.404E+02	0.937
α_3	1.75E-04	3.95E-03	2.68E-03	1.21E-02	9.426E-01	2.375E+02	0.951
α_4	1.18E-06	1.58E-03	5.42E-04	6.65E-03	3.816E-01	2.417E+02	0.937
α_5	1.60E-16	4.02E-04	2.20E-06	2.34E-03	9.865E-02	2.455E+02	0.923

CCCG = 6, Gamma = 0.358

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9757439	0.9875832	0.9886232	0.9958695	3.040E+02	3.822E+00	--
α_2	7.87E-04	5.43E-03	4.43E-03	1.35E-02	1.714E+00	3.138E+02	0.936
α_3	2.41E-04	3.67E-03	2.65E-03	1.06E-02	1.108E+00	3.006E+02	0.979
α_4	2.78E-05	2.11E-03	1.17E-03	7.35E-03	6.509E-01	3.084E+02	0.956
α_5	1.60E-08	8.09E-04	1.46E-04	3.90E-03	2.536E-01	3.132E+02	0.943
α_6	6.44E-17	3.97E-04	1.80E-06	2.31E-03	9.572E-02	2.410E+02	1.225

CCCG = 7, Gamma = 0.358

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9780228	0.9878355	0.9885887	0.9950758	4.219E+02	5.195E+00	--
α_2	9.12E-04	4.81E-03	4.08E-03	1.12E-02	2.105E+00	4.359E+02	0.972
α_3	2.98E-04	3.17E-03	2.42E-03	8.62E-03	1.320E+00	4.145E+02	1.024
α_4	1.20E-04	2.36E-03	1.64E-03	7.07E-03	9.967E-01	4.216E+02	1.007
α_5	6.29E-06	1.24E-03	5.91E-04	4.69E-03	5.249E-01	4.217E+02	1.008
α_6	3.40E-10	4.57E-04	4.47E-05	2.37E-03	1.956E-01	4.279E+02	0.994
α_7	3.58E-28	1.25E-04	2.84E-09	6.81E-04	5.291E-02	4.217E+02	1.009

CCCG = 8, Gamma = 0.358

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794345	0.9883002	0.9889469	0.9949572	4.926E+02	5.832E+00	--
α_2	8.76E-04	4.32E-03	3.70E-03	9.89E-03	2.229E+00	5.138E+02	0.964
α_3	2.21E-04	2.58E-03	1.94E-03	7.12E-03	1.260E+00	4.874E+02	1.018
α_4	1.21E-04	2.13E-03	1.50E-03	6.28E-03	1.042E+00	4.881E+02	1.017
α_5	3.59E-05	1.53E-03	9.36E-04	5.04E-03	7.626E-01	4.977E+02	0.997
α_6	1.54E-07	6.74E-04	1.88E-04	3.00E-03	3.271E-01	4.851E+02	1.024
α_7	2.59E-13	2.67E-04	7.17E-06	1.50E-03	1.344E-01	5.023E+02	0.990
α_8	1.81E-20	2.01E-04	1.88E-07	1.16E-03	7.682E-02	3.829E+02	1.298

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.90E-01	9.88E-01	9.87E-01	9.88E-01	9.88E-01	9.88E-01
α_2	6.50E-03	7.71E-03	8.31E-03	6.95E-03	5.43E-03	4.81E-03	4.32E-03
α_3		2.75E-03	2.76E-03	3.95E-03	3.67E-03	3.17E-03	2.58E-03
α_4			1.42E-03	1.58E-03	2.11E-03	2.36E-03	2.13E-03
α_5				4.02E-04	8.09E-04	1.24E-03	1.53E-03
α_6					3.97E-04	4.57E-04	6.74E-04
α_7						1.25E-04	2.67E-04
α_8							2.01E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.90E-01	9.88E-01	9.87E-01	9.88E-01	9.88E-01	9.88E-01
Beta	6.50E-03	1.05E-02	1.25E-02	1.29E-02	1.24E-02	1.22E-02	1.17E-02
Gamma		2.63E-01	3.35E-01	4.60E-01	5.62E-01	6.05E-01	6.31E-01
Delta			3.40E-01	3.34E-01	4.74E-01	5.69E-01	6.51E-01
Epsilon				2.03E-01	3.64E-01	4.36E-01	5.56E-01
Mu					3.29E-01	3.19E-01	4.27E-01
Omega						2.15E-01	4.10E-01
Sigma							4.29E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	15.50	15.50	15.50	15.50	15.50	15.50	15.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 4.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.104

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9907267	0.9975953	0.9989160	0.9999912	2.046E+02	4.932E-01	--
α_2	8.82E-06	2.40E-03	1.08E-03	9.27E-03	4.932E-01	2.046E+02	0.553

CCCG = 3, Gamma = 0.104

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9909200	0.9969019	0.9978002	0.9998167	3.409E+02	1.059E+00	--
α_2	3.91E-05	2.09E-03	1.23E-03	7.07E-03	7.137E-01	3.402E+02	0.741
α_3	3.61E-07	1.00E-03	3.04E-04	4.38E-03	3.458E-01	3.439E+02	0.733

CCCG = 4, Gamma = 0.104

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9916201	0.9963990	0.9969446	0.9993134	5.851E+02	2.115E+00	--
α_2	3.23E-04	2.61E-03	2.08E-03	6.71E-03	1.549E+00	5.923E+02	0.824
α_3	1.41E-08	4.51E-04	8.81E-05	2.14E-03	2.646E-01	5.870E+02	0.833
α_4	5.99E-08	5.42E-04	1.33E-04	2.48E-03	3.010E-01	5.550E+02	0.881

CCCG = 5, Gamma = 0.104

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9935962	0.9964438	0.9966623	0.9985453	1.492E+03	5.325E+00	--
α_2	7.71E-04	2.42E-03	2.20E-03	4.80E-03	3.632E+00	1.499E+03	0.937
α_3	8.99E-05	9.15E-04	7.02E-04	2.47E-03	1.354E+00	1.479E+03	0.951
α_4	1.87E-08	1.97E-04	4.70E-05	9.05E-04	2.961E-01	1.502E+03	0.937
α_5	8.28E-35	2.78E-05	3.06E-11	1.38E-04	4.243E-02	1.525E+03	0.923

CCCG = 6, Gamma = 0.104

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931843	0.9962846	0.9965305	0.9985450	1.324E+03	4.936E+00	--
α_2	5.71E-04	2.15E-03	1.91E-03	4.54E-03	2.915E+00	1.356E+03	0.936
α_3	8.25E-05	9.67E-04	7.27E-04	2.67E-03	1.257E+00	1.298E+03	0.979
α_4	1.54E-06	3.78E-04	1.73E-04	1.45E-03	5.031E-01	1.331E+03	0.956
α_5	2.48E-15	8.56E-05	1.13E-06	4.91E-04	1.155E-01	1.350E+03	0.943
α_6	6.54E-13	1.40E-04	5.12E-06	7.74E-04	1.451E-01	1.038E+03	1.225

CCCG = 7, Gamma = 0.104

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944570	0.9964920	0.9966115	0.9981190	2.742E+03	9.654E+00	--
α_2	6.67E-04	1.72E-03	1.61E-03	3.18E-03	4.851E+00	2.810E+03	0.972
α_3	2.68E-04	1.05E-03	9.26E-04	2.24E-03	2.800E+00	2.670E+03	1.024
α_4	5.21E-05	5.10E-04	3.94E-04	1.36E-03	1.384E+00	2.715E+03	1.007
α_5	6.39E-07	1.81E-04	8.07E-05	6.99E-04	4.902E-01	2.714E+03	1.008
α_6	9.91E-16	4.17E-05	5.28E-07	2.39E-04	1.146E-01	2.751E+03	0.994
α_7	2.84E-93	5.40E-06	5.75E-25	6.42E-06	1.464E-02	2.711E+03	1.009

CCCG = 8, Gamma = 0.104

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941720	0.9965358	0.9966949	0.9983567	2.056E+03	7.148E+00	--
α_2	3.76E-04	1.39E-03	1.23E-03	2.91E-03	2.980E+00	2.148E+03	0.964
α_3	1.67E-04	9.62E-04	8.05E-04	2.30E-03	1.960E+00	2.035E+03	1.018
α_4	4.18E-05	5.72E-04	4.19E-04	1.62E-03	1.166E+00	2.038E+03	1.017
α_5	1.47E-06	2.59E-04	1.25E-04	9.68E-04	5.375E-01	2.077E+03	0.997
α_6	1.97E-11	8.92E-05	6.92E-06	4.72E-04	1.805E-01	2.023E+03	1.024
α_7	1.02E-35	1.98E-05	1.48E-11	9.66E-05	4.139E-02	2.094E+03	0.990
α_8	1.08E-08	1.77E-04	3.91E-05	8.26E-04	2.827E-01	1.596E+03	1.298

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	2.40E-03	2.09E-03	2.61E-03	2.42E-03	2.15E-03	1.72E-03	1.39E-03
α_3		1.00E-03	4.51E-04	9.15E-04	9.67E-04	1.05E-03	9.62E-04
α_4			5.42E-04	1.97E-04	3.78E-04	5.10E-04	5.72E-04
α_5				2.78E-05	8.56E-05	1.81E-04	2.59E-04
α_6					1.40E-04	4.17E-05	8.92E-05
α_7						5.40E-06	1.98E-05
α_8							1.77E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	2.40E-03	3.10E-03	3.60E-03	3.56E-03	3.72E-03	3.51E-03	3.46E-03
Gamma		3.24E-01	2.76E-01	3.20E-01	4.23E-01	5.09E-01	6.00E-01
Delta			5.46E-01	1.97E-01	3.84E-01	4.13E-01	5.37E-01
Epsilon				1.24E-01	3.73E-01	3.09E-01	4.88E-01
Mu					6.20E-01	2.07E-01	5.25E-01
Omega						1.15E-01	6.88E-01
Sigma							9.00E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.50	4.50	4.50	4.50	4.50	4.50	4.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.12 Positive Displacement Pumps

2.1.12.1 ALL-PDP-FS: Positive Displacement Pumps Fail to Start

Generic CCF Parameters

Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Positive Displacement
Failure Mode: Fail to Start
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 77.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9815965	0.9953091	0.9979801	0.9999856	1.0000000	9.941E+01	4.685E-01
α_2	1.30E-05	4.69E-03	2.02E-03	1.84E-02	0.00E+00	4.685E-01	9.941E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9762961	0.9917121	0.9939622	0.9994291	1.0000000	1.350E+02	1.128E+00
α_2	2.08E-04	6.25E-03	4.06E-03	1.98E-02	0.00E+00	8.512E-01	1.353E+02
α_3	1.01E-07	2.03E-03	4.34E-04	9.54E-03	0.00E+00	2.768E-01	1.358E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9731834	0.9888328	0.9906856	0.9981343	1.0000000	1.677E+02	1.894E+00
α_2	6.40E-04	7.43E-03	5.60E-03	2.05E-02	0.00E+00	1.260E+00	1.683E+02
α_3	2.57E-06	2.37E-03	8.70E-04	9.83E-03	0.00E+00	4.024E-01	1.692E+02
α_4	9.46E-09	1.37E-03	2.03E-04	6.76E-03	0.00E+00	2.315E-01	1.693E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9745521	0.9873478	0.9885268	0.9961159	1.0000000	2.678E+02	3.432E+00
α_2	1.21E-03	7.09E-03	5.92E-03	1.70E-02	0.00E+00	1.924E+00	2.693E+02
α_3	2.24E-04	3.87E-03	2.74E-03	1.14E-02	0.00E+00	1.049E+00	2.702E+02
α_4	1.07E-06	1.41E-03	4.85E-04	5.94E-03	0.00E+00	3.822E-01	2.709E+02
α_5	2.46E-20	2.83E-04	2.63E-07	1.64E-03	0.00E+00	7.674E-02	2.712E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9755430	0.9874698	0.9885174	0.9958236	1.0000000	3.022E+02	3.835E+00
α_2	7.96E-04	5.56E-03	4.52E-03	1.39E-02	0.00E+00	1.701E+00	3.044E+02
α_3	3.11E-04	3.94E-03	2.93E-03	1.10E-02	0.00E+00	1.207E+00	3.048E+02

α_4	1.78E-05	1.95E-03	1.02E-03	7.02E-03	0.00E+00	5.960E-01	3.055E+02
α_5	2.83E-09	7.22E-04	9.66E-05	3.62E-03	0.00E+00	2.211E-01	3.058E+02
α_6	2.82E-15	3.59E-04	3.63E-06	2.07E-03	0.00E+00	1.098E-01	3.059E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9777019	0.9873559	0.9880663	0.9945876	1.0000000	4.488E+02	5.747E+00
α_2	1.01E-03	4.94E-03	4.23E-03	1.13E-02	0.00E+00	2.243E+00	4.523E+02
α_3	4.81E-04	3.58E-03	2.89E-03	9.07E-03	0.00E+00	1.630E+00	4.529E+02
α_4	1.48E-04	2.38E-03	1.70E-03	6.93E-03	0.00E+00	1.083E+00	4.535E+02
α_5	8.99E-06	1.24E-03	6.27E-04	4.57E-03	0.00E+00	5.654E-01	4.540E+02
α_6	2.31E-10	4.21E-04	3.89E-05	2.20E-03	0.00E+00	1.916E-01	4.544E+02
α_7	5.24E-41	7.66E-05	2.85E-12	3.36E-04	0.00E+00	3.480E-02	4.545E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9786198	0.9878887	0.9885720	0.9948314	1.0000000	4.670E+02	5.726E+00
α_2	7.69E-04	4.27E-03	3.59E-03	1.01E-02	0.00E+00	2.018E+00	4.707E+02
α_3	3.04E-04	2.94E-03	2.28E-03	7.85E-03	0.00E+00	1.391E+00	4.714E+02
α_4	1.34E-04	2.25E-03	1.60E-03	6.58E-03	0.00E+00	1.062E+00	4.717E+02
α_5	2.62E-05	1.49E-03	8.68E-04	5.05E-03	0.00E+00	7.026E-01	4.720E+02
α_6	2.90E-07	7.40E-04	2.27E-04	3.22E-03	0.00E+00	3.497E-01	4.724E+02
α_7	1.12E-15	2.28E-04	2.09E-06	1.32E-03	0.00E+00	1.078E-01	4.726E+02
α_8	2.33E-17	2.00E-04	8.48E-07	1.17E-03	0.00E+00	9.469E-02	4.727E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.92E-01	9.89E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01
α_2	4.69E-03	6.25E-03	7.43E-03	7.09E-03	5.56E-03	4.94E-03	4.27E-03
α_3		2.03E-03	2.37E-03	3.87E-03	3.94E-03	3.58E-03	2.94E-03
α_4			1.37E-03	1.41E-03	1.95E-03	2.38E-03	2.25E-03
α_5				2.83E-04	7.22E-04	1.24E-03	1.49E-03
α_6					3.59E-04	4.21E-04	7.40E-04
α_7						7.66E-05	2.28E-04
α_8							2.00E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.92E-01	9.89E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01
Beta	4.69E-03	8.29E-03	1.12E-02	1.27E-02	1.25E-02	1.26E-02	1.21E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	77.00	77.00	77.00	77.00	77.00	77.00	77.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 29.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.377

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9869369	0.9966353	0.9985088	0.9999889	1.432E+02	4.834E-01	--
α_2	1.11E-05	3.36E-03	1.49E-03	1.31E-02	4.834E-01	1.432E+02	0.510

CCCG = 3, Gamma = 0.377

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9848647	0.9945609	0.9959363	0.9995571	2.241E+02	1.226E+00	--
α_2	2.07E-04	4.27E-03	2.94E-03	1.29E-02	9.769E-01	2.277E+02	0.699
α_3	1.86E-08	1.17E-03	2.02E-04	5.66E-03	2.487E-01	2.129E+02	0.750

CCCG = 4, Gamma = 0.377

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9814708	0.9920915	0.9933125	0.9985374	2.580E+02	2.057E+00	--
α_2	5.96E-04	5.40E-03	4.23E-03	1.42E-02	1.442E+00	2.654E+02	0.798
α_3	2.06E-06	1.65E-03	6.19E-04	6.78E-03	4.114E-01	2.491E+02	0.853
α_4	1.12E-09	8.56E-04	9.33E-05	4.39E-03	2.036E-01	2.377E+02	0.895

CCCG = 5, Gamma = 0.377

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9817150	0.9907430	0.9915518	0.9970074	3.942E+02	3.683E+00	--
α_2	1.12E-03	5.48E-03	4.70E-03	1.25E-02	2.243E+00	4.072E+02	0.936
α_3	1.31E-04	2.60E-03	1.80E-03	7.79E-03	9.912E-01	3.809E+02	1.004
α_4	6.81E-07	9.99E-04	3.38E-04	4.24E-03	3.765E-01	3.765E+02	1.017
α_5	1.59E-21	1.84E-04	1.05E-07	1.06E-03	7.237E-02	3.940E+02	0.973

CCCG = 6, Gamma = 0.377

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9821686	0.9906883	0.9914137	0.9967301	4.404E+02	4.139E+00	--
α_2	8.57E-04	4.46E-03	3.79E-03	1.04E-02	2.128E+00	4.750E+02	0.909
α_3	1.87E-04	2.72E-03	1.98E-03	7.77E-03	1.134E+00	4.164E+02	1.038
α_4	8.63E-06	1.32E-03	6.55E-04	4.89E-03	5.533E-01	4.184E+02	1.035
α_5	2.02E-09	5.18E-04	6.92E-05	2.60E-03	2.210E-01	4.263E+02	1.016
α_6	3.78E-16	2.97E-04	2.06E-06	1.72E-03	1.027E-01	3.461E+02	1.252

CCCG = 7, Gamma = 0.377

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9840047	0.9906988	0.9911677	0.9957922	6.851E+02	6.432E+00	--
α_2	9.80E-04	3.77E-03	3.34E-03	8.03E-03	2.840E+00	7.504E+02	0.951
α_3	3.98E-04	2.68E-03	2.19E-03	6.64E-03	1.746E+00	6.491E+02	1.101
α_4	1.04E-04	1.66E-03	1.19E-03	4.83E-03	1.084E+00	6.514E+02	1.098
α_5	4.73E-06	8.32E-04	4.03E-04	3.11E-03	5.376E-01	6.454E+02	1.109
α_6	2.74E-10	3.12E-04	3.15E-05	1.61E-03	1.979E-01	6.339E+02	1.130
α_7	9.52E-53	4.25E-05	4.26E-15	1.45E-04	2.656E-02	6.248E+02	1.147

CCCG = 8, Gamma = 0.377

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9846454	0.9911762	0.9916445	0.9961083	6.866E+02	6.112E+00	--
α_2	6.68E-04	3.09E-03	2.67E-03	6.95E-03	2.364E+00	7.631E+02	0.936
α_3	2.69E-04	2.26E-03	1.79E-03	5.87E-03	1.512E+00	6.667E+02	1.072
α_4	9.65E-05	1.65E-03	1.17E-03	4.83E-03	1.056E+00	6.403E+02	1.117
α_5	1.55E-05	1.02E-03	5.83E-04	3.53E-03	6.745E-01	6.585E+02	1.086
α_6	6.46E-08	4.81E-04	1.22E-04	2.18E-03	3.076E-01	6.393E+02	1.120
α_7	1.28E-15	1.82E-04	1.80E-06	1.05E-03	1.093E-01	5.990E+02	1.196
α_8	2.16E-18	1.40E-04	3.88E-07	8.15E-04	8.885E-02	6.355E+02	1.127

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.95E-01	9.92E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01
α_2	3.36E-03	4.27E-03	5.40E-03	5.48E-03	4.46E-03	3.77E-03	3.09E-03
α_3		1.17E-03	1.65E-03	2.60E-03	2.72E-03	2.68E-03	2.26E-03
α_4			8.56E-04	9.99E-04	1.32E-03	1.66E-03	1.65E-03
α_5				1.84E-04	5.18E-04	8.32E-04	1.02E-03
α_6					2.97E-04	3.12E-04	4.81E-04
α_7						4.25E-05	1.82E-04
α_8							1.40E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.95E-01	9.92E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01
Beta	3.36E-03	5.44E-03	7.91E-03	9.26E-03	9.31E-03	9.30E-03	8.82E-03
Gamma		2.15E-01	3.17E-01	4.08E-01	5.21E-01	5.95E-01	6.50E-01
Delta			3.42E-01	3.13E-01	4.40E-01	5.15E-01	6.06E-01
Epsilon				1.55E-01	3.82E-01	4.17E-01	5.26E-01
Mu					3.64E-01	2.99E-01	4.40E-01
Omega						1.20E-01	4.01E-01
Sigma							4.34E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	29.00	29.00	29.00	29.00	29.00	29.00	29.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 14.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9675353	0.9918334	0.9965992	0.9999820	5.463E+01	4.498E-01	--
α_2	1.80E-05	8.17E-03	3.40E-03	3.25E-02	4.498E-01	5.463E+01	0.510

CCCG = 3, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9528498	0.9831893	0.9875181	0.9987248	6.891E+01	1.178E+00	--
α_2	5.83E-04	1.32E-02	8.99E-03	4.02E-02	9.387E-01	7.019E+01	0.699
α_3	3.79E-08	3.61E-03	5.83E-04	1.77E-02	2.396E-01	6.606E+01	0.750

CCCG = 4, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9438235	0.9764578	0.9802762	0.9960250	7.874E+01	1.898E+00	--
α_2	1.40E-03	1.55E-02	1.18E-02	4.22E-02	1.285E+00	8.165E+01	0.798
α_3	4.67E-06	5.06E-03	1.81E-03	2.11E-02	3.927E-01	7.717E+01	0.853
α_4	1.15E-08	2.98E-03	4.00E-04	1.50E-02	2.207E-01	7.373E+01	0.895

CCCG = 5, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9452930	0.9724889	0.9749254	0.9913550	1.239E+02	3.506E+00	--
α_2	2.71E-03	1.51E-02	1.28E-02	3.57E-02	1.992E+00	1.295E+02	0.936
α_3	5.44E-04	8.79E-03	6.30E-03	2.55E-02	1.078E+00	1.216E+02	1.004
α_4	1.58E-06	3.00E-03	9.72E-04	1.29E-02	3.632E-01	1.207E+02	1.017
α_5	5.29E-21	5.73E-04	3.32E-07	3.32E-03	7.248E-02	1.265E+02	0.973

CCCG = 6, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9480682	0.9726091	0.9746402	0.9902085	1.491E+02	4.199E+00	--
α_2	2.02E-03	1.17E-02	9.83E-03	2.79E-02	1.941E+00	1.635E+02	0.909
α_3	8.83E-04	9.20E-03	7.06E-03	2.48E-02	1.332E+00	1.435E+02	1.038
α_4	4.57E-05	4.25E-03	2.30E-03	1.51E-02	6.181E-01	1.446E+02	1.035
α_5	1.07E-08	1.56E-03	2.32E-04	7.75E-03	2.313E-01	1.477E+02	1.016
α_6	5.84E-20	6.40E-04	6.04E-07	3.72E-03	7.684E-02	1.200E+02	1.252

CCCG = 7, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9513591	0.9717726	0.9731885	0.9873496	2.142E+02	6.223E+00	--
α_2	2.70E-03	1.10E-02	9.70E-03	2.39E-02	2.654E+00	2.380E+02	0.951
α_3	1.08E-03	7.91E-03	6.40E-03	1.99E-02	1.645E+00	2.063E+02	1.101
α_4	3.56E-04	5.35E-03	3.87E-03	1.54E-02	1.115E+00	2.074E+02	1.098
α_5	2.83E-05	2.92E-03	1.55E-03	1.05E-02	6.034E-01	2.058E+02	1.109
α_6	1.56E-10	8.79E-04	6.55E-05	4.66E-03	1.780E-01	2.024E+02	1.130
α_7	7.46E-51	1.37E-04	2.81E-14	4.84E-04	2.734E-02	1.996E+02	1.147

CCCG = 8, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9530667	0.9727486	0.9741133	0.9877691	2.229E+02	6.246E+00	--
α_2	2.29E-03	9.91E-03	8.65E-03	2.18E-02	2.504E+00	2.502E+02	0.936
α_3	6.90E-04	6.43E-03	5.02E-03	1.70E-02	1.419E+00	2.192E+02	1.072
α_4	2.67E-04	4.85E-03	3.41E-03	1.44E-02	1.027E+00	2.107E+02	1.117
α_5	6.95E-05	3.37E-03	2.02E-03	1.13E-02	7.337E-01	2.169E+02	1.086
α_6	1.88E-06	1.88E-03	6.80E-04	7.83E-03	3.975E-01	2.108E+02	1.120
α_7	3.90E-20	3.89E-04	3.74E-07	2.26E-03	7.703E-02	1.977E+02	1.196
α_8	3.87E-18	4.17E-04	1.04E-06	2.43E-03	8.749E-02	2.097E+02	1.127

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.83E-01	9.76E-01	9.72E-01	9.73E-01	9.72E-01	9.73E-01
α_2	8.17E-03	1.32E-02	1.55E-02	1.51E-02	1.17E-02	1.10E-02	9.91E-03
α_3		3.61E-03	5.06E-03	8.79E-03	9.20E-03	7.91E-03	6.43E-03
α_4			2.98E-03	3.00E-03	4.25E-03	5.35E-03	4.85E-03
α_5				5.73E-04	1.56E-03	2.92E-03	3.37E-03
α_6					6.40E-04	8.79E-04	1.88E-03
α_7						1.37E-04	3.89E-04
α_8							4.17E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.83E-01	9.76E-01	9.72E-01	9.73E-01	9.72E-01	9.73E-01
Beta	8.17E-03	1.68E-02	2.35E-02	2.75E-02	2.74E-02	2.82E-02	2.73E-02
Gamma		2.15E-01	3.42E-01	4.49E-01	5.72E-01	6.09E-01	6.36E-01
Delta			3.71E-01	2.89E-01	4.12E-01	5.40E-01	6.29E-01
Epsilon				1.60E-01	3.41E-01	4.24E-01	5.55E-01
Mu					2.90E-01	2.58E-01	4.44E-01
Omega						1.35E-01	3.00E-01
Sigma							5.17E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	14.00	14.00	14.00	14.00	14.00	14.00	14.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.006

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8631898	0.9672544	0.9881923	0.9999747	1.123E+01	3.801E-01	--
α_2	2.53E-05	3.27E-02	1.18E-02	1.37E-01	3.801E-01	1.123E+01	0.510

CCCG = 3, Gamma = 0.006

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8554371	0.9511853	0.9655817	0.9976281	1.871E+01	9.600E-01	--
α_2	5.03E-04	3.32E-02	1.94E-02	1.13E-01	6.673E-01	1.944E+01	0.699
α_3	1.38E-06	1.56E-02	3.78E-03	7.19E-02	2.927E-01	1.844E+01	0.750

CCCG = 4, Gamma = 0.006

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8549459	0.9406442	0.9508356	0.9913941	2.645E+01	1.669E+00	--
α_2	2.08E-03	3.57E-02	2.57E-02	1.04E-01	1.039E+00	2.803E+01	0.798
α_3	1.25E-05	1.43E-02	5.13E-03	5.97E-02	3.887E-01	2.680E+01	0.853
α_4	1.08E-07	9.31E-03	1.55E-03	4.56E-02	2.414E-01	2.568E+01	0.895

CCCG = 5, Gamma = 0.006

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8863704	0.9422863	0.9471196	0.9816624	5.693E+01	3.487E+00	--
α_2	4.48E-03	2.86E-02	2.37E-02	6.94E-02	1.791E+00	6.082E+01	0.936
α_3	1.65E-03	2.07E-02	1.55E-02	5.74E-02	1.207E+00	5.720E+01	1.004
α_4	1.34E-05	7.53E-03	3.02E-03	3.03E-02	4.340E-01	5.720E+01	1.017
α_5	2.03E-26	9.12E-04	3.25E-08	5.03E-03	5.493E-02	6.021E+01	0.973

CCCG = 6, Gamma = 0.006

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8981506	0.9467952	0.9508173	0.9816820	6.948E+01	3.905E+00	--
α_2	1.61E-03	1.66E-02	1.28E-02	4.46E-02	1.335E+00	7.910E+01	0.909
α_3	2.68E-03	2.17E-02	1.74E-02	5.57E-02	1.531E+00	6.887E+01	1.038
α_4	1.97E-04	1.02E-02	6.08E-03	3.41E-02	7.191E-01	6.991E+01	1.035
α_5	5.03E-08	3.43E-03	5.88E-04	1.67E-02	2.467E-01	7.166E+01	1.016
α_6	1.38E-20	1.25E-03	7.53E-07	7.24E-03	7.279E-02	5.830E+01	1.252

CCCG = 7, Gamma = 0.006

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9122516	0.9496133	0.9522150	0.9780834	1.087E+02	5.770E+00	--
α_2	1.51E-03	1.21E-02	9.68E-03	3.10E-02	1.549E+00	1.264E+02	0.951
α_3	3.21E-03	1.80E-02	1.52E-02	4.24E-02	1.989E+00	1.085E+02	1.101
α_4	1.05E-03	1.16E-02	8.84E-03	3.17E-02	1.287E+00	1.095E+02	1.098
α_5	1.05E-04	6.30E-03	3.66E-03	2.15E-02	6.913E-01	1.090E+02	1.109
α_6	1.60E-08	2.16E-03	3.26E-04	1.07E-02	2.327E-01	1.074E+02	1.130
α_7	1.35E-64	1.99E-04	3.02E-17	5.02E-04	2.112E-02	1.061E+02	1.147

CCCG = 8, Gamma = 0.006

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9235241	0.9541907	0.9561574	0.9781387	1.461E+02	7.016E+00	--
α_2	1.17E-03	9.11E-03	7.31E-03	2.32E-02	1.583E+00	1.721E+02	0.936
α_3	2.33E-03	1.31E-02	1.10E-02	3.10E-02	1.986E+00	1.496E+02	1.072
α_4	1.61E-03	1.15E-02	9.34E-03	2.87E-02	1.672E+00	1.439E+02	1.117
α_5	3.59E-04	6.76E-03	4.73E-03	2.01E-02	1.011E+00	1.486E+02	1.086
α_6	2.98E-05	3.93E-03	2.00E-03	1.44E-02	5.709E-01	1.446E+02	1.120
α_7	3.06E-10	1.33E-03	1.04E-04	7.04E-03	1.809E-01	1.358E+02	1.196
α_8	1.25E-107	8.63E-05	2.61E-27	6.47E-05	1.245E-02	1.442E+02	1.127

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.67E-01	9.51E-01	9.41E-01	9.42E-01	9.47E-01	9.50E-01	9.54E-01
α_2	3.27E-02	3.32E-02	3.57E-02	2.86E-02	1.66E-02	1.21E-02	9.11E-03
α_3		1.56E-02	1.43E-02	2.07E-02	2.17E-02	1.80E-02	1.31E-02
α_4			9.31E-03	7.53E-03	1.02E-02	1.16E-02	1.15E-02
α_5				9.12E-04	3.43E-03	6.30E-03	6.76E-03
α_6					1.25E-03	2.16E-03	3.93E-03
α_7						1.99E-04	1.33E-03
α_8							8.63E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.67E-01	9.51E-01	9.41E-01	9.42E-01	9.47E-01	9.50E-01	9.54E-01
Beta	3.27E-02	4.88E-02	5.94E-02	5.77E-02	5.32E-02	5.04E-02	4.58E-02
Gamma		3.20E-01	3.98E-01	5.04E-01	6.88E-01	7.60E-01	8.01E-01
Delta			3.94E-01	2.90E-01	4.06E-01	5.30E-01	6.43E-01
Epsilon				1.08E-01	3.15E-01	4.27E-01	5.13E-01
Mu					2.67E-01	2.72E-01	4.42E-01
Omega						8.43E-02	2.65E-01
Sigma							6.09E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.50	0.50	0.50	0.50	0.50	0.50	0.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 18.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9779014	0.9943568	0.9975533	0.9999839	8.292E+01	4.706E-01	--
α_2	1.61E-05	5.64E-03	2.45E-03	2.21E-02	4.706E-01	8.292E+01	0.510

CCCG = 3, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9718273	0.9902197	0.9929268	0.9993620	1.116E+02	1.103E+00	--
α_2	2.03E-04	7.05E-03	4.47E-03	2.27E-02	8.104E-01	1.141E+02	0.699
α_3	2.29E-07	2.73E-03	6.40E-04	1.26E-02	2.921E-01	1.068E+02	0.750

CCCG = 4, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9712591	0.9879102	0.9898583	0.9978994	1.596E+02	1.953E+00	--
α_2	7.36E-04	7.90E-03	6.03E-03	2.14E-02	1.312E+00	1.648E+02	0.798
α_3	4.66E-06	2.77E-03	1.10E-03	1.12E-02	4.307E-01	1.549E+02	0.853
α_4	2.82E-09	1.42E-03	1.67E-04	7.21E-03	2.099E-01	1.479E+02	0.895

CCCG = 5, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9728923	0.9868879	0.9882318	0.9962905	2.338E+02	3.107E+00	--
α_2	9.71E-04	6.88E-03	5.59E-03	1.72E-02	1.684E+00	2.432E+02	0.936
α_3	1.83E-04	4.13E-03	2.80E-03	1.26E-02	9.426E-01	2.275E+02	1.004
α_4	1.27E-06	1.69E-03	5.82E-04	7.14E-03	3.816E-01	2.251E+02	1.017
α_5	1.67E-16	4.18E-04	2.29E-06	2.43E-03	9.865E-02	2.356E+02	0.973

CCCG = 6, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9753582	0.9873849	0.9884410	0.9958031	2.992E+02	3.822E+00	--
α_2	7.57E-04	5.23E-03	4.26E-03	1.30E-02	1.714E+00	3.262E+02	0.909
α_3	2.53E-04	3.86E-03	2.79E-03	1.11E-02	1.108E+00	2.859E+02	1.038
α_4	2.99E-05	2.26E-03	1.26E-03	7.89E-03	6.509E-01	2.873E+02	1.035
α_5	1.71E-08	8.65E-04	1.56E-04	4.17E-03	2.536E-01	2.929E+02	1.016
α_6	6.52E-17	4.02E-04	1.83E-06	2.34E-03	9.572E-02	2.379E+02	1.252

CCCG = 7, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9771600	0.9873560	0.9881382	0.9948807	4.057E+02	5.195E+00	--
α_2	8.87E-04	4.68E-03	3.97E-03	1.09E-02	2.105E+00	4.480E+02	0.951
α_3	3.19E-04	3.39E-03	2.59E-03	9.22E-03	1.320E+00	3.876E+02	1.101
α_4	1.30E-04	2.56E-03	1.77E-03	7.66E-03	9.967E-01	3.890E+02	1.098
α_5	6.88E-06	1.36E-03	6.46E-04	5.13E-03	5.249E-01	3.855E+02	1.109
α_6	3.84E-10	5.16E-04	5.05E-05	2.68E-03	1.956E-01	3.787E+02	1.130
α_7	4.04E-28	1.42E-04	3.21E-09	7.69E-04	5.291E-02	3.733E+02	1.147

CCCG = 8, Gamma = 0.234

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787516	0.9879102	0.9885780	0.9947884	4.766E+02	5.832E+00	--
α_2	8.47E-04	4.17E-03	3.57E-03	9.55E-03	2.229E+00	5.319E+02	0.936
α_3	2.32E-04	2.70E-03	2.03E-03	7.46E-03	1.260E+00	4.650E+02	1.072
α_4	1.32E-04	2.33E-03	1.64E-03	6.87E-03	1.042E+00	4.465E+02	1.117
α_5	3.89E-05	1.66E-03	1.01E-03	5.47E-03	7.626E-01	4.592E+02	1.086
α_6	1.68E-07	7.33E-04	2.05E-04	3.26E-03	3.271E-01	4.460E+02	1.120
α_7	3.12E-13	3.22E-04	8.62E-06	1.81E-03	1.344E-01	4.179E+02	1.196
α_8	1.56E-20	1.73E-04	1.62E-07	1.01E-03	7.682E-02	4.434E+02	1.127

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.90E-01	9.88E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01
α_2	5.64E-03	7.05E-03	7.90E-03	6.88E-03	5.23E-03	4.68E-03	4.17E-03
α_3		2.73E-03	2.77E-03	4.13E-03	3.86E-03	3.39E-03	2.70E-03
α_4			1.42E-03	1.69E-03	2.26E-03	2.56E-03	2.33E-03
α_5				4.18E-04	8.65E-04	1.36E-03	1.66E-03
α_6					4.02E-04	5.16E-04	7.33E-04
α_7						1.42E-04	3.22E-04
α_8							1.73E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.90E-01	9.88E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01
Beta	5.64E-03	9.78E-03	1.21E-02	1.31E-02	1.26E-02	1.26E-02	1.21E-02
Gamma		2.79E-01	3.47E-01	4.76E-01	5.86E-01	6.30E-01	6.55E-01
Delta			3.38E-01	3.38E-01	4.77E-01	5.74E-01	6.59E-01
Epsilon				1.98E-01	3.59E-01	4.41E-01	5.53E-01
Mu					3.17E-01	3.26E-01	4.25E-01
Omega						2.15E-01	4.03E-01
Sigma							3.50E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	18.00	18.00	18.00	18.00	18.00	18.00	18.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 15.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.201

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9922017	0.9979781	0.9990890	0.9999926	2.434E+02	4.932E-01	--
α_2	7.41E-06	2.02E-03	9.11E-04	7.80E-03	4.932E-01	2.434E+02	0.510

CCCG = 3, Gamma = 0.201

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9915598	0.9971205	0.9979557	0.9998297	3.669E+02	1.060E+00	--
α_2	3.54E-05	1.89E-03	1.12E-03	6.40E-03	7.137E-01	3.760E+02	0.699
α_3	3.54E-07	9.85E-04	2.98E-04	4.30E-03	3.458E-01	3.508E+02	0.750

CCCG = 4, Gamma = 0.201

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9919458	0.9965392	0.9970636	0.9993401	6.089E+02	2.115E+00	--
α_2	3.06E-04	2.47E-03	1.97E-03	6.36E-03	1.549E+00	6.253E+02	0.798
α_3	1.41E-08	4.51E-04	8.82E-05	2.15E-03	2.646E-01	5.860E+02	0.853
α_4	5.95E-08	5.38E-04	1.32E-04	2.46E-03	3.010E-01	5.587E+02	0.895

CCCG = 5, Gamma = 0.201

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9935251	0.9964043	0.9966252	0.9985291	1.475E+03	5.325E+00	--
α_2	7.64E-04	2.40E-03	2.18E-03	4.76E-03	3.632E+00	1.512E+03	0.936
α_3	9.41E-05	9.58E-04	7.35E-04	2.58E-03	1.354E+00	1.412E+03	1.004
α_4	2.01E-08	2.12E-04	5.07E-05	9.75E-04	2.961E-01	1.395E+03	1.017
α_5	8.66E-35	2.91E-05	3.20E-11	1.44E-04	4.243E-02	1.459E+03	0.973

CCCG = 6, Gamma = 0.201

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931784	0.9962813	0.9965275	0.9985437	1.322E+03	4.936E+00	--
α_2	5.49E-04	2.06E-03	1.83E-03	4.36E-03	2.915E+00	1.410E+03	0.909
α_3	8.67E-05	1.02E-03	7.64E-04	2.81E-03	1.257E+00	1.235E+03	1.038
α_4	1.65E-06	4.06E-04	1.86E-04	1.55E-03	5.031E-01	1.240E+03	1.035
α_5	2.65E-15	9.15E-05	1.21E-06	5.24E-04	1.155E-01	1.263E+03	1.016
α_6	6.62E-13	1.42E-04	5.18E-06	7.84E-04	1.451E-01	1.025E+03	1.252

CCCG = 7, Gamma = 0.201

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9943019	0.9963937	0.9965166	0.9980663	2.667E+03	9.654E+00	--
α_2	6.51E-04	1.68E-03	1.57E-03	3.10E-03	4.851E+00	2.883E+03	0.951
α_3	2.87E-04	1.12E-03	9.92E-04	2.40E-03	2.800E+00	2.492E+03	1.101
α_4	5.65E-05	5.53E-04	4.27E-04	1.48E-03	1.384E+00	2.500E+03	1.098
α_5	7.01E-07	1.98E-04	8.85E-05	7.66E-04	4.902E-01	2.476E+03	1.109
α_6	1.12E-15	4.71E-05	5.97E-07	2.70E-04	1.146E-01	2.431E+03	1.130
α_7	3.21E-93	6.11E-06	6.50E-25	7.26E-06	1.464E-02	2.395E+03	1.147

CCCG = 8, Gamma = 0.201

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940695	0.9964749	0.9966367	0.9983277	2.021E+03	7.148E+00	--
α_2	3.63E-04	1.34E-03	1.19E-03	2.81E-03	2.980E+00	2.224E+03	0.936
α_3	1.75E-04	1.01E-03	8.43E-04	2.41E-03	1.960E+00	1.942E+03	1.072
α_4	4.57E-05	6.25E-04	4.58E-04	1.77E-03	1.166E+00	1.865E+03	1.117
α_5	1.59E-06	2.80E-04	1.36E-04	1.05E-03	5.375E-01	1.917E+03	1.086
α_6	2.14E-11	9.70E-05	7.53E-06	5.13E-04	1.805E-01	1.861E+03	1.120
α_7	1.23E-35	2.37E-05	1.78E-11	1.16E-04	4.139E-02	1.743E+03	1.196
α_8	9.32E-09	1.53E-04	3.37E-05	7.13E-04	2.827E-01	1.849E+03	1.127

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.97E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	2.02E-03	1.89E-03	2.47E-03	2.40E-03	2.06E-03	1.68E-03	1.34E-03
α_3		9.85E-04	4.51E-04	9.58E-04	1.02E-03	1.12E-03	1.01E-03
α_4			5.38E-04	2.12E-04	4.06E-04	5.53E-04	6.25E-04
α_5				2.91E-05	9.15E-05	1.98E-04	2.80E-04
α_6					1.42E-04	4.71E-05	9.70E-05
α_7						6.11E-06	2.37E-05
α_8							1.53E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.97E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	2.02E-03	2.88E-03	3.46E-03	3.60E-03	3.72E-03	3.61E-03	3.53E-03
Gamma		3.42E-01	2.86E-01	3.33E-01	4.45E-01	5.34E-01	6.20E-01
Delta			5.44E-01	2.01E-01	3.86E-01	4.18E-01	5.39E-01
Epsilon				1.21E-01	3.65E-01	3.12E-01	4.70E-01
Mu					6.07E-01	2.12E-01	4.94E-01
Omega						1.15E-01	6.46E-01
Sigma							8.66E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	15.50	15.50	15.50	15.50	15.50	15.50	15.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.1.12.2 ALL-PDP-FR: Positive Displacement Pumps Fail to Run

Generic CCF Parameters

Component Group: Pump
Component Type: Motor Driven Pump
Component Subtype: Positive Displacement
Failure Mode: Fail to Run
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 75.2

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9610479	0.9870601	0.9910663	0.9993771	0.9903784	7.388E+01	9.685E-01
α_2	6.20E-04	1.29E-02	8.93E-03	3.89E-02	9.62E-03	9.685E-01	7.388E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9582691	0.9807197	0.9830229	0.9953062	0.9805699	1.337E+02	2.628E+00
α_2	3.74E-03	1.72E-02	1.49E-02	3.86E-02	1.94E-02	2.351E+00	1.340E+02
α_3	1.01E-07	2.03E-03	4.33E-04	9.53E-03	0.00E+00	2.768E-01	1.360E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9637142	0.9817372	0.9833572	0.9942218	0.9837204	1.914E+02	3.560E+00
α_2	2.40E-03	1.16E-02	9.97E-03	2.63E-02	9.77E-03	2.260E+00	1.927E+02
α_3	3.32E-04	5.48E-03	3.91E-03	1.60E-02	6.51E-03	1.069E+00	1.939E+02
α_4	8.22E-09	1.19E-03	1.77E-04	5.88E-03	0.00E+00	2.315E-01	1.947E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9706517	0.9836944	0.9846840	0.9933489	0.9857682	3.165E+02	5.247E+00
α_2	2.02E-03	8.25E-03	7.26E-03	1.79E-02	5.74E-03	2.656E+00	3.191E+02
α_3	8.99E-04	5.68E-03	4.69E-03	1.38E-02	6.10E-03	1.827E+00	3.200E+02
α_4	3.49E-05	2.14E-03	1.23E-03	7.31E-03	2.40E-03	6.878E-01	3.211E+02
α_5	2.07E-20	2.38E-04	2.22E-07	1.38E-03	0.00E+00	7.674E-02	3.217E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9733757	0.9848746	0.9857114	0.9935048	0.9873012	3.759E+02	5.773E+00
α_2	1.23E-03	5.95E-03	5.11E-03	1.35E-02	3.73E-03	2.271E+00	3.794E+02
α_3	8.59E-04	5.05E-03	4.22E-03	1.21E-02	4.72E-03	1.928E+00	3.798E+02
α_4	1.86E-04	2.88E-03	2.08E-03	8.34E-03	3.31E-03	1.101E+00	3.806E+02
α_5	5.15E-07	9.55E-04	3.10E-04	4.10E-03	9.40E-04	3.646E-01	3.813E+02

α_6	2.26E-15	2.88E-04	2.91E-06	1.66E-03	0.00E+00	1.098E-01	3.816E+02
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CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9769093	0.9859812	0.9865585	0.9930750	0.9885389	5.475E+02	7.784E+00
α_2	1.21E-03	4.86E-03	4.28E-03	1.05E-02	2.57E-03	2.701E+00	5.526E+02
α_3	8.37E-04	4.07E-03	3.49E-03	9.27E-03	3.54E-03	2.258E+00	5.530E+02
α_4	4.12E-04	2.99E-03	2.42E-03	7.52E-03	3.24E-03	1.660E+00	5.536E+02
α_5	5.56E-05	1.57E-03	1.03E-03	4.93E-03	1.72E-03	8.709E-01	5.544E+02
α_6	1.23E-08	4.69E-04	8.88E-05	2.24E-03	3.86E-04	2.603E-01	5.550E+02
α_7	4.29E-41	6.27E-05	2.33E-12	2.75E-04	0.00E+00	3.480E-02	5.552E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9784600	0.9869031	0.9874398	0.9935137	0.9895778	5.907E+02	7.839E+00
α_2	8.74E-04	3.99E-03	3.45E-03	8.95E-03	1.83E-03	2.390E+00	5.962E+02
α_3	5.49E-04	3.23E-03	2.69E-03	7.73E-03	2.66E-03	1.931E+00	5.966E+02
α_4	3.68E-04	2.73E-03	2.20E-03	6.91E-03	2.83E-03	1.635E+00	5.969E+02
α_5	1.25E-04	1.87E-03	1.35E-03	5.38E-03	2.05E-03	1.119E+00	5.974E+02
α_6	4.62E-06	8.83E-04	4.22E-04	3.32E-03	8.82E-04	5.286E-01	5.980E+02
α_7	6.34E-13	2.36E-04	7.74E-06	1.31E-03	1.64E-04	1.411E-01	5.984E+02
α_8	1.84E-17	1.58E-04	6.70E-07	9.21E-04	0.00E+00	9.469E-02	5.985E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.81E-01	9.82E-01	9.84E-01	9.85E-01	9.86E-01	9.87E-01
α_2	1.29E-02	1.72E-02	1.16E-02	8.25E-03	5.95E-03	4.86E-03	3.99E-03
α_3		2.03E-03	5.48E-03	5.68E-03	5.05E-03	4.07E-03	3.23E-03
α_4			1.19E-03	2.14E-03	2.88E-03	2.99E-03	2.73E-03
α_5				2.38E-04	9.55E-04	1.57E-03	1.87E-03
α_6					2.88E-04	4.69E-04	8.83E-04
α_7						6.27E-05	2.36E-04
α_8							1.58E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.81E-01	9.82E-01	9.84E-01	9.85E-01	9.86E-01	9.87E-01
Beta	1.29E-02	1.93E-02	1.83E-02	1.63E-02	1.51E-02	1.40E-02	1.31E-02
Gamma		1.05E-01	3.65E-01	4.94E-01	6.07E-01	6.53E-01	6.95E-01
Delta			1.78E-01	2.95E-01	4.50E-01	5.56E-01	6.46E-01
Epsilon				1.00E-01	3.01E-01	4.13E-01	5.35E-01
Mu					2.31E-01	2.53E-01	4.06E-01
Omega						1.18E-01	3.09E-01
Sigma							4.02E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	50.13	75.20	100.27	125.33	150.40	175.47	200.53
N₁	1.3333	0.5000	0.4444	0.3704	0.2963	0.2305	0.1756
N₂	0.5000	1.5000	1.0000	0.7315	0.5694	0.4576	0.3714
N₃		0.0000	0.6667	0.7778	0.7207	0.6286	0.5403
N₄			0.0000	0.3056	0.5046	0.5766	0.5731
N₅				0.0000	0.1435	0.3056	0.4168
N₆					0.0000	0.0687	0.1789
N₇						0.0000	0.0333
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 38.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.494

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9754662	0.9936729	0.9971848	0.9999790	7.592E+01	4.834E-01	--
α_2	2.10E-05	6.33E-03	2.82E-03	2.45E-02	4.834E-01	7.592E+01	0.916

CCCG = 3, Gamma = 0.499

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9758867	0.9913207	0.9935042	0.9992913	1.400E+02	1.226E+00	--
α_2	3.73E-04	7.65E-03	5.28E-03	2.30E-02	9.769E-01	1.268E+02	1.326
α_3	1.65E-08	1.03E-03	1.79E-04	5.01E-03	2.487E-01	2.405E+02	0.704

CCCG = 4, Gamma = 0.501

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9772765	0.9902936	0.9917875	0.9982028	2.099E+02	2.057E+00	--
α_2	7.27E-04	6.59E-03	5.16E-03	1.73E-02	1.442E+00	2.175E+02	1.075
α_3	3.06E-06	2.44E-03	9.16E-04	1.00E-02	4.114E-01	1.683E+02	1.394
α_4	8.93E-10	6.81E-04	7.42E-05	3.49E-03	2.036E-01	2.988E+02	0.787

CCCG = 5, Gamma = 0.503

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9802357	0.9899914	0.9908647	0.9967633	3.643E+02	3.683E+00	--
α_2	1.15E-03	5.63E-03	4.83E-03	1.29E-02	2.243E+00	3.960E+02	1.051
α_3	1.54E-04	3.06E-03	2.12E-03	9.17E-03	9.912E-01	3.233E+02	1.290
α_4	8.00E-07	1.17E-03	3.97E-04	4.98E-03	3.765E-01	3.205E+02	1.304
α_5	1.27E-21	1.47E-04	8.36E-08	8.48E-04	7.237E-02	4.928E+02	0.849

CCCG = 6, Gamma = 0.504

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9816536	0.9904185	0.9911645	0.9966349	4.278E+02	4.139E+00	--
α_2	8.39E-04	4.37E-03	3.71E-03	1.01E-02	2.128E+00	4.852E+02	0.988
α_3	2.00E-04	2.90E-03	2.11E-03	8.29E-03	1.134E+00	3.903E+02	1.230
α_4	1.00E-05	1.54E-03	7.62E-04	5.69E-03	5.533E-01	3.596E+02	1.337
α_5	2.17E-09	5.58E-04	7.45E-05	2.80E-03	2.210E-01	3.958E+02	1.216
α_6	2.85E-16	2.23E-04	1.55E-06	1.30E-03	1.027E-01	4.595E+02	1.047

CCCG = 7, Gamma = 0.505

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839678	0.9906773	0.9911472	0.9957824	6.835E+02	6.432E+00	--
α_2	9.41E-04	3.62E-03	3.21E-03	7.70E-03	2.840E+00	7.820E+02	0.990
α_3	3.99E-04	2.69E-03	2.20E-03	6.65E-03	1.746E+00	6.481E+02	1.196
α_4	1.11E-04	1.79E-03	1.28E-03	5.20E-03	1.084E+00	6.052E+02	1.282
α_5	5.11E-06	8.98E-04	4.35E-04	3.36E-03	5.376E-01	5.979E+02	1.299
α_6	2.62E-10	2.98E-04	3.01E-05	1.54E-03	1.979E-01	6.644E+02	1.170
α_7	7.44E-53	3.32E-05	3.33E-15	1.13E-04	2.656E-02	7.996E+02	0.972

CCCG = 8, Gamma = 0.506

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9850225	0.9913935	0.9918504	0.9962045	7.041E+02	6.112E+00	--
α_2	6.17E-04	2.85E-03	2.46E-03	6.42E-03	2.364E+00	8.261E+02	0.953
α_3	2.62E-04	2.20E-03	1.74E-03	5.72E-03	1.512E+00	6.845E+02	1.151
α_4	9.89E-05	1.69E-03	1.19E-03	4.95E-03	1.056E+00	6.251E+02	1.261
α_5	1.65E-05	1.09E-03	6.21E-04	3.76E-03	6.745E-01	6.178E+02	1.277
α_6	6.67E-08	4.96E-04	1.26E-04	2.25E-03	3.076E-01	6.193E+02	1.275
α_7	1.08E-15	1.54E-04	1.52E-06	8.89E-04	1.093E-01	7.094E+02	1.113
α_8	1.87E-18	1.21E-04	3.37E-07	7.07E-04	8.885E-02	7.325E+02	1.078

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.91E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	6.33E-03	7.65E-03	6.59E-03	5.63E-03	4.37E-03	3.62E-03	2.85E-03
α_3		1.03E-03	2.44E-03	3.06E-03	2.90E-03	2.69E-03	2.20E-03
α_4			6.81E-04	1.17E-03	1.54E-03	1.79E-03	1.69E-03
α_5				1.47E-04	5.58E-04	8.98E-04	1.09E-03
α_6					2.23E-04	2.98E-04	4.96E-04
α_7						3.32E-05	1.54E-04
α_8							1.21E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.91E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	6.33E-03	8.68E-03	9.71E-03	1.00E-02	9.58E-03	9.32E-03	8.61E-03
Gamma		1.19E-01	3.21E-01	4.37E-01	5.44E-01	6.12E-01	6.68E-01
Delta			2.18E-01	3.02E-01	4.44E-01	5.29E-01	6.17E-01
Epsilon				1.11E-01	3.37E-01	4.07E-01	5.25E-01
Mu					2.86E-01	2.69E-01	4.14E-01
Omega						1.00E-01	3.57E-01
Sigma							4.40E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	25.67	38.50	51.33	64.17	77.00	89.83	102.67
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 6.7

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.121

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8728315	0.9573687	0.9701949	0.9979981	2.133E+01	9.498E-01	--
α_2	2.00E-03	4.26E-02	2.98E-02	1.27E-01	9.498E-01	2.133E+01	0.916

CCCG = 3, Gamma = 0.113

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8391494	0.9234484	0.9314402	0.9803598	3.231E+01	2.678E+00	--
α_2	1.70E-02	7.28E-02	6.44E-02	1.57E-01	2.439E+00	3.108E+01	1.326
α_3	3.98E-08	3.79E-03	6.12E-04	1.86E-02	2.396E-01	6.292E+01	0.704

CCCG = 4, Gamma = 0.108

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8732301	0.9350520	0.9402922	0.9789388	5.133E+01	3.565E+00	--
α_2	8.28E-03	3.88E-02	3.37E-02	8.69E-02	2.285E+00	5.654E+01	1.075
α_3	1.41E-03	2.34E-02	1.68E-02	6.78E-02	1.059E+00	4.429E+01	1.394
α_4	1.06E-08	2.75E-03	3.68E-04	1.38E-02	2.207E-01	8.012E+01	0.787

CCCG = 5, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9102966	0.9494530	0.9522810	0.9789433	9.994E+01	5.320E+00	--
α_2	5.90E-03	2.34E-02	2.07E-02	5.00E-02	2.723E+00	1.138E+02	1.051
α_3	3.20E-03	1.96E-02	1.63E-02	4.71E-02	1.856E+00	9.304E+01	1.290
α_4	1.05E-04	7.12E-03	4.06E-03	2.46E-02	6.688E-01	9.322E+01	1.304
α_5	4.64E-21	5.03E-04	2.91E-07	2.91E-03	7.248E-02	1.442E+02	0.849

CCCG = 6, Gamma = 0.102

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9203164	0.9536528	0.9559230	0.9792322	1.263E+02	6.138E+00	--
α_2	3.79E-03	1.63E-02	1.43E-02	3.59E-02	2.510E+00	1.513E+02	0.988
α_3	3.08E-03	1.66E-02	1.41E-02	3.88E-02	2.053E+00	1.215E+02	1.230
α_4	6.71E-04	9.88E-03	7.19E-03	2.83E-02	1.123E+00	1.125E+02	1.337
α_5	1.99E-06	3.00E-03	1.01E-03	1.27E-02	3.748E-01	1.246E+02	1.216
α_6	4.83E-20	5.30E-04	4.99E-07	3.08E-03	7.684E-02	1.450E+02	1.047

CCCG = 7, Gamma = 0.101

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9343190	0.9593399	0.9608402	0.9792367	1.949E+02	8.260E+00	--
α_2	3.75E-03	1.32E-02	1.19E-02	2.74E-02	3.112E+00	2.320E+02	0.990
α_3	2.43E-03	1.17E-02	1.01E-02	2.65E-02	2.274E+00	1.923E+02	1.196
α_4	1.33E-03	9.32E-03	7.59E-03	2.32E-02	1.692E+00	1.799E+02	1.282
α_5	2.04E-04	5.07E-03	3.39E-03	1.57E-02	9.090E-01	1.783E+02	1.299
α_6	1.80E-08	1.24E-03	2.11E-04	6.02E-03	2.467E-01	1.988E+02	1.170
α_7	6.22E-51	1.14E-04	2.34E-14	4.03E-04	2.734E-02	2.395E+02	0.972

CCCG = 8, Gamma = 0.099

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9372864	0.9610993	0.9625230	0.9800504	2.065E+02	8.360E+00	--
α_2	2.98E-03	1.13E-02	1.00E-02	2.39E-02	2.875E+00	2.516E+02	0.953
α_3	1.62E-03	9.30E-03	7.80E-03	2.21E-02	1.959E+00	2.087E+02	1.151
α_4	1.09E-03	8.32E-03	6.69E-03	2.11E-02	1.600E+00	1.907E+02	1.261
α_5	4.32E-04	6.06E-03	4.43E-03	1.72E-02	1.150E+00	1.888E+02	1.277
α_6	2.40E-05	3.03E-03	1.55E-03	1.10E-02	5.764E-01	1.897E+02	1.275
α_7	4.55E-15	5.06E-04	5.27E-06	2.92E-03	1.103E-01	2.178E+02	1.113
α_8	3.61E-18	3.89E-04	9.72E-07	2.27E-03	8.749E-02	2.249E+02	1.078

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.57E-01	9.23E-01	9.35E-01	9.49E-01	9.54E-01	9.59E-01	9.61E-01
α_2	4.26E-02	7.28E-02	3.88E-02	2.34E-02	1.63E-02	1.32E-02	1.13E-02
α_3		3.79E-03	2.34E-02	1.96E-02	1.66E-02	1.17E-02	9.30E-03
α_4			2.75E-03	7.12E-03	9.88E-03	9.32E-03	8.32E-03
α_5				5.03E-04	3.00E-03	5.07E-03	6.06E-03
α_6					5.30E-04	1.24E-03	3.03E-03
α_7						1.14E-04	5.06E-04
α_8							3.89E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.57E-01	9.23E-01	9.35E-01	9.49E-01	9.54E-01	9.59E-01	9.61E-01
Beta	4.26E-02	7.66E-02	6.49E-02	5.05E-02	4.63E-02	4.07E-02	3.89E-02
Gamma		4.96E-02	4.02E-01	5.38E-01	6.48E-01	6.74E-01	7.09E-01
Delta			1.05E-01	2.81E-01	4.47E-01	5.74E-01	6.63E-01
Epsilon				6.59E-02	2.63E-01	4.08E-01	5.45E-01
Mu					1.50E-01	2.11E-01	3.93E-01
Omega						8.43E-02	2.28E-01
Sigma							4.34E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.47	6.70	8.93	11.17	13.40	15.63	17.87
N_1	1.3333	0.5000	0.4444	0.3704	0.2963	0.2305	0.1756
N_2	0.5000	1.5000	1.0000	0.7315	0.5694	0.4576	0.3714
N_3		0.0000	0.6667	0.7778	0.7207	0.6286	0.5403

N₄			0.0000	0.3056	0.5046	0.5766	0.5731
N₅				0.0000	0.1435	0.3056	0.4168
N₆					0.0000	0.0687	0.1789
N₇						0.0000	0.0333
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.026

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7866568	0.9484711	0.9808028	0.9999586	6.996E+00	3.801E-01	--
α_2	4.14E-05	5.15E-02	1.92E-02	2.13E-01	3.801E-01	6.996E+00	0.916

CCCG = 3, Gamma = 0.026

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7949290	0.9298906	0.9498220	0.9965156	1.273E+01	9.600E-01	--
α_2	8.88E-04	5.69E-02	3.40E-02	1.91E-01	6.673E-01	1.107E+01	1.326
α_3	1.16E-06	1.32E-02	3.19E-03	6.09E-02	2.927E-01	2.182E+01	0.704

CCCG = 4, Gamma = 0.026

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8231045	0.9271167	0.9393003	0.9893219	2.123E+01	1.669E+00	--
α_2	2.59E-03	4.40E-02	3.19E-02	1.27E-01	1.039E+00	2.256E+01	1.075
α_3	1.89E-05	2.14E-02	7.76E-03	8.90E-02	3.887E-01	1.780E+01	1.394
α_4	8.66E-08	7.49E-03	1.24E-03	3.67E-02	2.414E-01	3.199E+01	0.787

CCCG = 5, Gamma = 0.026

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8705888	0.9340623	0.9394888	0.9789613	4.940E+01	3.487E+00	--
α_2	4.80E-03	3.06E-02	2.54E-02	7.42E-02	1.791E+00	5.670E+01	1.051
α_3	2.04E-03	2.53E-02	1.91E-02	7.02E-02	1.207E+00	4.641E+01	1.290
α_4	1.64E-05	9.21E-03	3.70E-03	3.71E-02	4.340E-01	4.668E+01	1.304
α_5	1.69E-26	7.59E-04	2.70E-08	4.18E-03	5.493E-02	7.233E+01	0.849

CCCG = 6, Gamma = 0.026

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8867744	0.9407209	0.9451451	0.9795314	6.196E+01	3.905E+00	--
α_2	1.67E-03	1.72E-02	1.33E-02	4.63E-02	1.335E+00	7.617E+01	0.988
α_3	3.04E-03	2.46E-02	1.97E-02	6.29E-02	1.531E+00	6.073E+01	1.230
α_4	2.44E-04	1.26E-02	7.51E-03	4.20E-02	7.191E-01	5.656E+01	1.337
α_5	5.75E-08	3.92E-03	6.72E-04	1.90E-02	2.467E-01	6.275E+01	1.216
α_6	1.10E-20	9.96E-04	6.00E-07	5.78E-03	7.279E-02	7.303E+01	1.047

CCCG = 7, Gamma = 0.026

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9066164	0.9463227	0.9490749	0.9766225	1.017E+02	5.770E+00	--
α_2	1.52E-03	1.22E-02	9.74E-03	3.12E-02	1.549E+00	1.255E+02	0.990
α_3	3.38E-03	1.89E-02	1.60E-02	4.46E-02	1.989E+00	1.032E+02	1.196
α_4	1.18E-03	1.31E-02	9.98E-03	3.57E-02	1.287E+00	9.685E+01	1.282
α_5	1.19E-04	7.14E-03	4.15E-03	2.43E-02	6.913E-01	9.618E+01	1.299
α_6	1.60E-08	2.16E-03	3.26E-04	1.07E-02	2.327E-01	1.074E+02	1.170
α_7	1.11E-64	1.63E-04	2.47E-17	4.11E-04	2.112E-02	1.294E+02	0.972

CCCG = 8, Gamma = 0.026

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9188722	0.9513652	0.9534406	0.9767676	1.372E+02	7.016E+00	--
α_2	1.16E-03	9.02E-03	7.23E-03	2.30E-02	1.583E+00	1.739E+02	0.953
α_3	2.43E-03	1.37E-02	1.15E-02	3.23E-02	1.986E+00	1.434E+02	1.151
α_4	1.77E-03	1.26E-02	1.02E-02	3.15E-02	1.672E+00	1.310E+02	1.261
α_5	4.10E-04	7.72E-03	5.40E-03	2.29E-02	1.011E+00	1.300E+02	1.277
α_6	3.30E-05	4.35E-03	2.22E-03	1.59E-02	5.709E-01	1.307E+02	1.275
α_7	2.76E-10	1.20E-03	9.43E-05	6.36E-03	1.809E-01	1.501E+02	1.113
α_8	1.16E-107	8.02E-05	2.43E-27	6.01E-05	1.245E-02	1.552E+02	1.078

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.48E-01	9.30E-01	9.27E-01	9.34E-01	9.41E-01	9.46E-01	9.51E-01
α_2	5.15E-02	5.69E-02	4.40E-02	3.06E-02	1.72E-02	1.22E-02	9.02E-03
α_3		1.32E-02	2.14E-02	2.53E-02	2.46E-02	1.89E-02	1.37E-02
α_4			7.49E-03	9.21E-03	1.26E-02	1.31E-02	1.26E-02
α_5				7.59E-04	3.92E-03	7.14E-03	7.72E-03
α_6					9.96E-04	2.16E-03	4.35E-03
α_7						1.63E-04	1.20E-03
α_8							8.02E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.48E-01	9.30E-01	9.27E-01	9.34E-01	9.41E-01	9.46E-01	9.51E-01
Beta	5.15E-02	7.01E-02	7.29E-02	6.59E-02	5.93E-02	5.37E-02	4.86E-02
Gamma		1.89E-01	3.96E-01	5.36E-01	7.09E-01	7.73E-01	8.15E-01
Delta			2.60E-01	2.82E-01	4.15E-01	5.44E-01	6.55E-01
Epsilon				7.61E-02	2.81E-01	4.19E-01	5.14E-01
Mu					2.03E-01	2.46E-01	4.22E-01
Omega						7.01E-02	2.28E-01
Sigma							6.25E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.33	2.00	2.67	3.33	4.00	4.67	5.33
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 20.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.257

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9555576	0.9886233	0.9950287	0.9999673	4.089E+01	4.706E-01	--
α_2	3.27E-05	1.14E-02	4.97E-03	4.44E-02	4.706E-01	4.089E+01	0.916

CCCG = 3, Gamma = 0.259

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9553553	0.9844560	0.9887196	0.9989805	6.983E+01	1.103E+00	--
α_2	3.77E-04	1.30E-02	8.32E-03	4.19E-02	8.104E-01	6.130E+01	1.326
α_3	2.10E-07	2.50E-03	5.85E-04	1.15E-02	2.921E-01	1.167E+02	0.704

CCCG = 4, Gamma = 0.260

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9634243	0.9845917	0.9870599	0.9973168	1.248E+02	1.953E+00	--
α_2	9.32E-04	9.99E-03	7.63E-03	2.71E-02	1.312E+00	1.301E+02	1.075
α_3	7.16E-06	4.25E-03	1.68E-03	1.72E-02	4.307E-01	1.009E+02	1.394
α_4	2.33E-09	1.17E-03	1.38E-04	5.95E-03	2.099E-01	1.792E+02	0.787

CCCG = 5, Gamma = 0.261

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9698728	0.9854192	0.9869094	0.9958718	2.100E+02	3.107E+00	--
α_2	1.02E-03	7.23E-03	5.88E-03	1.81E-02	1.684E+00	2.312E+02	1.051
α_3	2.20E-04	4.97E-03	3.38E-03	1.52E-02	9.426E-01	1.886E+02	1.290
α_4	1.53E-06	2.03E-03	7.00E-04	8.59E-03	3.816E-01	1.872E+02	1.304
α_5	1.37E-16	3.42E-04	1.87E-06	1.99E-03	9.865E-02	2.881E+02	0.849

CCCG = 6, Gamma = 0.262

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9735423	0.9864508	0.9875831	0.9954904	2.783E+02	3.822E+00	--
α_2	7.66E-04	5.29E-03	4.32E-03	1.32E-02	1.714E+00	3.221E+02	0.988
α_3	2.80E-04	4.26E-03	3.08E-03	1.23E-02	1.108E+00	2.590E+02	1.230
α_4	3.60E-05	2.72E-03	1.52E-03	9.49E-03	6.509E-01	2.387E+02	1.337
α_5	1.91E-08	9.64E-04	1.74E-04	4.64E-03	2.536E-01	2.629E+02	1.216
α_6	5.08E-17	3.13E-04	1.42E-06	1.82E-03	9.572E-02	3.053E+02	1.047

CCCG = 7, Gamma = 0.263

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9766578	0.9870769	0.9878760	0.9947671	3.968E+02	5.195E+00	--
α_2	8.66E-04	4.56E-03	3.87E-03	1.06E-02	2.105E+00	4.592E+02	0.990
α_3	3.25E-04	3.46E-03	2.64E-03	9.39E-03	1.320E+00	3.806E+02	1.196
α_4	1.43E-04	2.80E-03	1.94E-03	8.38E-03	9.967E-01	3.553E+02	1.282
α_5	7.55E-06	1.49E-03	7.09E-04	5.63E-03	5.249E-01	3.512E+02	1.299
α_6	3.72E-10	5.01E-04	4.90E-05	2.60E-03	1.956E-01	3.904E+02	1.170
α_7	3.21E-28	1.13E-04	2.55E-09	6.11E-04	5.291E-02	4.699E+02	0.972

CCCG = 8, Gamma = 0.263

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9786041	0.9878260	0.9884984	0.9947519	4.732E+02	5.832E+00	--
α_2	8.06E-04	3.97E-03	3.40E-03	9.09E-03	2.229E+00	5.590E+02	0.953
α_3	2.33E-04	2.71E-03	2.04E-03	7.48E-03	1.260E+00	4.634E+02	1.151
α_4	1.40E-04	2.46E-03	1.73E-03	7.24E-03	1.042E+00	4.231E+02	1.261
α_5	4.27E-05	1.82E-03	1.11E-03	6.00E-03	7.626E-01	4.182E+02	1.277
α_6	1.78E-07	7.79E-04	2.18E-04	3.47E-03	3.271E-01	4.194E+02	1.275
α_7	2.71E-13	2.80E-04	7.49E-06	1.57E-03	1.344E-01	4.805E+02	1.113
α_8	1.39E-20	1.55E-04	1.45E-07	8.99E-04	7.682E-02	4.962E+02	1.078

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.84E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.14E-02	1.30E-02	9.99E-03	7.23E-03	5.29E-03	4.56E-03	3.97E-03
α_3		2.50E-03	4.25E-03	4.97E-03	4.26E-03	3.46E-03	2.71E-03
α_4			1.17E-03	2.03E-03	2.72E-03	2.80E-03	2.46E-03
α_5				3.42E-04	9.64E-04	1.49E-03	1.82E-03
α_6					3.13E-04	5.01E-04	7.79E-04
α_7						1.13E-04	2.80E-04
α_8							1.55E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.84E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.14E-02	1.55E-02	1.54E-02	1.46E-02	1.35E-02	1.29E-02	1.22E-02
Gamma		1.61E-01	3.52E-01	5.04E-01	6.09E-01	6.47E-01	6.74E-01
Delta			2.16E-01	3.23E-01	4.84E-01	5.87E-01	6.69E-01
Epsilon				1.44E-01	3.20E-01	4.29E-01	5.53E-01
Mu					2.45E-01	2.91E-01	4.00E-01
Omega						1.84E-01	3.58E-01
Sigma							3.56E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	13.33	20.00	26.67	33.33	40.00	46.67	53.33
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 8.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.103

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9847700	0.9960481	0.9982149	0.9999855	1.243E+02	4.932E-01	--
α_2	1.45E-05	3.95E-03	1.79E-03	1.52E-02	4.932E-01	1.243E+02	0.916

CCCG = 3, Gamma = 0.104

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9863870	0.9953516	0.9966962	0.9997246	2.269E+02	1.059E+00	--
α_2	6.92E-05	3.70E-03	2.18E-03	1.25E-02	7.137E-01	1.923E+02	1.326
α_3	3.42E-07	9.51E-04	2.87E-04	4.15E-03	3.458E-01	3.633E+02	0.704

CCCG = 4, Gamma = 0.104

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9893392	0.9954170	0.9961101	0.9991255	4.593E+02	2.115E+00	--
α_2	4.16E-04	3.36E-03	2.68E-03	8.65E-03	1.549E+00	4.594E+02	1.075
α_3	2.33E-08	7.45E-04	1.46E-04	3.54E-03	2.646E-01	3.551E+02	1.394
α_4	5.28E-08	4.78E-04	1.17E-04	2.18E-03	3.010E-01	6.293E+02	0.787

CCCG = 5, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9923936	0.9957751	0.9960343	0.9982713	1.255E+03	5.325E+00	--
α_2	8.59E-04	2.69E-03	2.45E-03	5.35E-03	3.632E+00	1.345E+03	1.051
α_3	1.21E-04	1.23E-03	9.47E-04	3.32E-03	1.354E+00	1.096E+03	1.290
α_4	2.59E-08	2.73E-04	6.51E-05	1.25E-03	2.961E-01	1.086E+03	1.304
α_5	7.57E-35	2.54E-05	2.80E-11	1.26E-04	4.243E-02	1.669E+03	0.849

CCCG = 6, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9922991	0.9958014	0.9960791	0.9983554	1.171E+03	4.936E+00	--
α_2	5.97E-04	2.24E-03	1.99E-03	4.74E-03	2.915E+00	1.297E+03	0.988
α_3	1.03E-04	1.20E-03	9.05E-04	3.33E-03	1.257E+00	1.043E+03	1.230
α_4	2.13E-06	5.24E-04	2.40E-04	2.01E-03	5.031E-01	9.600E+02	1.337
α_5	3.17E-15	1.09E-04	1.44E-06	6.27E-04	1.155E-01	1.056E+03	1.216
α_6	5.54E-13	1.18E-04	4.33E-06	6.56E-04	1.451E-01	1.226E+03	1.047

CCCG = 7, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9938453	0.9961045	0.9962371	0.9979110	2.469E+03	9.654E+00	--
α_2	6.77E-04	1.75E-03	1.63E-03	3.22E-03	4.851E+00	2.772E+03	0.990
α_3	3.12E-04	1.22E-03	1.08E-03	2.61E-03	2.800E+00	2.296E+03	1.196
α_4	6.59E-05	6.45E-04	4.98E-04	1.73E-03	1.384E+00	2.144E+03	1.282
α_5	8.19E-07	2.32E-04	1.04E-04	8.96E-04	4.902E-01	2.117E+03	1.299
α_6	1.16E-15	4.87E-05	6.18E-07	2.80E-04	1.146E-01	2.351E+03	1.170
α_7	2.72E-93	5.17E-06	5.51E-25	6.15E-06	1.464E-02	2.829E+03	0.972

CCCG = 8, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9936909	0.9962496	0.9964217	0.9982207	1.899E+03	7.148E+00	--
α_2	3.69E-04	1.36E-03	1.21E-03	2.86E-03	2.980E+00	2.189E+03	0.953
α_3	1.87E-04	1.08E-03	9.03E-04	2.58E-03	1.960E+00	1.813E+03	1.151
α_4	5.15E-05	7.04E-04	5.16E-04	2.00E-03	1.166E+00	1.655E+03	1.261
α_5	1.87E-06	3.29E-04	1.59E-04	1.23E-03	5.375E-01	1.635E+03	1.277
α_6	2.43E-11	1.10E-04	8.54E-06	5.82E-04	1.805E-01	1.639E+03	1.275
α_7	1.14E-35	2.21E-05	1.65E-11	1.08E-04	4.139E-02	1.877E+03	1.113
α_8	8.90E-09	1.46E-04	3.22E-05	6.80E-04	2.827E-01	1.938E+03	1.078

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	3.95E-03	3.70E-03	3.36E-03	2.69E-03	2.24E-03	1.75E-03	1.36E-03
α_3		9.51E-04	7.45E-04	1.23E-03	1.20E-03	1.22E-03	1.08E-03
α_4			4.78E-04	2.73E-04	5.24E-04	6.45E-04	7.04E-04
α_5				2.54E-05	1.09E-04	2.32E-04	3.29E-04
α_6					1.18E-04	4.87E-05	1.10E-04
α_7						5.17E-06	2.21E-05
α_8							1.46E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	3.95E-03	4.65E-03	4.58E-03	4.22E-03	4.20E-03	3.90E-03	3.75E-03
Gamma		2.05E-01	2.67E-01	3.62E-01	4.66E-01	5.52E-01	6.37E-01
Delta			3.91E-01	1.95E-01	3.84E-01	4.33E-01	5.48E-01
Epsilon				8.53E-02	3.03E-01	3.07E-01	4.63E-01
Mu					5.20E-01	1.89E-01	4.58E-01
Omega						9.60E-02	6.04E-01
Sigma							8.69E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.33	8.00	10.67	13.33	16.00	18.67	21.33
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.2 Turbine-Driven Pumps

2.2.1 Main Feedwater Turbine-Driven Pumps

2.2.1.1 MFW-TDP-FS: MFW Turbine-Driven Pumps Fail to Start

Generic CCF Parameters

System Group: Clean Water
System: Main Feedwater
Component Group: Pump
Component Type: Turbine Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Start
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 5.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9344075	0.9831957	0.9926358	0.9999492	1.0000000	2.741E+01	4.685E-01
α_2	4.76E-05	1.68E-02	7.37E-03	6.56E-02	0.00E+00	4.685E-01	2.741E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9499123	0.9824038	0.9871113	0.9987856	1.0000000	6.298E+01	1.128E+00
α_2	4.46E-04	1.33E-02	8.67E-03	4.18E-02	0.00E+00	8.512E-01	6.326E+01
α_3	2.16E-07	4.32E-03	9.26E-04	2.03E-02	0.00E+00	2.768E-01	6.383E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9535624	0.9805921	0.9837738	0.9967462	1.0000000	9.568E+01	1.894E+00
α_2	1.12E-03	1.29E-02	9.77E-03	3.55E-02	0.00E+00	1.260E+00	9.631E+01
α_3	4.49E-06	4.12E-03	1.52E-03	1.71E-02	0.00E+00	4.024E-01	9.717E+01
α_4	1.65E-08	2.37E-03	3.54E-04	1.17E-02	0.00E+00	2.315E-01	9.734E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9654219	0.9827764	0.9843634	0.9947051	1.0000000	1.958E+02	3.432E+00
α_2	1.64E-03	9.66E-03	8.07E-03	2.31E-02	0.00E+00	1.924E+00	1.973E+02
α_3	3.05E-04	5.26E-03	3.73E-03	1.55E-02	0.00E+00	1.049E+00	1.982E+02
α_4	1.46E-06	1.92E-03	6.61E-04	8.09E-03	0.00E+00	3.822E-01	1.989E+02
α_5	3.35E-20	3.85E-04	3.59E-07	2.24E-03	0.00E+00	7.674E-02	1.992E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
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α_1	0.9680677	0.9836153	0.9849709	0.9945233	1.0000000	2.302E+02	3.835E+00
α_2	1.04E-03	7.27E-03	5.92E-03	1.81E-02	0.00E+00	1.701E+00	2.324E+02
α_3	4.07E-04	5.16E-03	3.83E-03	1.44E-02	0.00E+00	1.207E+00	2.328E+02
α_4	2.33E-05	2.55E-03	1.34E-03	9.17E-03	0.00E+00	5.960E-01	2.335E+02
α_5	3.70E-09	9.45E-04	1.26E-04	4.74E-03	0.00E+00	2.211E-01	2.338E+02
α_6	3.69E-15	4.69E-04	4.75E-06	2.71E-03	0.00E+00	1.098E-01	2.339E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9735302	0.9849761	0.9858111	0.9935639	1.0000000	3.768E+02	5.747E+00
α_2	1.20E-03	5.86E-03	5.03E-03	1.34E-02	0.00E+00	2.243E+00	3.803E+02
α_3	5.72E-04	4.26E-03	3.43E-03	1.08E-02	0.00E+00	1.630E+00	3.809E+02
α_4	1.76E-04	2.83E-03	2.03E-03	8.23E-03	0.00E+00	1.083E+00	3.815E+02
α_5	1.07E-05	1.48E-03	7.45E-04	5.43E-03	0.00E+00	5.654E-01	3.820E+02
α_6	2.75E-10	5.01E-04	4.63E-05	2.61E-03	0.00E+00	1.916E-01	3.824E+02
α_7	6.23E-41	9.10E-05	3.38E-12	3.99E-04	0.00E+00	3.480E-02	3.825E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9747953	0.9857127	0.9865111	0.9938970	1.0000000	3.950E+02	5.726E+00
α_2	9.08E-04	5.04E-03	4.24E-03	1.19E-02	0.00E+00	2.018E+00	3.987E+02
α_3	3.58E-04	3.47E-03	2.69E-03	9.26E-03	0.00E+00	1.391E+00	3.994E+02
α_4	1.58E-04	2.65E-03	1.88E-03	7.76E-03	0.00E+00	1.062E+00	3.997E+02
α_5	3.09E-05	1.75E-03	1.02E-03	5.95E-03	0.00E+00	7.026E-01	4.000E+02
α_6	3.43E-07	8.73E-04	2.68E-04	3.80E-03	0.00E+00	3.497E-01	4.004E+02
α_7	1.32E-15	2.69E-04	2.47E-06	1.55E-03	0.00E+00	1.078E-01	4.006E+02
α_8	2.75E-17	2.36E-04	1.00E-06	1.38E-03	0.00E+00	9.469E-02	4.007E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.68E-02	1.33E-02	1.29E-02	9.66E-03	7.27E-03	5.86E-03	5.04E-03
α_3		4.32E-03	4.12E-03	5.26E-03	5.16E-03	4.26E-03	3.47E-03
α_4			2.37E-03	1.92E-03	2.55E-03	2.83E-03	2.65E-03
α_5				3.85E-04	9.45E-04	1.48E-03	1.75E-03
α_6					4.69E-04	5.01E-04	8.73E-04
α_7						9.10E-05	2.69E-04
α_8							2.36E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.68E-02	1.76E-02	1.94E-02	1.72E-02	1.64E-02	1.50E-02	1.43E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01

Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.00	5.00	5.00	5.00	5.00	5.00	5.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9705738	0.9924070	0.9966159	0.9999748	6.318E+01	4.834E-01	--
α_2	2.52E-05	7.59E-03	3.38E-03	2.94E-02	4.834E-01	6.318E+01	0.728

CCCG = 3, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9807590	0.9930804	0.9948261	0.9994358	1.759E+02	1.226E+00	--
α_2	2.77E-04	5.69E-03	3.92E-03	1.71E-02	9.769E-01	1.706E+02	0.775
α_3	1.96E-08	1.23E-03	2.13E-04	5.95E-03	2.487E-01	2.024E+02	0.656

CCCG = 4, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9799860	0.9914553	0.9927732	0.9984191	2.387E+02	2.057E+00	--
α_2	6.74E-04	6.11E-03	4.79E-03	1.61E-02	1.442E+00	2.344E+02	0.789
α_3	2.02E-06	1.62E-03	6.07E-04	6.65E-03	4.114E-01	2.540E+02	0.731
α_4	1.07E-09	8.13E-04	8.86E-05	4.17E-03	2.036E-01	2.503E+02	0.742

CCCG = 5, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9837300	0.9917661	0.9924870	0.9973395	4.436E+02	3.683E+00	--
α_2	1.06E-03	5.18E-03	4.44E-03	1.18E-02	2.243E+00	4.308E+02	0.823
α_3	1.06E-04	2.10E-03	1.45E-03	6.31E-03	9.912E-01	4.703E+02	0.756
α_4	5.30E-07	7.78E-04	2.63E-04	3.30E-03	3.765E-01	4.838E+02	0.736
α_5	1.50E-21	1.73E-04	9.86E-08	1.00E-03	7.237E-02	4.182E+02	0.852

CCCG = 6, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9837880	0.9915365	0.9921968	0.9970291	4.849E+02	4.139E+00	--
α_2	8.97E-04	4.67E-03	3.96E-03	1.08E-02	2.128E+00	4.539E+02	0.891
α_3	1.45E-04	2.10E-03	1.53E-03	6.01E-03	1.134E+00	5.387E+02	0.753
α_4	6.61E-06	1.01E-03	5.02E-04	3.75E-03	5.533E-01	5.458E+02	0.744
α_5	1.60E-09	4.12E-04	5.49E-05	2.06E-03	2.210E-01	5.367E+02	0.757
α_6	3.47E-16	2.73E-04	1.90E-06	1.58E-03	1.027E-01	3.766E+02	1.079

CCCG = 7, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9864798	0.9921413	0.9925386	0.9964466	8.120E+02	6.432E+00	--
α_2	1.01E-03	3.88E-03	3.44E-03	8.26E-03	2.840E+00	7.293E+02	0.942
α_3	2.88E-04	1.94E-03	1.59E-03	4.81E-03	1.746E+00	8.967E+02	0.768
α_4	7.48E-05	1.20E-03	8.60E-04	3.50E-03	1.084E+00	9.009E+02	0.764
α_5	3.35E-06	5.90E-04	2.86E-04	2.21E-03	5.376E-01	9.106E+02	0.757
α_6	1.84E-10	2.10E-04	2.12E-05	1.08E-03	1.979E-01	9.437E+02	0.731
α_7	7.75E-53	3.46E-05	3.46E-15	1.18E-04	2.656E-02	7.680E+02	0.898

CCCG = 8, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9866191	0.9923130	0.9927218	0.9966111	7.890E+02	6.112E+00	--
α_2	7.25E-04	3.35E-03	2.89E-03	7.53E-03	2.364E+00	7.035E+02	0.976
α_3	2.08E-04	1.75E-03	1.38E-03	4.54E-03	1.512E+00	8.637E+02	0.797
α_4	6.75E-05	1.15E-03	8.16E-04	3.38E-03	1.056E+00	9.158E+02	0.752
α_5	1.15E-05	7.58E-04	4.32E-04	2.62E-03	6.745E-01	8.887E+02	0.775
α_6	4.55E-08	3.39E-04	8.61E-05	1.54E-03	3.076E-01	9.074E+02	0.759
α_7	7.53E-16	1.08E-04	1.06E-06	6.21E-04	1.093E-01	1.015E+03	0.679
α_8	3.61E-18	2.34E-04	6.49E-07	1.36E-03	8.885E-02	3.802E+02	1.812

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.93E-01	9.91E-01	9.92E-01	9.92E-01	9.92E-01	9.92E-01
α_2	7.59E-03	5.69E-03	6.11E-03	5.18E-03	4.67E-03	3.88E-03	3.35E-03
α_3		1.23E-03	1.62E-03	2.10E-03	2.10E-03	1.94E-03	1.75E-03
α_4			8.13E-04	7.78E-04	1.01E-03	1.20E-03	1.15E-03
α_5				1.73E-04	4.12E-04	5.90E-04	7.58E-04
α_6					2.73E-04	2.10E-04	3.39E-04
α_7						3.46E-05	1.08E-04
α_8							2.34E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.93E-01	9.91E-01	9.92E-01	9.92E-01	9.92E-01	9.92E-01
Beta	7.59E-03	6.92E-03	8.54E-03	8.23E-03	8.46E-03	7.86E-03	7.69E-03
Gamma		1.77E-01	2.84E-01	3.71E-01	4.49E-01	5.06E-01	5.64E-01
Delta			3.35E-01	3.11E-01	4.47E-01	5.12E-01	5.97E-01
Epsilon				1.82E-01	4.03E-01	4.10E-01	5.55E-01
Mu					3.98E-01	2.93E-01	4.73E-01
Omega						1.42E-01	5.02E-01
Sigma							6.85E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8209865	0.9569483	0.9841971	0.9999660	8.449E+00	3.801E-01	--
α_2	3.40E-05	4.31E-02	1.58E-02	1.79E-01	3.801E-01	8.449E+00	0.728

CCCG = 3, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8558148	0.9513165	0.9656773	0.9976348	1.876E+01	9.600E-01	--
α_2	5.39E-04	3.55E-02	2.08E-02	1.21E-01	6.673E-01	1.813E+01	0.775
α_3	1.16E-06	1.32E-02	3.17E-03	6.07E-02	2.927E-01	2.191E+01	0.656

CCCG = 4, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8673918	0.9458788	0.9552657	0.9921844	2.917E+01	1.669E+00	--
α_2	2.01E-03	3.46E-02	2.49E-02	1.00E-01	1.039E+00	2.901E+01	0.789
α_3	1.04E-05	1.20E-02	4.29E-03	5.01E-02	3.887E-01	3.204E+01	0.731
α_4	8.74E-08	7.56E-03	1.25E-03	3.70E-02	2.414E-01	3.168E+01	0.742

CCCG = 5, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9079469	0.9534437	0.9574338	0.9852908	7.141E+01	3.487E+00	--
α_2	3.90E-03	2.49E-02	2.07E-02	6.06E-02	1.791E+00	7.005E+01	0.823
α_3	1.23E-03	1.54E-02	1.15E-02	4.30E-02	1.207E+00	7.700E+01	0.756
α_4	9.56E-06	5.40E-03	2.16E-03	2.18E-02	4.340E-01	7.990E+01	0.736
α_5	1.76E-26	7.92E-04	2.82E-08	4.36E-03	5.493E-02	6.934E+01	0.852

CCCG = 6, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9179229	0.9572870	0.9605868	0.9853673	8.751E+01	3.905E+00	--
α_2	1.57E-03	1.62E-02	1.25E-02	4.35E-02	1.335E+00	8.122E+01	0.891
α_3	1.92E-03	1.57E-02	1.25E-02	4.02E-02	1.531E+00	9.620E+01	0.753
α_4	1.40E-04	7.27E-03	4.33E-03	2.44E-02	7.191E-01	9.818E+01	0.744
α_5	3.71E-08	2.54E-03	4.34E-04	1.23E-02	2.467E-01	9.695E+01	0.757
α_6	1.18E-20	1.07E-03	6.43E-07	6.19E-03	7.279E-02	6.812E+01	1.079

CCCG = 7, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9330190	0.9616810	0.9637103	0.9834094	1.448E+02	5.770E+00	--
α_2	1.49E-03	1.19E-02	9.54E-03	3.06E-02	1.549E+00	1.282E+02	0.942
α_3	2.22E-03	1.25E-02	1.05E-02	2.95E-02	1.989E+00	1.572E+02	0.768
α_4	7.24E-04	8.05E-03	6.11E-03	2.20E-02	1.287E+00	1.585E+02	0.764
α_5	7.14E-05	4.28E-03	2.48E-03	1.46E-02	6.913E-01	1.607E+02	0.757
α_6	1.03E-08	1.39E-03	2.09E-04	6.88E-03	2.327E-01	1.670E+02	0.731
α_7	1.05E-64	1.55E-04	2.35E-17	3.91E-04	2.112E-02	1.361E+02	0.898

CCCG = 8, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9409722	0.9647474	0.9662947	0.9832377	1.920E+02	7.016E+00	--
α_2	1.22E-03	9.48E-03	7.61E-03	2.42E-02	1.583E+00	1.654E+02	0.976
α_3	1.72E-03	9.70E-03	8.16E-03	2.30E-02	1.986E+00	2.027E+02	0.797
α_4	1.08E-03	7.71E-03	6.26E-03	1.93E-02	1.672E+00	2.152E+02	0.752
α_5	2.54E-04	4.81E-03	3.36E-03	1.43E-02	1.011E+00	2.094E+02	0.775
α_6	2.01E-05	2.66E-03	1.35E-03	9.73E-03	5.709E-01	2.141E+02	0.759
α_7	1.73E-10	7.53E-04	5.89E-05	3.98E-03	1.809E-01	2.400E+02	0.679
α_8	2.00E-107	1.38E-04	4.20E-27	1.04E-04	1.245E-02	8.993E+01	1.812

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.57E-01	9.51E-01	9.46E-01	9.53E-01	9.57E-01	9.62E-01	9.65E-01
α_2	4.31E-02	3.55E-02	3.46E-02	2.49E-02	1.62E-02	1.19E-02	9.48E-03
α_3		1.32E-02	1.20E-02	1.54E-02	1.57E-02	1.25E-02	9.70E-03
α_4			7.56E-03	5.40E-03	7.27E-03	8.05E-03	7.71E-03
α_5				7.92E-04	2.54E-03	4.28E-03	4.81E-03
α_6					1.07E-03	1.39E-03	2.66E-03
α_7						1.55E-04	7.53E-04
α_8							1.38E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.57E-01	9.51E-01	9.46E-01	9.53E-01	9.57E-01	9.62E-01	9.65E-01
Beta	4.31E-02	4.87E-02	5.41E-02	4.66E-02	4.27E-02	3.83E-02	3.53E-02
Gamma		2.71E-01	3.61E-01	4.65E-01	6.21E-01	6.88E-01	7.31E-01
Delta			3.87E-01	2.86E-01	4.10E-01	5.26E-01	6.23E-01
Epsilon				1.28E-01	3.31E-01	4.20E-01	5.20E-01
Mu					2.96E-01	2.65E-01	4.25E-01
Omega						1.00E-01	2.51E-01
Sigma							1.55E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9496719	0.9871080	0.9943549	0.9999628	3.603E+01	4.706E-01	--
α_2	3.72E-05	1.29E-02	5.65E-03	5.03E-02	4.706E-01	3.603E+01	0.728

CCCG = 3, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9633875	0.9872708	0.9907779	0.9991673	8.551E+01	1.103E+00	--
α_2	2.81E-04	9.75E-03	6.20E-03	3.13E-02	8.104E-01	8.228E+01	0.775
α_3	2.50E-07	2.98E-03	6.98E-04	1.37E-02	2.921E-01	9.785E+01	0.656

CCCG = 4, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9693099	0.9870856	0.9891635	0.9977549	1.492E+02	1.953E+00	--
α_2	8.28E-04	8.88E-03	6.78E-03	2.41E-02	1.312E+00	1.465E+02	0.789
α_3	4.54E-06	2.70E-03	1.07E-03	1.09E-02	4.307E-01	1.590E+02	0.731
α_4	2.66E-09	1.34E-03	1.58E-04	6.80E-03	2.099E-01	1.568E+02	0.742

CCCG = 5, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9761138	0.9884531	0.9896400	0.9967360	2.660E+02	3.107E+00	--
α_2	9.17E-04	6.50E-03	5.28E-03	1.62E-02	1.684E+00	2.576E+02	0.823
α_3	1.48E-04	3.34E-03	2.27E-03	1.02E-02	9.426E-01	2.812E+02	0.756
α_4	9.88E-07	1.32E-03	4.52E-04	5.56E-03	3.816E-01	2.895E+02	0.736
α_5	1.57E-16	3.94E-04	2.16E-06	2.29E-03	9.865E-02	2.503E+02	0.852

CCCG = 6, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9782247	0.9888582	0.9897936	0.9962958	3.392E+02	3.822E+00	--
α_2	7.84E-04	5.42E-03	4.42E-03	1.35E-02	1.714E+00	3.146E+02	0.891
α_3	1.94E-04	2.96E-03	2.13E-03	8.54E-03	1.108E+00	3.734E+02	0.753
α_4	2.27E-05	1.72E-03	9.57E-04	6.00E-03	6.509E-01	3.783E+02	0.744
α_5	1.35E-08	6.81E-04	1.23E-04	3.28E-03	2.536E-01	3.722E+02	0.757
α_6	5.94E-17	3.66E-04	1.66E-06	2.13E-03	9.572E-02	2.612E+02	1.079

CCCG = 7, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9809450	0.9894583	0.9901131	0.9957355	4.876E+02	5.195E+00	--
α_2	9.13E-04	4.81E-03	4.08E-03	1.12E-02	2.105E+00	4.355E+02	0.942
α_3	2.31E-04	2.46E-03	1.87E-03	6.68E-03	1.320E+00	5.357E+02	0.768
α_4	9.42E-05	1.85E-03	1.28E-03	5.54E-03	9.967E-01	5.382E+02	0.764
α_5	4.87E-06	9.64E-04	4.58E-04	3.64E-03	5.249E-01	5.442E+02	0.757
α_6	2.58E-10	3.47E-04	3.39E-05	1.80E-03	1.956E-01	5.640E+02	0.731
α_7	3.29E-28	1.15E-04	2.61E-09	6.25E-04	5.291E-02	4.591E+02	0.898

CCCG = 8, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9817036	0.9895951	0.9901717	0.9955175	5.547E+02	5.832E+00	--
α_2	9.13E-04	4.50E-03	3.85E-03	1.03E-02	2.229E+00	4.932E+02	0.976
α_3	1.78E-04	2.07E-03	1.56E-03	5.73E-03	1.260E+00	6.060E+02	0.797
α_4	9.20E-05	1.62E-03	1.14E-03	4.78E-03	1.042E+00	6.425E+02	0.752
α_5	2.87E-05	1.22E-03	7.47E-04	4.03E-03	7.626E-01	6.235E+02	0.775
α_6	1.17E-07	5.13E-04	1.43E-04	2.28E-03	3.271E-01	6.368E+02	0.759
α_7	1.83E-13	1.89E-04	5.05E-06	1.06E-03	1.344E-01	7.126E+02	0.679
α_8	2.60E-20	2.88E-04	2.70E-07	1.67E-03	7.682E-02	2.668E+02	1.812

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01
α_2	1.29E-02	9.75E-03	8.88E-03	6.50E-03	5.42E-03	4.81E-03	4.50E-03
α_3		2.98E-03	2.70E-03	3.34E-03	2.96E-03	2.46E-03	2.07E-03
α_4			1.34E-03	1.32E-03	1.72E-03	1.85E-03	1.62E-03
α_5				3.94E-04	6.81E-04	9.64E-04	1.22E-03
α_6					3.66E-04	3.47E-04	5.13E-04
α_7						1.15E-04	1.89E-04
α_8							2.88E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01
Beta	1.29E-02	1.27E-02	1.29E-02	1.15E-02	1.11E-02	1.05E-02	1.04E-02
Gamma		2.34E-01	3.13E-01	4.37E-01	5.14E-01	5.44E-01	5.68E-01
Delta			3.31E-01	3.39E-01	4.83E-01	5.71E-01	6.49E-01
Epsilon				2.30E-01	3.79E-01	4.35E-01	5.77E-01
Mu					3.50E-01	3.24E-01	4.48E-01
Omega						2.49E-01	4.81E-01
Sigma							6.04E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.2.1.2 MFW-TDP-FR: MFW Turbine-Driven Pumps Fail to Run

Generic CCF Parameters

System Group: Clean Water
System: Main Feedwater
Component Group: Pump
Component Type: Turbine Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 61.7

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9782711	0.9944606	0.9976118	0.9999830	1.0000000	8.411E+01	4.685E-01
α_2	1.54E-05	5.54E-03	2.39E-03	2.17E-02	0.00E+00	4.685E-01	8.411E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9733126	0.9906625	0.9931930	0.9993564	1.0000000	1.197E+02	1.128E+00
α_2	2.35E-04	7.05E-03	4.58E-03	2.23E-02	0.00E+00	8.512E-01	1.200E+02
α_3	1.14E-07	2.29E-03	4.89E-04	1.08E-02	0.00E+00	2.768E-01	1.205E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9705338	0.9877253	0.9897597	0.9979473	1.0000000	1.524E+02	1.894E+00
α_2	7.04E-04	8.17E-03	6.16E-03	2.25E-02	0.00E+00	1.260E+00	1.530E+02
α_3	2.83E-06	2.61E-03	9.57E-04	1.08E-02	0.00E+00	4.024E-01	1.539E+02
α_4	1.04E-08	1.50E-03	2.23E-04	7.43E-03	0.00E+00	2.315E-01	1.540E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9730444	0.9865916	0.9878397	0.9958814	1.0000000	2.525E+02	3.432E+00
α_2	1.28E-03	7.52E-03	6.28E-03	1.80E-02	0.00E+00	1.924E+00	2.540E+02
α_3	2.37E-04	4.10E-03	2.90E-03	1.20E-02	0.00E+00	1.049E+00	2.549E+02
α_4	1.13E-06	1.49E-03	5.14E-04	6.30E-03	0.00E+00	3.822E-01	2.556E+02
α_5	2.60E-20	3.00E-04	2.79E-07	1.74E-03	0.00E+00	7.674E-02	2.559E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9742614	0.9868104	0.9879122	0.9955982	1.0000000	2.869E+02	3.835E+00
α_2	8.38E-04	5.85E-03	4.76E-03	1.46E-02	0.00E+00	1.701E+00	2.891E+02
α_3	3.27E-04	4.15E-03	3.08E-03	1.16E-02	0.00E+00	1.207E+00	2.895E+02

α_4	1.88E-05	2.05E-03	1.08E-03	7.39E-03	0.00E+00	5.960E-01	2.902E+02
α_5	2.98E-09	7.60E-04	1.02E-04	3.81E-03	0.00E+00	2.211E-01	2.905E+02
α_6	2.97E-15	3.78E-04	3.82E-06	2.18E-03	0.00E+00	1.098E-01	2.906E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9769286	0.9869154	0.9876503	0.9943983	1.0000000	4.335E+02	5.747E+00
α_2	1.04E-03	5.11E-03	4.38E-03	1.17E-02	0.00E+00	2.243E+00	4.370E+02
α_3	4.98E-04	3.71E-03	2.99E-03	9.39E-03	0.00E+00	1.630E+00	4.376E+02
α_4	1.53E-04	2.47E-03	1.76E-03	7.17E-03	0.00E+00	1.083E+00	4.382E+02
α_5	9.30E-06	1.29E-03	6.49E-04	4.73E-03	0.00E+00	5.654E-01	4.387E+02
α_6	2.39E-10	4.36E-04	4.03E-05	2.27E-03	0.00E+00	1.916E-01	4.391E+02
α_7	5.43E-41	7.92E-05	2.95E-12	3.47E-04	0.00E+00	3.480E-02	4.392E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9779110	0.9874836	0.9881896	0.9946535	1.0000000	4.517E+02	5.726E+00
α_2	7.95E-04	4.41E-03	3.71E-03	1.04E-02	0.00E+00	2.018E+00	4.554E+02
α_3	3.14E-04	3.04E-03	2.35E-03	8.11E-03	0.00E+00	1.391E+00	4.561E+02
α_4	1.38E-04	2.32E-03	1.65E-03	6.80E-03	0.00E+00	1.062E+00	4.564E+02
α_5	2.71E-05	1.54E-03	8.97E-04	5.22E-03	0.00E+00	7.026E-01	4.567E+02
α_6	3.00E-07	7.65E-04	2.35E-04	3.32E-03	0.00E+00	3.497E-01	4.571E+02
α_7	1.15E-15	2.36E-04	2.16E-06	1.36E-03	0.00E+00	1.078E-01	4.573E+02
α_8	2.41E-17	2.07E-04	8.77E-07	1.21E-03	0.00E+00	9.469E-02	4.574E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.91E-01	9.88E-01	9.87E-01	9.87E-01	9.87E-01	9.87E-01
α_2	5.54E-03	7.05E-03	8.17E-03	7.52E-03	5.85E-03	5.11E-03	4.41E-03
α_3		2.29E-03	2.61E-03	4.10E-03	4.15E-03	3.71E-03	3.04E-03
α_4			1.50E-03	1.49E-03	2.05E-03	2.47E-03	2.32E-03
α_5				3.00E-04	7.60E-04	1.29E-03	1.54E-03
α_6					3.78E-04	4.36E-04	7.65E-04
α_7						7.92E-05	2.36E-04
α_8							2.07E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.91E-01	9.88E-01	9.87E-01	9.87E-01	9.87E-01	9.87E-01
Beta	5.54E-03	9.34E-03	1.23E-02	1.34E-02	1.32E-02	1.31E-02	1.25E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	61.70	61.70	61.70	61.70	61.70	61.70	61.70
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 15.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.245

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9857588	0.9963314	0.9983734	0.9999879	1.313E+02	4.834E-01	--
α_2	1.21E-05	3.67E-03	1.63E-03	1.42E-02	4.834E-01	1.313E+02	0.451

CCCG = 3, Gamma = 0.245

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9863970	0.9951129	0.9963498	0.9996023	2.496E+02	1.226E+00	--
α_2	1.89E-04	3.90E-03	2.68E-03	1.17E-02	9.769E-01	2.497E+02	0.583
α_3	1.58E-08	9.90E-04	1.71E-04	4.80E-03	2.487E-01	2.510E+02	0.581

CCCG = 4, Gamma = 0.245

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9840482	0.9931948	0.9942476	0.9987423	3.002E+02	2.057E+00	--
α_2	5.23E-04	4.75E-03	3.71E-03	1.25E-02	1.442E+00	3.023E+02	0.655
α_3	1.71E-06	1.36E-03	5.12E-04	5.61E-03	4.114E-01	3.012E+02	0.660
α_4	9.09E-10	6.93E-04	7.55E-05	3.56E-03	2.036E-01	2.935E+02	0.678

CCCG = 5, Gamma = 0.245

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9850906	0.9924565	0.9931178	0.9975634	4.846E+02	3.683E+00	--
α_2	9.40E-04	4.60E-03	3.94E-03	1.05E-02	2.243E+00	4.856E+02	0.757
α_3	1.01E-04	2.02E-03	1.39E-03	6.05E-03	9.912E-01	4.905E+02	0.751
α_4	5.29E-07	7.76E-04	2.62E-04	3.29E-03	3.765E-01	4.849E+02	0.761
α_5	1.32E-21	1.53E-04	8.71E-08	8.83E-04	7.237E-02	4.734E+02	0.780

CCCG = 6, Gamma = 0.245

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9853576	0.9923580	0.9929552	0.9973184	5.375E+02	4.139E+00	--
α_2	7.48E-04	3.89E-03	3.31E-03	9.04E-03	2.128E+00	5.446E+02	0.767
α_3	1.43E-04	2.07E-03	1.51E-03	5.94E-03	1.134E+00	5.459E+02	0.767
α_4	6.63E-06	1.01E-03	5.03E-04	3.76E-03	5.533E-01	5.446E+02	0.770
α_5	1.58E-09	4.05E-04	5.41E-05	2.03E-03	2.210E-01	5.449E+02	0.770
α_6	3.26E-16	2.56E-04	1.78E-06	1.49E-03	1.027E-01	4.007E+02	1.047

CCCG = 7, Gamma = 0.245

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9872425	0.9925856	0.9929607	0.9966480	8.611E+02	6.432E+00	--
α_2	8.38E-04	3.22E-03	2.86E-03	6.86E-03	2.840E+00	8.782E+02	0.797
α_3	3.04E-04	2.05E-03	1.68E-03	5.07E-03	1.746E+00	8.501E+02	0.825
α_4	7.83E-05	1.26E-03	8.99E-04	3.66E-03	1.084E+00	8.617E+02	0.814
α_5	3.51E-06	6.17E-04	2.99E-04	2.31E-03	5.376E-01	8.703E+02	0.807
α_6	2.05E-10	2.33E-04	2.36E-05	1.21E-03	1.979E-01	8.474E+02	0.829
α_7	7.64E-53	3.41E-05	3.42E-15	1.17E-04	2.656E-02	7.782E+02	0.903

CCCG = 8, Gamma = 0.245

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9877149	0.9929438	0.9933196	0.9968899	8.601E+02	6.112E+00	--
α_2	5.71E-04	2.64E-03	2.28E-03	5.94E-03	2.364E+00	8.926E+02	0.785
α_3	2.11E-04	1.77E-03	1.40E-03	4.61E-03	1.512E+00	8.504E+02	0.824
α_4	7.29E-05	1.24E-03	8.81E-04	3.65E-03	1.056E+00	8.483E+02	0.827
α_5	1.18E-05	7.77E-04	4.43E-04	2.68E-03	6.745E-01	8.670E+02	0.809
α_6	4.70E-08	3.50E-04	8.88E-05	1.59E-03	3.076E-01	8.797E+02	0.798
α_7	9.39E-16	1.34E-04	1.32E-06	7.74E-04	1.093E-01	8.144E+02	0.862
α_8	2.09E-18	1.36E-04	3.76E-07	7.90E-04	8.885E-02	6.555E+02	1.071

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.95E-01	9.93E-01	9.92E-01	9.92E-01	9.93E-01	9.93E-01
α_2	3.67E-03	3.90E-03	4.75E-03	4.60E-03	3.89E-03	3.22E-03	2.64E-03
α_3		9.90E-04	1.36E-03	2.02E-03	2.07E-03	2.05E-03	1.77E-03
α_4			6.93E-04	7.76E-04	1.01E-03	1.26E-03	1.24E-03
α_5				1.53E-04	4.05E-04	6.17E-04	7.77E-04
α_6					2.56E-04	2.33E-04	3.50E-04
α_7						3.41E-05	1.34E-04
α_8							1.36E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.95E-01	9.93E-01	9.92E-01	9.92E-01	9.93E-01	9.93E-01
Beta	3.67E-03	4.89E-03	6.81E-03	7.54E-03	7.64E-03	7.41E-03	7.06E-03
Gamma		2.03E-01	3.02E-01	3.90E-01	4.91E-01	5.65E-01	6.26E-01
Delta			3.37E-01	3.15E-01	4.47E-01	5.11E-01	5.98E-01
Epsilon				1.65E-01	3.95E-01	4.13E-01	5.29E-01
Mu					3.87E-01	3.02E-01	4.43E-01
Omega						1.28E-01	4.36E-01
Sigma							5.02E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	15.10	15.10	15.10	15.10	15.10	15.10	15.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 15.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.251

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9727519	0.9931494	0.9971525	0.9999849	6.521E+01	4.498E-01	--
α_2	1.51E-05	6.85E-03	2.85E-03	2.72E-02	4.498E-01	6.521E+01	0.451

CCCG = 3, Gamma = 0.251

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9623855	0.9866123	0.9900787	0.9989876	8.684E+01	1.178E+00	--
α_2	4.70E-04	1.07E-02	7.26E-03	3.25E-02	9.387E-01	8.703E+01	0.583
α_3	2.84E-08	2.72E-03	4.37E-04	1.33E-02	2.396E-01	8.794E+01	0.581

CCCG = 4, Gamma = 0.251

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9557981	0.9815187	0.9845437	0.9968904	1.008E+02	1.898E+00	--
α_2	1.12E-03	1.24E-02	9.46E-03	3.39E-02	1.285E+00	1.020E+02	0.655
α_3	3.53E-06	3.83E-03	1.37E-03	1.60E-02	3.927E-01	1.022E+02	0.660
α_4	8.49E-09	2.21E-03	2.95E-04	1.11E-02	2.207E-01	9.964E+01	0.678

CCCG = 5, Gamma = 0.251

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9575870	0.9787205	0.9806280	0.9933338	1.612E+02	3.506E+00	--
α_2	2.16E-03	1.21E-02	1.02E-02	2.86E-02	1.992E+00	1.626E+02	0.757
α_3	4.02E-04	6.50E-03	4.66E-03	1.89E-02	1.078E+00	1.647E+02	0.751
α_4	1.16E-06	2.22E-03	7.18E-04	9.52E-03	3.632E-01	1.633E+02	0.761
α_5	4.19E-21	4.54E-04	2.63E-07	2.63E-03	7.248E-02	1.597E+02	0.780

CCCG = 6, Gamma = 0.251

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9593836	0.9786217	0.9802258	0.9923785	1.922E+02	4.199E+00	--
α_2	1.69E-03	9.81E-03	8.22E-03	2.34E-02	1.941E+00	1.959E+02	0.767
α_3	6.45E-04	6.73E-03	5.16E-03	1.82E-02	1.332E+00	1.966E+02	0.767
α_4	3.36E-05	3.13E-03	1.69E-03	1.11E-02	6.181E-01	1.966E+02	0.770
α_5	8.04E-09	1.17E-03	1.74E-04	5.81E-03	2.313E-01	1.970E+02	0.770
α_6	4.83E-20	5.30E-04	4.99E-07	3.08E-03	7.684E-02	1.449E+02	1.047

CCCG = 7, Gamma = 0.251

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9622350	0.9781250	0.9792364	0.9902191	2.782E+02	6.223E+00	--
α_2	2.25E-03	9.19E-03	8.08E-03	1.99E-02	2.654E+00	2.863E+02	0.797
α_3	8.03E-04	5.89E-03	4.76E-03	1.48E-02	1.645E+00	2.777E+02	0.825
α_4	2.62E-04	3.94E-03	2.85E-03	1.13E-02	1.115E+00	2.818E+02	0.814
α_5	2.04E-05	2.11E-03	1.12E-03	7.58E-03	6.034E-01	2.850E+02	0.807
α_6	1.14E-10	6.40E-04	4.77E-05	3.40E-03	1.780E-01	2.778E+02	0.829
α_7	5.83E-51	1.07E-04	2.20E-14	3.78E-04	2.734E-02	2.552E+02	0.903

CCCG = 8, Gamma = 0.251

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9633462	0.9787547	0.9798315	0.9904855	2.877E+02	6.246E+00	--
α_2	1.90E-03	8.26E-03	7.20E-03	1.82E-02	2.504E+00	3.007E+02	0.785
α_3	5.27E-04	4.92E-03	3.83E-03	1.30E-02	1.419E+00	2.872E+02	0.824
α_4	1.96E-04	3.57E-03	2.51E-03	1.06E-02	1.027E+00	2.867E+02	0.827
α_5	5.14E-05	2.50E-03	1.50E-03	8.34E-03	7.337E-01	2.933E+02	0.809
α_6	1.33E-06	1.33E-03	4.81E-04	5.55E-03	3.975E-01	2.977E+02	0.798
α_7	2.79E-20	2.79E-04	2.68E-07	1.62E-03	7.703E-02	2.759E+02	0.862
α_8	3.66E-18	3.94E-04	9.84E-07	2.30E-03	8.749E-02	2.220E+02	1.071

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.87E-01	9.82E-01	9.79E-01	9.79E-01	9.78E-01	9.79E-01
α_2	6.85E-03	1.07E-02	1.24E-02	1.21E-02	9.81E-03	9.19E-03	8.26E-03
α_3		2.72E-03	3.83E-03	6.50E-03	6.73E-03	5.89E-03	4.92E-03
α_4			2.21E-03	2.22E-03	3.13E-03	3.94E-03	3.57E-03
α_5				4.54E-04	1.17E-03	2.11E-03	2.50E-03
α_6					5.30E-04	6.40E-04	1.33E-03
α_7						1.07E-04	2.79E-04
α_8							3.94E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.87E-01	9.82E-01	9.79E-01	9.79E-01	9.78E-01	9.79E-01
Beta	6.85E-03	1.34E-02	1.85E-02	2.13E-02	2.14E-02	2.19E-02	2.12E-02
Gamma		2.03E-01	3.27E-01	4.31E-01	5.41E-01	5.80E-01	6.11E-01
Delta			3.66E-01	2.91E-01	4.18E-01	5.36E-01	6.21E-01
Epsilon				1.70E-01	3.52E-01	4.21E-01	5.58E-01
Mu					3.11E-01	2.61E-01	4.46E-01
Omega						1.43E-01	3.35E-01
Sigma							5.85E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	15.50	15.50	15.50	15.50	15.50	15.50	15.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9235572	0.9818111	0.9936017	0.9999863	2.052E+01	3.801E-01	--
α_2	1.37E-05	1.82E-02	6.40E-03	7.64E-02	3.801E-01	2.052E+01	0.451

CCCG = 3, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9048602	0.9681749	0.9778242	0.9984807	2.920E+01	9.600E-01	--
α_2	3.31E-04	2.21E-02	1.28E-02	7.58E-02	6.673E-01	2.948E+01	0.583
α_3	8.43E-07	9.69E-03	2.31E-03	4.46E-02	2.927E-01	2.992E+01	0.581

CCCG = 4, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8983044	0.9587576	0.9660864	0.9941022	3.880E+01	1.669E+00	--
α_2	1.47E-03	2.55E-02	1.82E-02	7.44E-02	1.039E+00	3.970E+01	0.655
α_3	8.33E-06	9.61E-03	3.42E-03	4.02E-02	3.887E-01	4.006E+01	0.660
α_4	7.06E-08	6.13E-03	1.01E-03	3.00E-02	2.414E-01	3.915E+01	0.678

CCCG = 5, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9159473	0.9575560	0.9612243	0.9866178	7.867E+01	3.487E+00	--
α_2	3.40E-03	2.18E-02	1.81E-02	5.31E-02	1.791E+00	8.024E+01	0.757
α_3	1.16E-03	1.46E-02	1.09E-02	4.07E-02	1.207E+00	8.145E+01	0.751
α_4	9.41E-06	5.32E-03	2.13E-03	2.14E-02	4.340E-01	8.117E+01	0.761
α_5	1.53E-26	6.90E-04	2.45E-08	3.80E-03	5.493E-02	7.957E+01	0.780

CCCG = 6, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9241711	0.9605855	0.9636509	0.9865183	9.516E+01	3.905E+00	--
α_2	1.29E-03	1.34E-02	1.03E-02	3.60E-02	1.335E+00	9.845E+01	0.767
α_3	1.88E-03	1.53E-02	1.22E-02	3.94E-02	1.531E+00	9.831E+01	0.767
α_4	1.40E-04	7.23E-03	4.30E-03	2.43E-02	7.191E-01	9.878E+01	0.770
α_5	3.63E-08	2.48E-03	4.24E-04	1.21E-02	2.467E-01	9.925E+01	0.770
α_6	1.10E-20	9.95E-04	6.00E-07	5.77E-03	7.279E-02	7.308E+01	1.047

CCCG = 7, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9344353	0.9625007	0.9644899	0.9837694	1.481E+02	5.770E+00	--
α_2	1.23E-03	9.87E-03	7.88E-03	2.53E-02	1.549E+00	1.554E+02	0.797
α_3	2.33E-03	1.31E-02	1.10E-02	3.10E-02	1.989E+00	1.498E+02	0.825
α_4	7.53E-04	8.37E-03	6.36E-03	2.29E-02	1.287E+00	1.524E+02	0.814
α_5	7.44E-05	4.46E-03	2.59E-03	1.52E-02	6.913E-01	1.544E+02	0.807
α_6	1.14E-08	1.54E-03	2.32E-04	7.62E-03	2.327E-01	1.508E+02	0.829
α_7	1.03E-64	1.52E-04	2.31E-17	3.84E-04	2.112E-02	1.386E+02	0.903

CCCG = 8, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9424435	0.9656347	0.9671458	0.9836646	1.972E+02	7.016E+00	--
α_2	9.63E-04	7.48E-03	6.00E-03	1.91E-02	1.583E+00	2.100E+02	0.785
α_3	1.75E-03	9.86E-03	8.29E-03	2.33E-02	1.986E+00	1.994E+02	0.824
α_4	1.17E-03	8.33E-03	6.76E-03	2.08E-02	1.672E+00	1.991E+02	0.827
α_5	2.61E-04	4.93E-03	3.44E-03	1.47E-02	1.011E+00	2.041E+02	0.809
α_6	2.08E-05	2.74E-03	1.40E-03	1.00E-02	5.709E-01	2.074E+02	0.798
α_7	2.16E-10	9.40E-04	7.36E-05	4.97E-03	1.809E-01	1.923E+02	0.862
α_8	1.16E-107	8.03E-05	2.43E-27	6.02E-05	1.245E-02	1.549E+02	1.071

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.68E-01	9.59E-01	9.58E-01	9.61E-01	9.63E-01	9.66E-01
α_2	1.82E-02	2.21E-02	2.55E-02	2.18E-02	1.34E-02	9.87E-03	7.48E-03
α_3		9.69E-03	9.61E-03	1.46E-02	1.53E-02	1.31E-02	9.86E-03
α_4			6.13E-03	5.32E-03	7.23E-03	8.37E-03	8.33E-03
α_5				6.90E-04	2.48E-03	4.46E-03	4.93E-03
α_6					9.95E-04	1.54E-03	2.74E-03
α_7						1.52E-04	9.40E-04
α_8							8.03E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.68E-01	9.59E-01	9.58E-01	9.61E-01	9.63E-01	9.66E-01
Beta	1.82E-02	3.18E-02	4.12E-02	4.24E-02	3.94E-02	3.75E-02	3.44E-02
Gamma		3.04E-01	3.82E-01	4.86E-01	6.61E-01	7.37E-01	7.82E-01
Delta			3.89E-01	2.92E-01	4.11E-01	5.26E-01	6.33E-01
Epsilon				1.15E-01	3.25E-01	4.23E-01	5.11E-01
Mu					2.86E-01	2.75E-01	4.33E-01
Omega						9.00E-02	2.71E-01
Sigma							7.88E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 18.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9806941	0.9950714	0.9978652	0.9999860	9.501E+01	4.706E-01	--
α_2	1.40E-05	4.93E-03	2.13E-03	1.93E-02	4.706E-01	9.501E+01	0.451

CCCG = 3, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9771136	0.9920623	0.9942657	0.9994830	1.378E+02	1.103E+00	--
α_2	1.68E-04	5.84E-03	3.70E-03	1.88E-02	8.104E-01	1.380E+02	0.583
α_3	1.76E-07	2.10E-03	4.92E-04	9.68E-03	2.921E-01	1.388E+02	0.581

CCCG = 4, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9769902	0.9903314	0.9918960	0.9983228	2.000E+02	1.953E+00	--
α_2	6.02E-04	6.46E-03	4.93E-03	1.76E-02	1.312E+00	2.017E+02	0.655
α_3	3.59E-06	2.14E-03	8.44E-04	8.64E-03	4.307E-01	2.012E+02	0.660
α_4	2.13E-09	1.07E-03	1.26E-04	5.44E-03	2.099E-01	1.961E+02	0.678

CCCG = 5, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9788268	0.9897697	0.9908239	0.9971102	3.006E+02	3.107E+00	--
α_2	7.83E-04	5.55E-03	4.51E-03	1.39E-02	1.684E+00	3.018E+02	0.757
α_3	1.36E-04	3.08E-03	2.09E-03	9.42E-03	9.426E-01	3.049E+02	0.751
α_4	9.49E-07	1.26E-03	4.34E-04	5.34E-03	3.816E-01	3.015E+02	0.761
α_5	1.34E-16	3.35E-04	1.83E-06	1.95E-03	9.865E-02	2.945E+02	0.780

CCCG = 6, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9805975	0.9900765	0.9909116	0.9967028	3.813E+02	3.822E+00	--
α_2	6.38E-04	4.41E-03	3.59E-03	1.10E-02	1.714E+00	3.872E+02	0.767
α_3	1.87E-04	2.85E-03	2.05E-03	8.22E-03	1.108E+00	3.880E+02	0.767
α_4	2.22E-05	1.68E-03	9.35E-04	5.86E-03	6.509E-01	3.871E+02	0.770
α_5	1.29E-08	6.54E-04	1.18E-04	3.15E-03	2.536E-01	3.875E+02	0.770
α_6	5.44E-17	3.36E-04	1.52E-06	1.95E-03	9.572E-02	2.850E+02	1.047

CCCG = 7, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9822335	0.9901734	0.9907846	0.9960259	5.235E+02	5.195E+00	--
α_2	7.43E-04	3.92E-03	3.32E-03	9.12E-03	2.105E+00	5.355E+02	0.797
α_3	2.38E-04	2.54E-03	1.94E-03	6.90E-03	1.320E+00	5.184E+02	0.825
α_4	9.65E-05	1.89E-03	1.31E-03	5.67E-03	9.967E-01	5.254E+02	0.814
α_5	4.99E-06	9.88E-04	4.69E-04	3.73E-03	5.249E-01	5.308E+02	0.807
α_6	2.81E-10	3.78E-04	3.70E-05	1.96E-03	1.956E-01	5.169E+02	0.829
α_7	3.18E-28	1.11E-04	2.52E-09	6.05E-04	5.291E-02	4.747E+02	0.903

CCCG = 8, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9833822	0.9905524	0.9910769	0.9959314	6.115E+02	5.832E+00	--
α_2	7.09E-04	3.50E-03	2.99E-03	8.01E-03	2.229E+00	6.352E+02	0.785
α_3	1.78E-04	2.08E-03	1.56E-03	5.73E-03	1.260E+00	6.056E+02	0.824
α_4	9.78E-05	1.72E-03	1.21E-03	5.08E-03	1.042E+00	6.039E+02	0.827
α_5	2.90E-05	1.23E-03	7.55E-04	4.07E-03	7.626E-01	6.173E+02	0.809
α_6	1.19E-07	5.22E-04	1.46E-04	2.32E-03	3.271E-01	6.265E+02	0.798
α_7	2.24E-13	2.32E-04	6.21E-06	1.30E-03	1.344E-01	5.800E+02	0.862
α_8	1.48E-20	1.65E-04	1.54E-07	9.55E-04	7.682E-02	4.668E+02	1.071

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.92E-01	9.90E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
α_2	4.93E-03	5.84E-03	6.46E-03	5.55E-03	4.41E-03	3.92E-03	3.50E-03
α_3		2.10E-03	2.14E-03	3.08E-03	2.85E-03	2.54E-03	2.08E-03
α_4			1.07E-03	1.26E-03	1.68E-03	1.89E-03	1.72E-03
α_5				3.35E-04	6.54E-04	9.88E-04	1.23E-03
α_6					3.36E-04	3.78E-04	5.22E-04
α_7						1.11E-04	2.32E-04
α_8							1.65E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.92E-01	9.90E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
Beta	4.93E-03	7.94E-03	9.67E-03	1.02E-02	9.92E-03	9.83E-03	9.45E-03
Gamma		2.64E-01	3.32E-01	4.58E-01	5.56E-01	6.02E-01	6.30E-01
Delta			3.34E-01	3.42E-01	4.84E-01	5.70E-01	6.51E-01
Epsilon				2.09E-01	3.71E-01	4.38E-01	5.55E-01
Mu					3.39E-01	3.31E-01	4.27E-01
Omega						2.28E-01	4.32E-01
Sigma							4.15E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	18.50	18.50	18.50	18.50	18.50	18.50	18.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 8.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.139

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9927045	0.9981086	0.9991479	0.9999931	2.603E+02	4.932E-01	--
α_2	6.93E-06	1.89E-03	8.52E-04	7.30E-03	4.932E-01	2.603E+02	0.451

CCCG = 3, Gamma = 0.139

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9929523	0.9975961	0.9982938	0.9998579	4.397E+02	1.059E+00	--
α_2	3.03E-05	1.62E-03	9.56E-04	5.47E-03	7.137E-01	4.397E+02	0.583
α_3	2.81E-07	7.83E-04	2.37E-04	3.42E-03	3.458E-01	4.411E+02	0.581

CCCG = 4, Gamma = 0.139

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9934238	0.9971750	0.9976036	0.9994616	7.464E+02	2.115E+00	--
α_2	2.55E-04	2.06E-03	1.64E-03	5.30E-03	1.549E+00	7.513E+02	0.655
α_3	1.10E-08	3.54E-04	6.92E-05	1.68E-03	2.646E-01	7.473E+02	0.660
α_4	4.57E-08	4.14E-04	1.01E-04	1.89E-03	3.010E-01	7.276E+02	0.678

CCCG = 5, Gamma = 0.139

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9948638	0.9971483	0.9973238	0.9988338	1.862E+03	5.325E+00	--
α_2	6.21E-04	1.95E-03	1.77E-03	3.87E-03	3.632E+00	1.861E+03	0.757
α_3	7.08E-05	7.21E-04	5.53E-04	1.94E-03	1.354E+00	1.877E+03	0.751
α_4	1.51E-08	1.60E-04	3.81E-05	7.33E-04	2.961E-01	1.855E+03	0.761
α_5	6.98E-35	2.34E-05	2.58E-11	1.16E-04	4.243E-02	1.810E+03	0.780

CCCG = 6, Gamma = 0.139

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9944964	0.9970005	0.9971994	0.9988257	1.641E+03	4.936E+00	--
α_2	4.66E-04	1.75E-03	1.56E-03	3.71E-03	2.915E+00	1.661E+03	0.767
α_3	6.44E-05	7.55E-04	5.67E-04	2.09E-03	1.257E+00	1.663E+03	0.767
α_4	1.23E-06	3.03E-04	1.39E-04	1.16E-03	5.031E-01	1.658E+03	0.770
α_5	2.02E-15	6.96E-05	9.19E-07	3.99E-04	1.155E-01	1.658E+03	0.770
α_6	5.56E-13	1.19E-04	4.36E-06	6.59E-04	1.451E-01	1.219E+03	1.047

CCCG = 7, Gamma = 0.139

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9954965	0.9971503	0.9972475	0.9984723	3.378E+03	9.654E+00	--
α_2	5.47E-04	1.41E-03	1.32E-03	2.60E-03	4.851E+00	3.431E+03	0.797
α_3	2.16E-04	8.43E-04	7.45E-04	1.80E-03	2.800E+00	3.319E+03	0.825
α_4	4.20E-05	4.11E-04	3.18E-04	1.10E-03	1.384E+00	3.363E+03	0.814
α_5	5.11E-07	1.44E-04	6.45E-05	5.58E-04	4.902E-01	3.396E+03	0.807
α_6	8.24E-16	3.47E-05	4.39E-07	1.99E-04	1.146E-01	3.305E+03	0.829
α_7	2.54E-93	4.82E-06	5.13E-25	5.73E-06	1.464E-02	3.035E+03	0.903

CCCG = 8, Gamma = 0.139

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9952713	0.9971898	0.9973190	0.9986672	2.536E+03	7.148E+00	--
α_2	3.05E-04	1.13E-03	1.00E-03	2.37E-03	2.980E+00	2.643E+03	0.785
α_3	1.35E-04	7.78E-04	6.51E-04	1.86E-03	1.960E+00	2.517E+03	0.824
α_4	3.39E-05	4.64E-04	3.40E-04	1.32E-03	1.166E+00	2.510E+03	0.827
α_5	1.19E-06	2.09E-04	1.01E-04	7.84E-04	5.375E-01	2.565E+03	0.809
α_6	1.53E-11	6.94E-05	5.38E-06	3.67E-04	1.805E-01	2.602E+03	0.798
α_7	8.89E-36	1.72E-05	1.29E-11	8.40E-05	4.139E-02	2.408E+03	0.862
α_8	8.89E-09	1.46E-04	3.22E-05	6.80E-04	2.827E-01	1.938E+03	1.071

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	1.89E-03	1.62E-03	2.06E-03	1.95E-03	1.75E-03	1.41E-03	1.13E-03
α_3		7.83E-04	3.54E-04	7.21E-04	7.55E-04	8.43E-04	7.78E-04
α_4			4.14E-04	1.60E-04	3.03E-04	4.11E-04	4.64E-04
α_5				2.34E-05	6.96E-05	1.44E-04	2.09E-04
α_6					1.19E-04	3.47E-05	6.94E-05
α_7						4.82E-06	1.72E-05
α_8							1.46E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	1.89E-03	2.40E-03	2.82E-03	2.85E-03	3.00E-03	2.85E-03	2.81E-03
Gamma		3.26E-01	2.72E-01	3.17E-01	4.16E-01	5.05E-01	5.99E-01
Delta			5.39E-01	2.03E-01	3.94E-01	4.14E-01	5.38E-01
Epsilon				1.28E-01	3.83E-01	3.09E-01	4.88E-01
Mu					6.31E-01	2.15E-01	5.26E-01
Omega						1.22E-01	7.02E-01
Sigma							8.95E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.60	8.60	8.60	8.60	8.60	8.60	8.60
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.2.2 Auxiliary Feedwater Turbine-Driven Pumps

2.2.2.1 AFW-TDP-FS: AFW Turbine-Driven Pumps Fail to Start

Generic CCF Parameters

Plant Type:	PWR
System Group:	Clean Water
System:	Auxiliary Feedwater
Component Group:	Pump
Component Type:	Turbine Driven Pump
Component Subtype:	Centrifugal
Failure Mode:	Fail to Start
Date Range:	2006 through 2020
Prior:	Default 2015

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9202127	0.9795237	0.9909751	0.9999381	0.0000000	2.241E+01	4.685E-01
α_2	5.83E-05	2.05E-02	9.02E-03	7.98E-02	0.00E+00	4.685E-01	2.241E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9457174	0.9809153	0.9860142	0.9986769	0.0000000	5.798E+01	1.128E+00
α_2	4.84E-04	1.44E-02	9.41E-03	4.54E-02	0.00E+00	8.512E-01	5.826E+01
α_3	2.34E-07	4.68E-03	1.00E-03	2.20E-02	0.00E+00	2.768E-01	5.883E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9510776	0.9795438	0.9828910	0.9965680	0.0000000	9.068E+01	1.894E+00
α_2	1.18E-03	1.36E-02	1.03E-02	3.74E-02	0.00E+00	1.260E+00	9.131E+01
α_3	4.73E-06	4.35E-03	1.60E-03	1.80E-02	0.00E+00	4.024E-01	9.217E+01
α_4	1.74E-08	2.50E-03	3.73E-04	1.24E-02	0.00E+00	2.315E-01	9.234E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9645377	0.9823331	0.9839596	0.9945673	0.0000000	1.908E+02	3.432E+00
α_2	1.69E-03	9.90E-03	8.28E-03	2.37E-02	0.00E+00	1.924E+00	1.923E+02
α_3	3.13E-04	5.40E-03	3.83E-03	1.59E-02	0.00E+00	1.049E+00	1.932E+02
α_4	1.50E-06	1.97E-03	6.78E-04	8.30E-03	0.00E+00	3.822E-01	1.939E+02
α_5	3.43E-20	3.95E-04	3.68E-07	2.30E-03	0.00E+00	7.674E-02	1.942E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
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α_1	0.9673747	0.9832576	0.9846419	0.9944035	0.0000000	2.252E+02	3.835E+00
α_2	1.06E-03	7.43E-03	6.05E-03	1.85E-02	0.00E+00	1.701E+00	2.274E+02
α_3	4.16E-04	5.27E-03	3.92E-03	1.47E-02	0.00E+00	1.207E+00	2.278E+02
α_4	2.39E-05	2.60E-03	1.37E-03	9.37E-03	0.00E+00	5.960E-01	2.285E+02
α_5	3.78E-09	9.65E-04	1.29E-04	4.84E-03	0.00E+00	2.211E-01	2.288E+02
α_6	3.77E-15	4.79E-04	4.85E-06	2.76E-03	0.00E+00	1.098E-01	2.289E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9731763	0.9847771	0.9856229	0.9934781	0.0000000	3.718E+02	5.747E+00
α_2	1.22E-03	5.94E-03	5.09E-03	1.36E-02	0.00E+00	2.243E+00	3.753E+02
α_3	5.79E-04	4.32E-03	3.48E-03	1.09E-02	0.00E+00	1.630E+00	3.759E+02
α_4	1.78E-04	2.87E-03	2.05E-03	8.34E-03	0.00E+00	1.083E+00	3.765E+02
α_5	1.08E-05	1.50E-03	7.55E-04	5.50E-03	0.00E+00	5.654E-01	3.770E+02
α_6	2.79E-10	5.07E-04	4.69E-05	2.64E-03	0.00E+00	1.916E-01	3.774E+02
α_7	6.31E-41	9.22E-05	3.43E-12	4.04E-04	0.00E+00	3.480E-02	3.775E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9744830	0.9855322	0.9863403	0.9938201	0.0000000	3.900E+02	5.726E+00
α_2	9.19E-04	5.10E-03	4.29E-03	1.20E-02	0.00E+00	2.018E+00	3.937E+02
α_3	3.63E-04	3.51E-03	2.72E-03	9.37E-03	0.00E+00	1.391E+00	3.944E+02
α_4	1.60E-04	2.68E-03	1.91E-03	7.86E-03	0.00E+00	1.062E+00	3.947E+02
α_5	3.13E-05	1.78E-03	1.04E-03	6.03E-03	0.00E+00	7.026E-01	3.950E+02
α_6	3.47E-07	8.84E-04	2.71E-04	3.84E-03	0.00E+00	3.497E-01	3.954E+02
α_7	1.33E-15	2.72E-04	2.50E-06	1.57E-03	0.00E+00	1.078E-01	3.956E+02
α_8	2.79E-17	2.39E-04	1.01E-06	1.39E-03	0.00E+00	9.469E-02	3.957E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.80E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
α_2	2.05E-02	1.44E-02	1.36E-02	9.90E-03	7.43E-03	5.94E-03	5.10E-03
α_3		4.68E-03	4.35E-03	5.40E-03	5.27E-03	4.32E-03	3.51E-03
α_4			2.50E-03	1.97E-03	2.60E-03	2.87E-03	2.68E-03
α_5				3.95E-04	9.65E-04	1.50E-03	1.78E-03
α_6					4.79E-04	5.07E-04	8.84E-04
α_7						9.22E-05	2.72E-04
α_8							2.39E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.80E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
Beta	2.05E-02	1.91E-02	2.05E-02	1.77E-02	1.67E-02	1.52E-02	1.45E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01

Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9254105	0.9808392	0.9915376	0.9999442	2.409E+01	4.706E-01	--
α_2	5.58E-05	1.92E-02	8.46E-03	7.46E-02	4.706E-01	2.409E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9492792	0.9823211	0.9871539	0.9988381	6.126E+01	1.103E+00	--
α_2	3.76E-04	1.30E-02	8.28E-03	4.17E-02	8.104E-01	6.155E+01	--
α_3	3.95E-07	4.68E-03	1.10E-03	2.16E-02	2.921E-01	6.207E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9595678	0.9829546	0.9856771	0.9970284	1.126E+02	1.953E+00	--
α_2	1.07E-03	1.15E-02	8.76E-03	3.10E-02	1.312E+00	1.132E+02	--
α_3	6.33E-06	3.76E-03	1.49E-03	1.52E-02	4.307E-01	1.141E+02	--
α_4	3.65E-09	1.83E-03	2.17E-04	9.33E-03	2.099E-01	1.143E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9696218	0.9852970	0.9867994	0.9958370	2.082E+02	3.107E+00	--
α_2	1.13E-03	7.97E-03	6.48E-03	1.99E-02	1.684E+00	2.096E+02	--
α_3	1.97E-04	4.46E-03	3.03E-03	1.36E-02	9.426E-01	2.104E+02	--
α_4	1.36E-06	1.81E-03	6.21E-04	7.62E-03	3.816E-01	2.109E+02	--
α_5	1.87E-16	4.67E-04	2.56E-06	2.72E-03	9.865E-02	2.112E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9733376	0.9863454	0.9874863	0.9954551	2.761E+02	3.822E+00	--
α_2	8.87E-04	6.12E-03	4.99E-03	1.52E-02	1.714E+00	2.782E+02	--
α_3	2.60E-04	3.96E-03	2.86E-03	1.14E-02	1.108E+00	2.788E+02	--
α_4	3.07E-05	2.33E-03	1.30E-03	8.12E-03	6.509E-01	2.793E+02	--
α_5	1.79E-08	9.06E-04	1.63E-04	4.37E-03	2.536E-01	2.797E+02	--
α_6	5.54E-17	3.42E-04	1.55E-06	1.99E-03	9.572E-02	2.798E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9771222	0.9873350	0.9881185	0.9948722	4.050E+02	5.195E+00	--
α_2	9.74E-04	5.13E-03	4.35E-03	1.20E-02	2.105E+00	4.081E+02	--
α_3	3.02E-04	3.22E-03	2.46E-03	8.74E-03	1.320E+00	4.089E+02	--
α_4	1.24E-04	2.43E-03	1.68E-03	7.28E-03	9.967E-01	4.092E+02	--
α_5	6.47E-06	1.28E-03	6.08E-04	4.83E-03	5.249E-01	4.097E+02	--
α_6	3.54E-10	4.77E-04	4.66E-05	2.47E-03	1.956E-01	4.100E+02	--
α_7	3.68E-28	1.29E-04	2.92E-09	7.00E-04	5.291E-02	4.101E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787229	0.9878938	0.9885625	0.9947813	4.759E+02	5.832E+00	--
α_2	9.39E-04	4.63E-03	3.96E-03	1.06E-02	2.229E+00	4.795E+02	--
α_3	2.24E-04	2.62E-03	1.97E-03	7.22E-03	1.260E+00	4.805E+02	--
α_4	1.23E-04	2.16E-03	1.53E-03	6.38E-03	1.042E+00	4.807E+02	--
α_5	3.72E-05	1.58E-03	9.69E-04	5.22E-03	7.626E-01	4.810E+02	--
α_6	1.55E-07	6.79E-04	1.90E-04	3.02E-03	3.271E-01	4.814E+02	--
α_7	2.70E-13	2.79E-04	7.48E-06	1.57E-03	1.344E-01	4.816E+02	--
α_8	1.44E-20	1.59E-04	1.50E-07	9.26E-04	7.682E-02	4.817E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.92E-02	1.30E-02	1.15E-02	7.97E-03	6.12E-03	5.13E-03	4.63E-03
α_3		4.68E-03	3.76E-03	4.46E-03	3.96E-03	3.22E-03	2.62E-03
α_4			1.83E-03	1.81E-03	2.33E-03	2.43E-03	2.16E-03
α_5				4.67E-04	9.06E-04	1.28E-03	1.58E-03
α_6					3.42E-04	4.77E-04	6.79E-04
α_7						1.29E-04	2.79E-04
α_8							1.59E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.92E-02	1.77E-02	1.70E-02	1.47E-02	1.37E-02	1.27E-02	1.21E-02
Gamma		2.65E-01	3.28E-01	4.58E-01	5.52E-01	5.95E-01	6.18E-01
Delta			3.28E-01	3.38E-01	4.74E-01	5.73E-01	6.50E-01
Epsilon				2.05E-01	3.49E-01	4.37E-01	5.55E-01
Mu					2.74E-01	3.21E-01	4.14E-01
Omega						2.13E-01	3.92E-01
Sigma							3.64E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.2.2.2 AFW-TDP-FH: AFW Turbine-Driven Pumps Fail to Run Less Than One Hour

Generic CCF Parameters

Plant Type: PWR
System Group: Clean Water
System: Auxiliary Feedwater
Component Group: Pump
Component Type: Turbine Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run < 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9202127	0.9795237	0.9909751	0.9999381	0.0000000	2.241E+01	4.685E-01
α_2	5.83E-05	2.05E-02	9.02E-03	7.98E-02	0.00E+00	4.685E-01	2.241E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9457174	0.9809153	0.9860142	0.9986769	0.0000000	5.798E+01	1.128E+00
α_2	4.84E-04	1.44E-02	9.41E-03	4.54E-02	0.00E+00	8.512E-01	5.826E+01
α_3	2.34E-07	4.68E-03	1.00E-03	2.20E-02	0.00E+00	2.768E-01	5.883E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9510776	0.9795438	0.9828910	0.9965680	0.0000000	9.068E+01	1.894E+00
α_2	1.18E-03	1.36E-02	1.03E-02	3.74E-02	0.00E+00	1.260E+00	9.131E+01
α_3	4.73E-06	4.35E-03	1.60E-03	1.80E-02	0.00E+00	4.024E-01	9.217E+01
α_4	1.74E-08	2.50E-03	3.73E-04	1.24E-02	0.00E+00	2.315E-01	9.234E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9645377	0.9823331	0.9839596	0.9945673	0.0000000	1.908E+02	3.432E+00
α_2	1.69E-03	9.90E-03	8.28E-03	2.37E-02	0.00E+00	1.924E+00	1.923E+02
α_3	3.13E-04	5.40E-03	3.83E-03	1.59E-02	0.00E+00	1.049E+00	1.932E+02
α_4	1.50E-06	1.97E-03	6.78E-04	8.30E-03	0.00E+00	3.822E-01	1.939E+02
α_5	3.43E-20	3.95E-04	3.68E-07	2.30E-03	0.00E+00	7.674E-02	1.942E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9673747	0.9832576	0.9846419	0.9944035	0.0000000	2.252E+02	3.835E+00
α_2	1.06E-03	7.43E-03	6.05E-03	1.85E-02	0.00E+00	1.701E+00	2.274E+02

α_3	4.16E-04	5.27E-03	3.92E-03	1.47E-02	0.00E+00	1.207E+00	2.278E+02
α_4	2.39E-05	2.60E-03	1.37E-03	9.37E-03	0.00E+00	5.960E-01	2.285E+02
α_5	3.78E-09	9.65E-04	1.29E-04	4.84E-03	0.00E+00	2.211E-01	2.288E+02
α_6	3.77E-15	4.79E-04	4.85E-06	2.76E-03	0.00E+00	1.098E-01	2.289E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9731763	0.9847771	0.9856229	0.9934781	0.0000000	3.718E+02	5.747E+00
α_2	1.22E-03	5.94E-03	5.09E-03	1.36E-02	0.00E+00	2.243E+00	3.753E+02
α_3	5.79E-04	4.32E-03	3.48E-03	1.09E-02	0.00E+00	1.630E+00	3.759E+02
α_4	1.78E-04	2.87E-03	2.05E-03	8.34E-03	0.00E+00	1.083E+00	3.765E+02
α_5	1.08E-05	1.50E-03	7.55E-04	5.50E-03	0.00E+00	5.654E-01	3.770E+02
α_6	2.79E-10	5.07E-04	4.69E-05	2.64E-03	0.00E+00	1.916E-01	3.774E+02
α_7	6.31E-41	9.22E-05	3.43E-12	4.04E-04	0.00E+00	3.480E-02	3.775E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9744830	0.9855322	0.9863403	0.9938201	0.0000000	3.900E+02	5.726E+00
α_2	9.19E-04	5.10E-03	4.29E-03	1.20E-02	0.00E+00	2.018E+00	3.937E+02
α_3	3.63E-04	3.51E-03	2.72E-03	9.37E-03	0.00E+00	1.391E+00	3.944E+02
α_4	1.60E-04	2.68E-03	1.91E-03	7.86E-03	0.00E+00	1.062E+00	3.947E+02
α_5	3.13E-05	1.78E-03	1.04E-03	6.03E-03	0.00E+00	7.026E-01	3.950E+02
α_6	3.47E-07	8.84E-04	2.71E-04	3.84E-03	0.00E+00	3.497E-01	3.954E+02
α_7	1.33E-15	2.72E-04	2.50E-06	1.57E-03	0.00E+00	1.078E-01	3.956E+02
α_8	2.79E-17	2.39E-04	1.01E-06	1.39E-03	0.00E+00	9.469E-02	3.957E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.80E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
α_2	2.05E-02	1.44E-02	1.36E-02	9.90E-03	7.43E-03	5.94E-03	5.10E-03
α_3		4.68E-03	4.35E-03	5.40E-03	5.27E-03	4.32E-03	3.51E-03
α_4			2.50E-03	1.97E-03	2.60E-03	2.87E-03	2.68E-03
α_5				3.95E-04	9.65E-04	1.50E-03	1.78E-03
α_6					4.79E-04	5.07E-04	8.84E-04
α_7						9.22E-05	2.72E-04
α_8							2.39E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.80E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
Beta	2.05E-02	1.91E-02	2.05E-02	1.77E-02	1.67E-02	1.52E-02	1.45E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9254105	0.9808392	0.9915376	0.9999442	2.409E+01	4.706E-01	--
α_2	5.58E-05	1.92E-02	8.46E-03	7.46E-02	4.706E-01	2.409E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9492792	0.9823211	0.9871539	0.9988381	6.126E+01	1.103E+00	--
α_2	3.76E-04	1.30E-02	8.28E-03	4.17E-02	8.104E-01	6.155E+01	--
α_3	3.95E-07	4.68E-03	1.10E-03	2.16E-02	2.921E-01	6.207E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9595678	0.9829546	0.9856771	0.9970284	1.126E+02	1.953E+00	--
α_2	1.07E-03	1.15E-02	8.76E-03	3.10E-02	1.312E+00	1.132E+02	--
α_3	6.33E-06	3.76E-03	1.49E-03	1.52E-02	4.307E-01	1.141E+02	--
α_4	3.65E-09	1.83E-03	2.17E-04	9.33E-03	2.099E-01	1.143E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9696218	0.9852970	0.9867994	0.9958370	2.082E+02	3.107E+00	--
α_2	1.13E-03	7.97E-03	6.48E-03	1.99E-02	1.684E+00	2.096E+02	--
α_3	1.97E-04	4.46E-03	3.03E-03	1.36E-02	9.426E-01	2.104E+02	--
α_4	1.36E-06	1.81E-03	6.21E-04	7.62E-03	3.816E-01	2.109E+02	--
α_5	1.87E-16	4.67E-04	2.56E-06	2.72E-03	9.865E-02	2.112E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9733376	0.9863454	0.9874863	0.9954551	2.761E+02	3.822E+00	--
α_2	8.87E-04	6.12E-03	4.99E-03	1.52E-02	1.714E+00	2.782E+02	--
α_3	2.60E-04	3.96E-03	2.86E-03	1.14E-02	1.108E+00	2.788E+02	--
α_4	3.07E-05	2.33E-03	1.30E-03	8.12E-03	6.509E-01	2.793E+02	--
α_5	1.79E-08	9.06E-04	1.63E-04	4.37E-03	2.536E-01	2.797E+02	--
α_6	5.54E-17	3.42E-04	1.55E-06	1.99E-03	9.572E-02	2.798E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9771222	0.9873350	0.9881185	0.9948722	4.050E+02	5.195E+00	--
α_2	9.74E-04	5.13E-03	4.35E-03	1.20E-02	2.105E+00	4.081E+02	--
α_3	3.02E-04	3.22E-03	2.46E-03	8.74E-03	1.320E+00	4.089E+02	--
α_4	1.24E-04	2.43E-03	1.68E-03	7.28E-03	9.967E-01	4.092E+02	--
α_5	6.47E-06	1.28E-03	6.08E-04	4.83E-03	5.249E-01	4.097E+02	--
α_6	3.54E-10	4.77E-04	4.66E-05	2.47E-03	1.956E-01	4.100E+02	--
α_7	3.68E-28	1.29E-04	2.92E-09	7.00E-04	5.291E-02	4.101E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787229	0.9878938	0.9885625	0.9947813	4.759E+02	5.832E+00	--
α_2	9.39E-04	4.63E-03	3.96E-03	1.06E-02	2.229E+00	4.795E+02	--
α_3	2.24E-04	2.62E-03	1.97E-03	7.22E-03	1.260E+00	4.805E+02	--
α_4	1.23E-04	2.16E-03	1.53E-03	6.38E-03	1.042E+00	4.807E+02	--
α_5	3.72E-05	1.58E-03	9.69E-04	5.22E-03	7.626E-01	4.810E+02	--
α_6	1.55E-07	6.79E-04	1.90E-04	3.02E-03	3.271E-01	4.814E+02	--
α_7	2.70E-13	2.79E-04	7.48E-06	1.57E-03	1.344E-01	4.816E+02	--
α_8	1.44E-20	1.59E-04	1.50E-07	9.26E-04	7.682E-02	4.817E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.92E-02	1.30E-02	1.15E-02	7.97E-03	6.12E-03	5.13E-03	4.63E-03
α_3		4.68E-03	3.76E-03	4.46E-03	3.96E-03	3.22E-03	2.62E-03
α_4			1.83E-03	1.81E-03	2.33E-03	2.43E-03	2.16E-03
α_5				4.67E-04	9.06E-04	1.28E-03	1.58E-03
α_6					3.42E-04	4.77E-04	6.79E-04
α_7						1.29E-04	2.79E-04
α_8							1.59E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.92E-02	1.77E-02	1.70E-02	1.47E-02	1.37E-02	1.27E-02	1.21E-02
Gamma		2.65E-01	3.28E-01	4.58E-01	5.52E-01	5.95E-01	6.18E-01
Delta			3.28E-01	3.38E-01	4.74E-01	5.73E-01	6.50E-01
Epsilon				2.05E-01	3.49E-01	4.37E-01	5.55E-01
Mu					2.74E-01	3.21E-01	4.14E-01
Omega						2.13E-01	3.92E-01
Sigma							3.64E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.2.2.3 AFW-TDP-FHRH: AFW Turbine-Driven Pumps Fail to Run Less Than or Greater Than One Hour

Generic CCF Parameters

Plant Type: PWR
System Group: Clean Water
System: Auxiliary Feedwater
Component Group: Pump
Component Type: Turbine Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run < 1H, Fail to Run > 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9235240	0.9803811	0.9913633	0.9999407	1.0000000	2.341E+01	4.685E-01
α_2	5.58E-05	1.96E-02	8.63E-03	7.65E-02	0.00E+00	4.685E-01	2.341E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9466116	0.9812328	0.9862494	0.9986987	1.0000000	5.898E+01	1.128E+00
α_2	4.76E-04	1.42E-02	9.25E-03	4.46E-02	0.00E+00	8.512E-01	5.926E+01
α_3	2.31E-07	4.61E-03	9.88E-04	2.16E-02	0.00E+00	2.768E-01	5.983E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9515956	0.9797624	0.9830751	0.9966052	1.0000000	9.168E+01	1.894E+00
α_2	1.17E-03	1.35E-02	1.02E-02	3.70E-02	0.00E+00	1.260E+00	9.231E+01
α_3	4.68E-06	4.30E-03	1.58E-03	1.78E-02	0.00E+00	4.024E-01	9.317E+01
α_4	1.72E-08	2.47E-03	3.69E-04	1.23E-02	0.00E+00	2.315E-01	9.334E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9647181	0.9824236	0.9840420	0.9945954	1.0000000	1.918E+02	3.432E+00
α_2	1.68E-03	9.85E-03	8.24E-03	2.36E-02	0.00E+00	1.924E+00	1.933E+02
α_3	3.11E-04	5.37E-03	3.81E-03	1.58E-02	0.00E+00	1.049E+00	1.942E+02
α_4	1.49E-06	1.96E-03	6.75E-04	8.26E-03	0.00E+00	3.822E-01	1.949E+02
α_5	3.41E-20	3.93E-04	3.66E-07	2.28E-03	0.00E+00	7.674E-02	1.952E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9675157	0.9833304	0.9847088	0.9944279	1.0000000	2.262E+02	3.835E+00

α_2	1.06E-03	7.39E-03	6.02E-03	1.84E-02	0.00E+00	1.701E+00	2.284E+02
α_3	4.14E-04	5.25E-03	3.90E-03	1.47E-02	0.00E+00	1.207E+00	2.288E+02
α_4	2.37E-05	2.59E-03	1.36E-03	9.33E-03	0.00E+00	5.960E-01	2.295E+02
α_5	3.76E-09	9.61E-04	1.29E-04	4.82E-03	0.00E+00	2.211E-01	2.298E+02
α_6	3.75E-15	4.77E-04	4.83E-06	2.75E-03	0.00E+00	1.098E-01	2.299E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9732470	0.9848173	0.9856609	0.9934954	1.0000000	3.728E+02	5.747E+00
α_2	1.21E-03	5.93E-03	5.08E-03	1.35E-02	0.00E+00	2.243E+00	3.763E+02
α_3	5.78E-04	4.30E-03	3.47E-03	1.09E-02	0.00E+00	1.630E+00	3.769E+02
α_4	1.78E-04	2.86E-03	2.05E-03	8.32E-03	0.00E+00	1.083E+00	3.775E+02
α_5	1.08E-05	1.49E-03	7.53E-04	5.49E-03	0.00E+00	5.654E-01	3.780E+02
α_6	2.78E-10	5.06E-04	4.68E-05	2.64E-03	0.00E+00	1.916E-01	3.784E+02
α_7	6.30E-41	9.19E-05	3.42E-12	4.03E-04	0.00E+00	3.480E-02	3.785E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9745473	0.9855687	0.9863748	0.9938356	1.0000000	3.910E+02	5.726E+00
α_2	9.17E-04	5.09E-03	4.28E-03	1.20E-02	0.00E+00	2.018E+00	3.947E+02
α_3	3.62E-04	3.50E-03	2.71E-03	9.35E-03	0.00E+00	1.391E+00	3.954E+02
α_4	1.59E-04	2.68E-03	1.90E-03	7.84E-03	0.00E+00	1.062E+00	3.957E+02
α_5	3.13E-05	1.77E-03	1.03E-03	6.01E-03	0.00E+00	7.026E-01	3.960E+02
α_6	3.46E-07	8.82E-04	2.71E-04	3.83E-03	0.00E+00	3.497E-01	3.964E+02
α_7	1.33E-15	2.72E-04	2.49E-06	1.57E-03	0.00E+00	1.078E-01	3.966E+02
α_8	2.78E-17	2.39E-04	1.01E-06	1.39E-03	0.00E+00	9.469E-02	3.967E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.80E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.96E-02	1.42E-02	1.35E-02	9.85E-03	7.39E-03	5.93E-03	5.09E-03
α_3		4.61E-03	4.30E-03	5.37E-03	5.25E-03	4.30E-03	3.50E-03
α_4			2.47E-03	1.96E-03	2.59E-03	2.86E-03	2.68E-03
α_5				3.93E-04	9.61E-04	1.49E-03	1.77E-03
α_6					4.77E-04	5.06E-04	8.82E-04
α_7						9.19E-05	2.72E-04
α_8							2.39E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.80E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.96E-02	1.88E-02	2.02E-02	1.76E-02	1.67E-02	1.52E-02	1.44E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9236432	0.9803811	0.9913298	0.9999428	2.352E+01	4.706E-01	--
α_2	5.72E-05	1.96E-02	8.67E-03	7.64E-02	4.706E-01	2.352E+01	1.066

CCCG = 3, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9461871	0.9812328	0.9863542	0.9987654	5.764E+01	1.103E+00	--
α_2	4.10E-04	1.42E-02	9.04E-03	4.54E-02	8.104E-01	5.641E+01	1.107
α_3	3.88E-07	4.61E-03	1.08E-03	2.12E-02	2.921E-01	6.313E+01	0.999

CCCG = 4, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9520651	0.9797624	0.9829763	0.9964642	9.453E+01	1.953E+00	--
α_2	1.26E-03	1.35E-02	1.03E-02	3.65E-02	1.312E+00	9.614E+01	1.186
α_3	7.24E-06	4.30E-03	1.70E-03	1.74E-02	4.307E-01	9.971E+01	1.154
α_4	4.94E-09	2.47E-03	2.93E-04	1.26E-02	2.099E-01	8.464E+01	1.362

CCCG = 5, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9637251	0.9824236	0.9842099	0.9950159	1.737E+02	3.107E+00	--
α_2	1.39E-03	9.85E-03	8.02E-03	2.46E-02	1.684E+00	1.692E+02	1.242
α_3	2.38E-04	5.37E-03	3.65E-03	1.64E-02	9.426E-01	1.745E+02	1.210
α_4	1.47E-06	1.96E-03	6.73E-04	8.26E-03	3.816E-01	1.946E+02	1.089
α_5	1.57E-16	3.93E-04	2.15E-06	2.29E-03	9.865E-02	2.509E+02	0.846

CCCG = 6, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9674851	0.9833304	0.9847152	0.9944437	2.255E+02	3.822E+00	--
α_2	1.07E-03	7.39E-03	6.03E-03	1.84E-02	1.714E+00	2.301E+02	1.212
α_3	3.45E-04	5.25E-03	3.79E-03	1.51E-02	1.108E+00	2.101E+02	1.330
α_4	3.42E-05	2.59E-03	1.44E-03	9.04E-03	6.509E-01	2.506E+02	1.118
α_5	1.90E-08	9.61E-04	1.73E-04	4.63E-03	2.536E-01	2.636E+02	1.065
α_6	7.74E-17	4.77E-04	2.17E-06	2.78E-03	9.572E-02	2.005E+02	1.400

CCCG = 7, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9725959	0.9848173	0.9857519	0.9938466	3.370E+02	5.195E+00	--
α_2	1.13E-03	5.93E-03	5.03E-03	1.38E-02	2.105E+00	3.531E+02	1.158
α_3	4.05E-04	4.30E-03	3.29E-03	1.17E-02	1.320E+00	3.053E+02	1.341
α_4	1.46E-04	2.86E-03	1.98E-03	8.57E-03	9.967E-01	3.474E+02	1.180
α_5	7.56E-06	1.49E-03	7.10E-04	5.63E-03	5.249E-01	3.509E+02	1.170
α_6	3.76E-10	5.06E-04	4.95E-05	2.62E-03	1.956E-01	3.863E+02	1.064
α_7	2.62E-28	9.19E-05	2.08E-09	4.99E-04	5.291E-02	5.755E+02	0.714

CCCG = 8, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9746540	0.9855687	0.9863622	0.9937736	3.983E+02	5.832E+00	--
α_2	1.03E-03	5.09E-03	4.36E-03	1.16E-02	2.229E+00	4.360E+02	1.102
α_3	3.01E-04	3.50E-03	2.64E-03	9.67E-03	1.260E+00	3.583E+02	1.343
α_4	1.52E-04	2.68E-03	1.89E-03	7.89E-03	1.042E+00	3.882E+02	1.240
α_5	4.16E-05	1.77E-03	1.08E-03	5.84E-03	7.626E-01	4.299E+02	1.121
α_6	2.02E-07	8.82E-04	2.46E-04	3.92E-03	3.271E-01	3.707E+02	1.301
α_7	2.63E-13	2.72E-04	7.28E-06	1.53E-03	1.344E-01	4.943E+02	0.976
α_8	2.15E-20	2.39E-04	2.24E-07	1.39E-03	7.682E-02	3.218E+02	1.500

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.80E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.96E-02	1.42E-02	1.35E-02	9.85E-03	7.39E-03	5.93E-03	5.09E-03
α_3		4.61E-03	4.30E-03	5.37E-03	5.25E-03	4.30E-03	3.50E-03
α_4			2.47E-03	1.96E-03	2.59E-03	2.86E-03	2.68E-03
α_5				3.93E-04	9.61E-04	1.49E-03	1.77E-03
α_6					4.77E-04	5.06E-04	8.82E-04
α_7						9.19E-05	2.72E-04
α_8							2.39E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.80E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.96E-02	1.88E-02	2.02E-02	1.76E-02	1.67E-02	1.52E-02	1.44E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.2.2.4 AFW-TDP-RH: AFW Turbine-Driven Pumps Fail to Run Greater Than One Hour

Generic CCF Parameters

Plant Type: PWR
System Group: Clean Water
System: Auxiliary Feedwater
Component Group: Pump
Component Type: Turbine Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run > 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9235240	0.9803811	0.9913633	0.9999407	1.0000000	2.341E+01	4.685E-01
α_2	5.58E-05	1.96E-02	8.63E-03	7.65E-02	0.00E+00	4.685E-01	2.341E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9466116	0.9812328	0.9862494	0.9986987	1.0000000	5.898E+01	1.128E+00
α_2	4.76E-04	1.42E-02	9.25E-03	4.46E-02	0.00E+00	8.512E-01	5.926E+01
α_3	2.31E-07	4.61E-03	9.88E-04	2.16E-02	0.00E+00	2.768E-01	5.983E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9515956	0.9797624	0.9830751	0.9966052	1.0000000	9.168E+01	1.894E+00
α_2	1.17E-03	1.35E-02	1.02E-02	3.70E-02	0.00E+00	1.260E+00	9.231E+01
α_3	4.68E-06	4.30E-03	1.58E-03	1.78E-02	0.00E+00	4.024E-01	9.317E+01
α_4	1.72E-08	2.47E-03	3.69E-04	1.23E-02	0.00E+00	2.315E-01	9.334E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9647181	0.9824236	0.9840420	0.9945954	1.0000000	1.918E+02	3.432E+00
α_2	1.68E-03	9.85E-03	8.24E-03	2.36E-02	0.00E+00	1.924E+00	1.933E+02
α_3	3.11E-04	5.37E-03	3.81E-03	1.58E-02	0.00E+00	1.049E+00	1.942E+02
α_4	1.49E-06	1.96E-03	6.75E-04	8.26E-03	0.00E+00	3.822E-01	1.949E+02
α_5	3.41E-20	3.93E-04	3.66E-07	2.28E-03	0.00E+00	7.674E-02	1.952E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9675157	0.9833304	0.9847088	0.9944279	1.0000000	2.262E+02	3.835E+00
α_2	1.06E-03	7.39E-03	6.02E-03	1.84E-02	0.00E+00	1.701E+00	2.284E+02

α_3	4.14E-04	5.25E-03	3.90E-03	1.47E-02	0.00E+00	1.207E+00	2.288E+02
α_4	2.37E-05	2.59E-03	1.36E-03	9.33E-03	0.00E+00	5.960E-01	2.295E+02
α_5	3.76E-09	9.61E-04	1.29E-04	4.82E-03	0.00E+00	2.211E-01	2.298E+02
α_6	3.75E-15	4.77E-04	4.83E-06	2.75E-03	0.00E+00	1.098E-01	2.299E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9732470	0.9848173	0.9856609	0.9934954	1.0000000	3.728E+02	5.747E+00
α_2	1.21E-03	5.93E-03	5.08E-03	1.35E-02	0.00E+00	2.243E+00	3.763E+02
α_3	5.78E-04	4.30E-03	3.47E-03	1.09E-02	0.00E+00	1.630E+00	3.769E+02
α_4	1.78E-04	2.86E-03	2.05E-03	8.32E-03	0.00E+00	1.083E+00	3.775E+02
α_5	1.08E-05	1.49E-03	7.53E-04	5.49E-03	0.00E+00	5.654E-01	3.780E+02
α_6	2.78E-10	5.06E-04	4.68E-05	2.64E-03	0.00E+00	1.916E-01	3.784E+02
α_7	6.30E-41	9.19E-05	3.42E-12	4.03E-04	0.00E+00	3.480E-02	3.785E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9745473	0.9855687	0.9863748	0.9938356	1.0000000	3.910E+02	5.726E+00
α_2	9.17E-04	5.09E-03	4.28E-03	1.20E-02	0.00E+00	2.018E+00	3.947E+02
α_3	3.62E-04	3.50E-03	2.71E-03	9.35E-03	0.00E+00	1.391E+00	3.954E+02
α_4	1.59E-04	2.68E-03	1.90E-03	7.84E-03	0.00E+00	1.062E+00	3.957E+02
α_5	3.13E-05	1.77E-03	1.03E-03	6.01E-03	0.00E+00	7.026E-01	3.960E+02
α_6	3.46E-07	8.82E-04	2.71E-04	3.83E-03	0.00E+00	3.497E-01	3.964E+02
α_7	1.33E-15	2.72E-04	2.49E-06	1.57E-03	0.00E+00	1.078E-01	3.966E+02
α_8	2.78E-17	2.39E-04	1.01E-06	1.39E-03	0.00E+00	9.469E-02	3.967E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.80E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.96E-02	1.42E-02	1.35E-02	9.85E-03	7.39E-03	5.93E-03	5.09E-03
α_3		4.61E-03	4.30E-03	5.37E-03	5.25E-03	4.30E-03	3.50E-03
α_4			2.47E-03	1.96E-03	2.59E-03	2.86E-03	2.68E-03
α_5				3.93E-04	9.61E-04	1.49E-03	1.77E-03
α_6					4.77E-04	5.06E-04	8.82E-04
α_7						9.19E-05	2.72E-04
α_8							2.39E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.80E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.96E-02	1.88E-02	2.02E-02	1.76E-02	1.67E-02	1.52E-02	1.44E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9236432	0.9803811	0.9913298	0.9999428	2.352E+01	4.706E-01	--
α_2	5.72E-05	1.96E-02	8.67E-03	7.64E-02	4.706E-01	2.352E+01	1.066

CCCG = 3, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9461871	0.9812328	0.9863542	0.9987654	5.764E+01	1.103E+00	--
α_2	4.10E-04	1.42E-02	9.04E-03	4.54E-02	8.104E-01	5.641E+01	1.107
α_3	3.88E-07	4.61E-03	1.08E-03	2.12E-02	2.921E-01	6.313E+01	0.999

CCCG = 4, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9520651	0.9797624	0.9829763	0.9964642	9.453E+01	1.953E+00	--
α_2	1.26E-03	1.35E-02	1.03E-02	3.65E-02	1.312E+00	9.614E+01	1.186
α_3	7.24E-06	4.30E-03	1.70E-03	1.74E-02	4.307E-01	9.971E+01	1.154
α_4	4.94E-09	2.47E-03	2.93E-04	1.26E-02	2.099E-01	8.464E+01	1.362

CCCG = 5, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9637251	0.9824236	0.9842099	0.9950159	1.737E+02	3.107E+00	--
α_2	1.39E-03	9.85E-03	8.02E-03	2.46E-02	1.684E+00	1.692E+02	1.242
α_3	2.38E-04	5.37E-03	3.65E-03	1.64E-02	9.426E-01	1.745E+02	1.210
α_4	1.47E-06	1.96E-03	6.73E-04	8.26E-03	3.816E-01	1.946E+02	1.089
α_5	1.57E-16	3.93E-04	2.15E-06	2.29E-03	9.865E-02	2.509E+02	0.846

CCCG = 6, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9674851	0.9833304	0.9847152	0.9944437	2.255E+02	3.822E+00	--
α_2	1.07E-03	7.39E-03	6.03E-03	1.84E-02	1.714E+00	2.301E+02	1.212
α_3	3.45E-04	5.25E-03	3.79E-03	1.51E-02	1.108E+00	2.101E+02	1.330
α_4	3.42E-05	2.59E-03	1.44E-03	9.04E-03	6.509E-01	2.506E+02	1.118
α_5	1.90E-08	9.61E-04	1.73E-04	4.63E-03	2.536E-01	2.636E+02	1.065
α_6	7.74E-17	4.77E-04	2.17E-06	2.78E-03	9.572E-02	2.005E+02	1.400

CCCG = 7, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9725959	0.9848173	0.9857519	0.9938466	3.370E+02	5.195E+00	--
α_2	1.13E-03	5.93E-03	5.03E-03	1.38E-02	2.105E+00	3.531E+02	1.158
α_3	4.05E-04	4.30E-03	3.29E-03	1.17E-02	1.320E+00	3.053E+02	1.341
α_4	1.46E-04	2.86E-03	1.98E-03	8.57E-03	9.967E-01	3.474E+02	1.180
α_5	7.56E-06	1.49E-03	7.10E-04	5.63E-03	5.249E-01	3.509E+02	1.170
α_6	3.76E-10	5.06E-04	4.95E-05	2.62E-03	1.956E-01	3.863E+02	1.064
α_7	2.62E-28	9.19E-05	2.08E-09	4.99E-04	5.291E-02	5.755E+02	0.714

CCCG = 8, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9746540	0.9855687	0.9863622	0.9937736	3.983E+02	5.832E+00	--
α_2	1.03E-03	5.09E-03	4.36E-03	1.16E-02	2.229E+00	4.360E+02	1.102
α_3	3.01E-04	3.50E-03	2.64E-03	9.67E-03	1.260E+00	3.583E+02	1.343
α_4	1.52E-04	2.68E-03	1.89E-03	7.89E-03	1.042E+00	3.882E+02	1.240
α_5	4.16E-05	1.77E-03	1.08E-03	5.84E-03	7.626E-01	4.299E+02	1.121
α_6	2.02E-07	8.82E-04	2.46E-04	3.92E-03	3.271E-01	3.707E+02	1.301
α_7	2.63E-13	2.72E-04	7.28E-06	1.53E-03	1.344E-01	4.943E+02	0.976
α_8	2.15E-20	2.39E-04	2.24E-07	1.39E-03	7.682E-02	3.218E+02	1.500

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.80E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.96E-02	1.42E-02	1.35E-02	9.85E-03	7.39E-03	5.93E-03	5.09E-03
α_3		4.61E-03	4.30E-03	5.37E-03	5.25E-03	4.30E-03	3.50E-03
α_4			2.47E-03	1.96E-03	2.59E-03	2.86E-03	2.68E-03
α_5				3.93E-04	9.61E-04	1.49E-03	1.77E-03
α_6					4.77E-04	5.06E-04	8.82E-04
α_7						9.19E-05	2.72E-04
α_8							2.39E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.80E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.96E-02	1.88E-02	2.02E-02	1.76E-02	1.67E-02	1.52E-02	1.44E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.2.3 High Pressure Coolant Injection and Reactor Core Isolation Cooling Turbine-Driven Pumps

2.2.3.1 HCI-RCI-TDP-FS: HPCI AND RCIC Turbine-Driven Pumps Fail to Start

Generic CCF Parameters

Plant Type: BWR
System Group: Clean Water
System: High Pressure Coolant Injection, Reactor Core Isolation
Component Group: Pump
Component Type: Turbine Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Start
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 64.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9788435	0.9946073	0.9976755	0.9999834	1.0000000	8.641E+01	4.685E-01
α_2	1.50E-05	5.39E-03	2.33E-03	2.12E-02	0.00E+00	4.685E-01	8.641E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9738087	0.9908369	0.9933210	0.9993685	1.0000000	1.220E+02	1.128E+00
α_2	2.31E-04	6.91E-03	4.49E-03	2.19E-02	0.00E+00	8.512E-01	1.223E+02
α_3	1.12E-07	2.25E-03	4.80E-04	1.06E-02	0.00E+00	2.768E-01	1.228E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9709636	0.9879056	0.9899109	0.9979778	1.0000000	1.547E+02	1.894E+00
α_2	6.93E-04	8.05E-03	6.07E-03	2.21E-02	0.00E+00	1.260E+00	1.553E+02
α_3	2.79E-06	2.57E-03	9.43E-04	1.06E-02	0.00E+00	4.024E-01	1.562E+02
α_4	1.02E-08	1.48E-03	2.20E-04	7.32E-03	0.00E+00	2.315E-01	1.563E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9732785	0.9867110	0.9879482	0.9959185	1.0000000	2.548E+02	3.432E+00
α_2	1.27E-03	7.45E-03	6.22E-03	1.78E-02	0.00E+00	1.924E+00	2.563E+02
α_3	2.35E-04	4.06E-03	2.88E-03	1.19E-02	0.00E+00	1.049E+00	2.572E+02
α_4	1.12E-06	1.48E-03	5.10E-04	6.24E-03	0.00E+00	3.822E-01	2.579E+02
α_5	2.58E-20	2.97E-04	2.77E-07	1.73E-03	0.00E+00	7.674E-02	2.582E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9744624	0.9869140	0.9880073	0.9956331	1.0000000	2.892E+02	3.835E+00
α_2	8.31E-04	5.80E-03	4.73E-03	1.45E-02	0.00E+00	1.701E+00	2.914E+02
α_3	3.25E-04	4.12E-03	3.06E-03	1.15E-02	0.00E+00	1.207E+00	2.918E+02
α_4	1.86E-05	2.03E-03	1.07E-03	7.33E-03	0.00E+00	5.960E-01	2.925E+02
α_5	2.95E-09	7.54E-04	1.01E-04	3.78E-03	0.00E+00	2.211E-01	2.928E+02
α_6	2.95E-15	3.75E-04	3.79E-06	2.16E-03	0.00E+00	1.098E-01	2.929E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9770466	0.9869836	0.9877147	0.9944276	1.0000000	4.358E+02	5.747E+00
α_2	1.04E-03	5.08E-03	4.36E-03	1.16E-02	0.00E+00	2.243E+00	4.393E+02
α_3	4.95E-04	3.69E-03	2.97E-03	9.34E-03	0.00E+00	1.630E+00	4.399E+02
α_4	1.53E-04	2.45E-03	1.75E-03	7.14E-03	0.00E+00	1.083E+00	4.405E+02
α_5	9.25E-06	1.28E-03	6.46E-04	4.70E-03	0.00E+00	5.654E-01	4.410E+02
α_6	2.38E-10	4.34E-04	4.01E-05	2.26E-03	0.00E+00	1.916E-01	4.414E+02
α_7	5.40E-41	7.88E-05	2.93E-12	3.46E-04	0.00E+00	3.480E-02	4.415E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9780176	0.9875462	0.9882487	0.9946804	1.0000000	4.540E+02	5.726E+00
α_2	7.91E-04	4.39E-03	3.70E-03	1.04E-02	0.00E+00	2.018E+00	4.577E+02
α_3	3.12E-04	3.02E-03	2.34E-03	8.07E-03	0.00E+00	1.391E+00	4.584E+02
α_4	1.37E-04	2.31E-03	1.64E-03	6.77E-03	0.00E+00	1.062E+00	4.587E+02
α_5	2.70E-05	1.53E-03	8.93E-04	5.19E-03	0.00E+00	7.026E-01	4.590E+02
α_6	2.99E-07	7.61E-04	2.33E-04	3.31E-03	0.00E+00	3.497E-01	4.594E+02
α_7	1.15E-15	2.35E-04	2.15E-06	1.35E-03	0.00E+00	1.078E-01	4.596E+02
α_8	2.40E-17	2.06E-04	8.72E-07	1.20E-03	0.00E+00	9.469E-02	4.597E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.91E-01	9.88E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01
α_2	5.39E-03	6.91E-03	8.05E-03	7.45E-03	5.80E-03	5.08E-03	4.39E-03
α_3		2.25E-03	2.57E-03	4.06E-03	4.12E-03	3.69E-03	3.02E-03
α_4			1.48E-03	1.48E-03	2.03E-03	2.45E-03	2.31E-03
α_5				2.97E-04	7.54E-04	1.28E-03	1.53E-03
α_6					3.75E-04	4.34E-04	7.61E-04
α_7						7.88E-05	2.35E-04
α_8							2.06E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.91E-01	9.88E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01
Beta	5.39E-03	9.16E-03	1.21E-02	1.33E-02	1.31E-02	1.30E-02	1.25E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01

Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	64.00	64.00	64.00	64.00	64.00	64.00	64.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 23.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.359

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9872095	0.9967056	0.9985401	0.9999891	1.463E+02	4.834E-01	--
α_2	1.09E-05	3.29E-03	1.46E-03	1.28E-02	4.834E-01	1.463E+02	0.459

CCCG = 3, Gamma = 0.359

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9865502	0.9951681	0.9963912	0.9996068	2.524E+02	1.226E+00	--
α_2	1.87E-04	3.86E-03	2.66E-03	1.16E-02	9.769E-01	2.520E+02	0.609
α_3	1.55E-08	9.70E-04	1.68E-04	4.70E-03	2.487E-01	2.562E+02	0.600

CCCG = 4, Gamma = 0.359

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9839228	0.9931412	0.9942021	0.9987324	2.978E+02	2.057E+00	--
α_2	5.27E-04	4.79E-03	3.75E-03	1.26E-02	1.442E+00	2.998E+02	0.687
α_3	1.70E-06	1.36E-03	5.10E-04	5.59E-03	4.114E-01	3.022E+02	0.684
α_4	9.34E-10	7.12E-04	7.76E-05	3.65E-03	2.036E-01	2.857E+02	0.724

CCCG = 5, Gamma = 0.359

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9844590	0.9921361	0.9928251	0.9974595	4.647E+02	3.683E+00	--
α_2	9.82E-04	4.81E-03	4.12E-03	1.10E-02	2.243E+00	4.644E+02	0.808
α_3	1.06E-04	2.11E-03	1.46E-03	6.35E-03	9.912E-01	4.677E+02	0.805
α_4	5.39E-07	7.90E-04	2.67E-04	3.35E-03	3.765E-01	4.759E+02	0.792
α_5	1.32E-21	1.52E-04	8.66E-08	8.78E-04	7.237E-02	4.761E+02	0.792

CCCG = 6, Gamma = 0.359

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9846312	0.9919779	0.9926043	0.9971846	5.118E+02	4.139E+00	--
α_2	7.87E-04	4.09E-03	3.48E-03	9.50E-03	2.128E+00	5.178E+02	0.822
α_3	1.52E-04	2.20E-03	1.60E-03	6.31E-03	1.134E+00	5.134E+02	0.831
α_4	6.87E-06	1.05E-03	5.21E-04	3.89E-03	5.533E-01	5.255E+02	0.813
α_5	1.61E-09	4.15E-04	5.54E-05	2.08E-03	2.210E-01	5.324E+02	0.802
α_6	3.29E-16	2.59E-04	1.80E-06	1.50E-03	1.027E-01	3.971E+02	1.076

CCCG = 7, Gamma = 0.359

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9863720	0.9920785	0.9924789	0.9964181	8.055E+02	6.432E+00	--
α_2	9.02E-04	3.47E-03	3.08E-03	7.39E-03	2.840E+00	8.152E+02	0.869
α_3	3.25E-04	2.19E-03	1.79E-03	5.42E-03	1.746E+00	7.958E+02	0.891
α_4	8.30E-05	1.33E-03	9.53E-04	3.88E-03	1.084E+00	8.129E+02	0.873
α_5	3.73E-06	6.57E-04	3.18E-04	2.46E-03	5.376E-01	8.183E+02	0.868
α_6	2.10E-10	2.39E-04	2.41E-05	1.24E-03	1.979E-01	8.277E+02	0.858
α_7	7.42E-53	3.31E-05	3.32E-15	1.13E-04	2.656E-02	8.013E+02	0.887

CCCG = 8, Gamma = 0.359

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9868369	0.9924384	0.9928407	0.9966665	8.022E+02	6.112E+00	--
α_2	6.20E-04	2.87E-03	2.47E-03	6.44E-03	2.364E+00	8.227E+02	0.861
α_3	2.26E-04	1.90E-03	1.50E-03	4.93E-03	1.512E+00	7.947E+02	0.892
α_4	7.69E-05	1.31E-03	9.30E-04	3.85E-03	1.056E+00	8.036E+02	0.883
α_5	1.24E-05	8.21E-04	4.68E-04	2.83E-03	6.745E-01	8.209E+02	0.865
α_6	5.10E-08	3.79E-04	9.64E-05	1.72E-03	3.076E-01	8.104E+02	0.876
α_7	9.19E-16	1.31E-04	1.30E-06	7.58E-04	1.093E-01	8.318E+02	0.854
α_8	2.36E-18	1.53E-04	4.25E-07	8.92E-04	8.885E-02	5.807E+02	1.223

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.95E-01	9.93E-01	9.92E-01	9.92E-01	9.92E-01	9.92E-01
α_2	3.29E-03	3.86E-03	4.79E-03	4.81E-03	4.09E-03	3.47E-03	2.87E-03
α_3		9.70E-04	1.36E-03	2.11E-03	2.20E-03	2.19E-03	1.90E-03
α_4			7.12E-04	7.90E-04	1.05E-03	1.33E-03	1.31E-03
α_5				1.52E-04	4.15E-04	6.57E-04	8.21E-04
α_6					2.59E-04	2.39E-04	3.79E-04
α_7						3.31E-05	1.31E-04
α_8							1.53E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.95E-01	9.93E-01	9.92E-01	9.92E-01	9.92E-01	9.92E-01
Beta	3.29E-03	4.83E-03	6.86E-03	7.86E-03	8.02E-03	7.92E-03	7.56E-03
Gamma		2.01E-01	3.02E-01	3.89E-01	4.90E-01	5.62E-01	6.21E-01
Delta			3.44E-01	3.08E-01	4.39E-01	5.08E-01	5.96E-01
Epsilon				1.61E-01	3.90E-01	4.11E-01	5.31E-01
Mu					3.84E-01	2.93E-01	4.47E-01
Omega						1.22E-01	4.28E-01
Sigma							5.38E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	23.00	23.00	23.00	23.00	23.00	23.00	23.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 9.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.141

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9645115	0.9910700	0.9962772	0.9999803	4.992E+01	4.498E-01	--
α_2	1.97E-05	8.93E-03	3.72E-03	3.55E-02	4.498E-01	4.992E+01	0.459

CCCG = 3, Gamma = 0.141

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9551629	0.9840207	0.9881410	0.9987888	7.256E+01	1.178E+00	--
α_2	5.63E-04	1.28E-02	8.70E-03	3.89E-02	9.387E-01	7.260E+01	0.609
α_3	3.37E-08	3.21E-03	5.18E-04	1.58E-02	2.396E-01	7.431E+01	0.600

CCCG = 4, Gamma = 0.141

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9488167	0.9785710	0.9820599	0.9963871	8.669E+01	1.898E+00	--
α_2	1.30E-03	1.44E-02	1.10E-02	3.93E-02	1.285E+00	8.778E+01	0.687
α_3	4.05E-06	4.39E-03	1.57E-03	1.83E-02	3.927E-01	8.906E+01	0.684
α_4	1.00E-08	2.61E-03	3.49E-04	1.31E-02	2.207E-01	8.430E+01	0.724

CCCG = 5, Gamma = 0.141

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9523987	0.9760942	0.9782263	0.9925013	1.431E+02	3.506E+00	--
α_2	2.43E-03	1.36E-02	1.15E-02	3.22E-02	1.992E+00	1.441E+02	0.808
α_3	4.54E-04	7.35E-03	5.26E-03	2.14E-02	1.078E+00	1.456E+02	0.805
α_4	1.28E-06	2.44E-03	7.88E-04	1.05E-02	3.632E-01	1.487E+02	0.792
α_5	4.49E-21	4.86E-04	2.81E-07	2.81E-03	7.248E-02	1.490E+02	0.792

CCCG = 6, Gamma = 0.141

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9546300	0.9760989	0.9778835	0.9914694	1.715E+02	4.199E+00	--
α_2	1.89E-03	1.10E-02	9.20E-03	2.62E-02	1.941E+00	1.748E+02	0.822
α_3	7.30E-04	7.62E-03	5.84E-03	2.06E-02	1.332E+00	1.736E+02	0.831
α_4	3.71E-05	3.46E-03	1.86E-03	1.23E-02	6.181E-01	1.782E+02	0.813
α_5	8.76E-09	1.28E-03	1.90E-04	6.33E-03	2.313E-01	1.808E+02	0.802
α_6	5.19E-20	5.69E-04	5.36E-07	3.31E-03	7.684E-02	1.349E+02	1.076

CCCG = 7, Gamma = 0.141

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9580526	0.9756850	0.9769143	0.9891185	2.497E+02	6.223E+00	--
α_2	2.52E-03	1.03E-02	9.06E-03	2.23E-02	2.654E+00	2.552E+02	0.869
α_3	8.92E-04	6.55E-03	5.29E-03	1.65E-02	1.645E+00	2.497E+02	0.891
α_4	2.89E-04	4.35E-03	3.15E-03	1.25E-02	1.115E+00	2.554E+02	0.873
α_5	2.26E-05	2.34E-03	1.24E-03	8.39E-03	6.034E-01	2.574E+02	0.868
α_6	1.21E-10	6.82E-04	5.08E-05	3.62E-03	1.780E-01	2.607E+02	0.858
α_7	5.89E-51	1.08E-04	2.22E-14	3.82E-04	2.734E-02	2.525E+02	0.887

CCCG = 8, Gamma = 0.141

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9591572	0.9763097	0.9775046	0.9893811	2.574E+02	6.246E+00	--
α_2	2.15E-03	9.31E-03	8.13E-03	2.05E-02	2.504E+00	2.664E+02	0.861
α_3	5.86E-04	5.47E-03	4.26E-03	1.45E-02	1.419E+00	2.580E+02	0.892
α_4	2.15E-04	3.92E-03	2.75E-03	1.16E-02	1.027E+00	2.612E+02	0.883
α_5	5.65E-05	2.74E-03	1.64E-03	9.16E-03	7.337E-01	2.670E+02	0.865
α_6	1.50E-06	1.50E-03	5.43E-04	6.26E-03	3.975E-01	2.638E+02	0.876
α_7	2.84E-20	2.84E-04	2.73E-07	1.65E-03	7.703E-02	2.710E+02	0.854
α_8	4.29E-18	4.62E-04	1.16E-06	2.70E-03	8.749E-02	1.892E+02	1.223

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.84E-01	9.79E-01	9.76E-01	9.76E-01	9.76E-01	9.76E-01
α_2	8.93E-03	1.28E-02	1.44E-02	1.36E-02	1.10E-02	1.03E-02	9.31E-03
α_3		3.21E-03	4.39E-03	7.35E-03	7.62E-03	6.55E-03	5.47E-03
α_4			2.61E-03	2.44E-03	3.46E-03	4.35E-03	3.92E-03
α_5				4.86E-04	1.28E-03	2.34E-03	2.74E-03
α_6					5.69E-04	6.82E-04	1.50E-03
α_7						1.08E-04	2.84E-04
α_8							4.62E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.84E-01	9.79E-01	9.76E-01	9.76E-01	9.76E-01	9.76E-01
Beta	8.93E-03	1.60E-02	2.14E-02	2.39E-02	2.39E-02	2.43E-02	2.37E-02
Gamma		2.01E-01	3.27E-01	4.30E-01	5.41E-01	5.77E-01	6.07E-01
Delta			3.73E-01	2.85E-01	4.11E-01	5.33E-01	6.20E-01
Epsilon				1.66E-01	3.48E-01	4.19E-01	5.60E-01
Mu					3.08E-01	2.53E-01	4.51E-01
Omega						1.37E-01	3.32E-01
Sigma							6.19E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	9.00	9.00	9.00	9.00	9.00	9.00	9.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9222381	0.9814951	0.9934870	0.9999861	2.016E+01	3.801E-01	--
α_2	1.39E-05	1.85E-02	6.51E-03	7.78E-02	3.801E-01	2.016E+01	0.459

CCCG = 3, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9010288	0.9668698	0.9768940	0.9984162	2.802E+01	9.600E-01	--
α_2	3.46E-04	2.31E-02	1.34E-02	7.91E-02	6.673E-01	2.819E+01	0.609
α_3	8.71E-07	1.00E-02	2.39E-03	4.61E-02	2.927E-01	2.896E+01	0.600

CCCG = 4, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8934847	0.9567608	0.9644160	0.9938073	3.693E+01	1.669E+00	--
α_2	1.55E-03	2.67E-02	1.91E-02	7.79E-02	1.039E+00	3.782E+01	0.687
α_3	8.64E-06	9.96E-03	3.55E-03	4.16E-02	3.887E-01	3.864E+01	0.684
α_4	7.55E-08	6.55E-03	1.08E-03	3.20E-02	2.414E-01	3.664E+01	0.724

CCCG = 5, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9106063	0.9548122	0.9586958	0.9857330	7.368E+01	3.487E+00	--
α_2	3.64E-03	2.33E-02	1.93E-02	5.67E-02	1.791E+00	7.504E+01	0.808
α_3	1.25E-03	1.56E-02	1.17E-02	4.35E-02	1.207E+00	7.596E+01	0.805
α_4	9.79E-06	5.53E-03	2.21E-03	2.23E-02	4.340E-01	7.799E+01	0.792
α_5	1.56E-26	7.01E-04	2.49E-08	3.86E-03	5.493E-02	7.834E+01	0.792

CCCG = 6, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9189298	0.9578191	0.9610813	0.9855532	8.866E+01	3.905E+00	--
α_2	1.39E-03	1.43E-02	1.10E-02	3.86E-02	1.335E+00	9.181E+01	0.822
α_3	2.04E-03	1.66E-02	1.33E-02	4.26E-02	1.531E+00	9.065E+01	0.831
α_4	1.47E-04	7.63E-03	4.54E-03	2.56E-02	7.191E-01	9.352E+01	0.813
α_5	3.78E-08	2.59E-03	4.42E-04	1.26E-02	2.467E-01	9.518E+01	0.802
α_6	1.13E-20	1.02E-03	6.16E-07	5.94E-03	7.279E-02	7.108E+01	1.076

CCCG = 7, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9293934	0.9595808	0.9617120	0.9824861	1.370E+02	5.770E+00	--
α_2	1.34E-03	1.07E-02	8.58E-03	2.76E-02	1.549E+00	1.426E+02	0.869
α_3	2.52E-03	1.42E-02	1.19E-02	3.34E-02	1.989E+00	1.385E+02	0.891
α_4	8.07E-04	8.98E-03	6.82E-03	2.45E-02	1.287E+00	1.421E+02	0.873
α_5	8.00E-05	4.79E-03	2.78E-03	1.63E-02	6.913E-01	1.436E+02	0.868
α_6	1.18E-08	1.60E-03	2.40E-04	7.89E-03	2.327E-01	1.456E+02	0.858
α_7	1.02E-64	1.50E-04	2.27E-17	3.77E-04	2.112E-02	1.411E+02	0.887

CCCG = 8, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9379649	0.9629325	0.9645533	0.9823637	1.823E+02	7.016E+00	--
α_2	1.06E-03	8.21E-03	6.58E-03	2.09E-02	1.583E+00	1.913E+02	0.861
α_3	1.89E-03	1.07E-02	8.98E-03	2.52E-02	1.986E+00	1.841E+02	0.892
α_4	1.24E-03	8.89E-03	7.22E-03	2.22E-02	1.672E+00	1.864E+02	0.883
α_5	2.79E-04	5.26E-03	3.68E-03	1.57E-02	1.011E+00	1.910E+02	0.865
α_6	2.28E-05	3.01E-03	1.53E-03	1.10E-02	5.709E-01	1.889E+02	0.876
α_7	2.13E-10	9.30E-04	7.29E-05	4.92E-03	1.809E-01	1.943E+02	0.854
α_8	1.32E-107	9.17E-05	2.78E-27	6.88E-05	1.245E-02	1.357E+02	1.223

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.67E-01	9.57E-01	9.55E-01	9.58E-01	9.60E-01	9.63E-01
α_2	1.85E-02	2.31E-02	2.67E-02	2.33E-02	1.43E-02	1.07E-02	8.21E-03
α_3		1.00E-02	9.96E-03	1.56E-02	1.66E-02	1.42E-02	1.07E-02
α_4			6.55E-03	5.53E-03	7.63E-03	8.98E-03	8.89E-03
α_5				7.01E-04	2.59E-03	4.79E-03	5.26E-03
α_6					1.02E-03	1.60E-03	3.01E-03
α_7						1.50E-04	9.30E-04
α_8							9.17E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.67E-01	9.57E-01	9.55E-01	9.58E-01	9.60E-01	9.63E-01
Beta	1.85E-02	3.31E-02	4.32E-02	4.52E-02	4.22E-02	4.04E-02	3.71E-02
Gamma		3.02E-01	3.82E-01	4.84E-01	6.60E-01	7.34E-01	7.79E-01
Delta			3.97E-01	2.85E-01	4.04E-01	5.23E-01	6.30E-01
Epsilon				1.12E-01	3.21E-01	4.21E-01	5.11E-01
Mu					2.84E-01	2.67E-01	4.34E-01
Omega						8.57E-02	2.53E-01
Sigma							8.97E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 25.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.391

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9829306	0.9956434	0.9981144	0.9999876	1.076E+02	4.706E-01	--
α_2	1.24E-05	4.36E-03	1.89E-03	1.71E-02	4.706E-01	1.076E+02	0.459

CCCG = 3, Gamma = 0.391

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9779347	0.9923481	0.9944731	0.9995018	1.430E+02	1.103E+00	--
α_2	1.62E-04	5.64E-03	3.58E-03	1.82E-02	8.104E-01	1.428E+02	0.609
α_3	1.68E-07	2.01E-03	4.70E-04	9.26E-03	2.921E-01	1.452E+02	0.600

CCCG = 4, Gamma = 0.391

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9770130	0.9903410	0.9919041	0.9983245	2.002E+02	1.953E+00	--
α_2	6.01E-04	6.46E-03	4.93E-03	1.75E-02	1.312E+00	2.018E+02	0.687
α_3	3.54E-06	2.11E-03	8.34E-04	8.54E-03	4.307E-01	2.036E+02	0.684
α_4	2.17E-09	1.09E-03	1.28E-04	5.54E-03	2.099E-01	1.926E+02	0.724

CCCG = 5, Gamma = 0.391

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9781008	0.9894175	0.9905072	0.9970101	2.905E+02	3.107E+00	--
α_2	8.13E-04	5.76E-03	4.68E-03	1.44E-02	1.684E+00	2.906E+02	0.808
α_3	1.42E-04	3.21E-03	2.18E-03	9.81E-03	9.426E-01	2.926E+02	0.805
α_4	9.60E-07	1.28E-03	4.40E-04	5.40E-03	3.816E-01	2.979E+02	0.792
α_5	1.32E-16	3.31E-04	1.81E-06	1.92E-03	9.865E-02	2.981E+02	0.792

CCCG = 6, Gamma = 0.391

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9797089	0.9896204	0.9904931	0.9965505	3.644E+02	3.822E+00	--
α_2	6.69E-04	4.62E-03	3.77E-03	1.15E-02	1.714E+00	3.692E+02	0.822
α_3	1.98E-04	3.02E-03	2.18E-03	8.71E-03	1.108E+00	3.659E+02	0.831
α_4	2.29E-05	1.73E-03	9.66E-04	6.06E-03	6.509E-01	3.746E+02	0.813
α_5	1.32E-08	6.67E-04	1.20E-04	3.22E-03	2.536E-01	3.797E+02	0.802
α_6	5.48E-17	3.38E-04	1.53E-06	1.97E-03	9.572E-02	2.833E+02	1.076

CCCG = 7, Gamma = 0.391

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9811230	0.9895571	0.9902059	0.9957756	4.923E+02	5.195E+00	--
α_2	7.97E-04	4.20E-03	3.56E-03	9.79E-03	2.105E+00	4.990E+02	0.869
α_3	2.54E-04	2.70E-03	2.06E-03	7.34E-03	1.320E+00	4.871E+02	0.891
α_4	1.02E-04	2.00E-03	1.39E-03	5.99E-03	9.967E-01	4.975E+02	0.873
α_5	5.29E-06	1.05E-03	4.97E-04	3.95E-03	5.249E-01	5.010E+02	0.868
α_6	2.87E-10	3.86E-04	3.77E-05	2.00E-03	1.956E-01	5.069E+02	0.858
α_7	3.07E-28	1.08E-04	2.44E-09	5.85E-04	5.291E-02	4.908E+02	0.887

CCCG = 8, Gamma = 0.391

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9822418	0.9899021	0.9904620	0.9956503	5.717E+02	5.832E+00	--
α_2	7.68E-04	3.79E-03	3.24E-03	8.67E-03	2.229E+00	5.864E+02	0.861
α_3	1.90E-04	2.22E-03	1.67E-03	6.12E-03	1.260E+00	5.668E+02	0.892
α_4	1.03E-04	1.81E-03	1.28E-03	5.35E-03	1.042E+00	5.731E+02	0.883
α_5	3.05E-05	1.30E-03	7.96E-04	4.29E-03	7.626E-01	5.854E+02	0.865
α_6	1.29E-07	5.66E-04	1.58E-04	2.51E-03	3.271E-01	5.781E+02	0.876
α_7	2.19E-13	2.26E-04	6.07E-06	1.27E-03	1.344E-01	5.934E+02	0.854
α_8	1.67E-20	1.85E-04	1.74E-07	1.08E-03	7.682E-02	4.143E+02	1.223

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.92E-01	9.90E-01	9.89E-01	9.90E-01	9.90E-01	9.90E-01
α_2	4.36E-03	5.64E-03	6.46E-03	5.76E-03	4.62E-03	4.20E-03	3.79E-03
α_3		2.01E-03	2.11E-03	3.21E-03	3.02E-03	2.70E-03	2.22E-03
α_4			1.09E-03	1.28E-03	1.73E-03	2.00E-03	1.81E-03
α_5				3.31E-04	6.67E-04	1.05E-03	1.30E-03
α_6					3.38E-04	3.86E-04	5.66E-04
α_7						1.08E-04	2.26E-04
α_8							1.85E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.92E-01	9.90E-01	9.89E-01	9.90E-01	9.90E-01	9.90E-01
Beta	4.36E-03	7.65E-03	9.66E-03	1.06E-02	1.04E-02	1.04E-02	1.01E-02
Gamma		2.62E-01	3.31E-01	4.56E-01	5.55E-01	5.98E-01	6.25E-01
Delta			3.40E-01	3.34E-01	4.76E-01	5.67E-01	6.49E-01
Epsilon				2.05E-01	3.67E-01	4.35E-01	5.57E-01
Mu					3.36E-01	3.20E-01	4.29E-01
Omega						2.18E-01	4.21E-01
Sigma							4.50E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	25.00	25.00	25.00	25.00	25.00	25.00	25.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.047

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9922070	0.9979795	0.9990896	0.9999926	2.436E+02	4.932E-01	--
α_2	7.41E-06	2.02E-03	9.10E-04	7.79E-03	4.932E-01	2.436E+02	0.459

CCCG = 3, Gamma = 0.047

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9925019	0.9974423	0.9981845	0.9998487	4.132E+02	1.059E+00	--
α_2	3.23E-05	1.73E-03	1.02E-03	5.84E-03	7.137E-01	4.117E+02	0.609
α_3	2.97E-07	8.27E-04	2.50E-04	3.61E-03	3.458E-01	4.177E+02	0.600

CCCG = 4, Gamma = 0.047

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9930185	0.9970007	0.9974556	0.9994283	7.029E+02	2.115E+00	--
α_2	2.70E-04	2.18E-03	1.74E-03	5.62E-03	1.549E+00	7.085E+02	0.687
α_3	1.16E-08	3.71E-04	7.25E-05	1.77E-03	2.646E-01	7.129E+02	0.684
α_4	4.93E-08	4.47E-04	1.10E-04	2.04E-03	3.010E-01	6.736E+02	0.724

CCCG = 5, Gamma = 0.047

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9945002	0.9969463	0.9971341	0.9987511	1.738E+03	5.325E+00	--
α_2	6.66E-04	2.09E-03	1.90E-03	4.15E-03	3.632E+00	1.736E+03	0.808
α_3	7.61E-05	7.75E-04	5.95E-04	2.09E-03	1.354E+00	1.746E+03	0.805
α_4	1.58E-08	1.67E-04	3.98E-05	7.66E-04	2.961E-01	1.775E+03	0.792
α_5	7.12E-35	2.39E-05	2.63E-11	1.18E-04	4.243E-02	1.775E+03	0.792

CCCG = 6, Gamma = 0.047

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940837	0.9967753	0.9969890	0.9987374	1.526E+03	4.936E+00	--
α_2	5.01E-04	1.89E-03	1.68E-03	3.99E-03	2.915E+00	1.543E+03	0.822
α_3	7.01E-05	8.22E-04	6.17E-04	2.27E-03	1.257E+00	1.529E+03	0.831
α_4	1.31E-06	3.22E-04	1.47E-04	1.23E-03	5.031E-01	1.564E+03	0.813
α_5	2.11E-15	7.29E-05	9.62E-07	4.18E-04	1.155E-01	1.584E+03	0.802
α_6	5.75E-13	1.23E-04	4.50E-06	6.81E-04	1.451E-01	1.181E+03	1.076

CCCG = 7, Gamma = 0.047

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9951154	0.9969090	0.9970144	0.9983428	3.114E+03	9.654E+00	--
α_2	5.97E-04	1.54E-03	1.44E-03	2.84E-03	4.851E+00	3.144E+03	0.869
α_3	2.34E-04	9.12E-04	8.06E-04	1.95E-03	2.800E+00	3.067E+03	0.891
α_4	4.51E-05	4.42E-04	3.41E-04	1.18E-03	1.384E+00	3.131E+03	0.873
α_5	5.50E-07	1.56E-04	6.95E-05	6.02E-04	4.902E-01	3.151E+03	0.868
α_6	8.55E-16	3.60E-05	4.56E-07	2.06E-04	1.146E-01	3.186E+03	0.858
α_7	2.50E-93	4.75E-06	5.05E-25	5.64E-06	1.464E-02	3.084E+03	0.887

CCCG = 8, Gamma = 0.047

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9948441	0.9969357	0.9970765	0.9985466	2.326E+03	7.148E+00	--
α_2	3.36E-04	1.24E-03	1.10E-03	2.60E-03	2.980E+00	2.403E+03	0.861
α_3	1.46E-04	8.44E-04	7.06E-04	2.01E-03	1.960E+00	2.320E+03	0.892
α_4	3.63E-05	4.97E-04	3.64E-04	1.41E-03	1.166E+00	2.345E+03	0.883
α_5	1.27E-06	2.24E-04	1.09E-04	8.40E-04	5.375E-01	2.395E+03	0.865
α_6	1.69E-11	7.63E-05	5.92E-06	4.04E-04	1.805E-01	2.364E+03	0.876
α_7	8.82E-36	1.71E-05	1.28E-11	8.34E-05	4.139E-02	2.426E+03	0.854
α_8	1.02E-08	1.67E-04	3.68E-05	7.78E-04	2.827E-01	1.693E+03	1.223

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	2.02E-03	1.73E-03	2.18E-03	2.09E-03	1.89E-03	1.54E-03	1.24E-03
α_3		8.27E-04	3.71E-04	7.75E-04	8.22E-04	9.12E-04	8.44E-04
α_4			4.47E-04	1.67E-04	3.22E-04	4.42E-04	4.97E-04
α_5				2.39E-05	7.29E-05	1.56E-04	2.24E-04
α_6					1.23E-04	3.60E-05	7.63E-05
α_7						4.75E-06	1.71E-05
α_8							1.67E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	2.02E-03	2.56E-03	3.00E-03	3.05E-03	3.22E-03	3.09E-03	3.06E-03
Gamma		3.23E-01	2.73E-01	3.16E-01	4.15E-01	5.02E-01	5.96E-01
Delta			5.46E-01	1.97E-01	3.86E-01	4.12E-01	5.38E-01
Epsilon				1.25E-01	3.78E-01	3.08E-01	4.94E-01
Mu					6.28E-01	2.07E-01	5.37E-01
Omega						1.17E-01	7.07E-01
Sigma							9.07E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.2.3.2 HCI-RCI-TDP-FH: HPCI AND RCIC Turbine-Driven Pumps Fail to Run Less Than One Hour

Generic CCF Parameters

Plant Type: BWR
System Group: Clean Water
System: High Pressure Coolant Injection, Reactor Core Isolation
Component Group: Pump
Component Type: Turbine Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run < 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 14.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9503222	0.9872964	0.9944636	0.9999615	1.0000000	3.641E+01	4.685E-01
α_2	3.57E-05	1.27E-02	5.54E-03	4.97E-02	0.00E+00	4.685E-01	3.641E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9560299	0.9845700	0.9887125	0.9989334	1.0000000	7.198E+01	1.128E+00
α_2	3.90E-04	1.16E-02	7.59E-03	3.67E-02	0.00E+00	8.512E-01	7.226E+01
α_3	1.89E-07	3.79E-03	8.11E-04	1.78E-02	0.00E+00	2.768E-01	7.283E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9574525	0.9822311	0.9851527	0.9970244	1.0000000	1.047E+02	1.894E+00
α_2	1.02E-03	1.18E-02	8.94E-03	3.25E-02	0.00E+00	1.260E+00	1.053E+02
α_3	4.10E-06	3.78E-03	1.39E-03	1.56E-02	0.00E+00	4.024E-01	1.062E+02
α_4	1.51E-08	2.17E-03	3.24E-04	1.08E-02	0.00E+00	2.315E-01	1.063E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9669071	0.9835207	0.9850412	0.9949361	1.0000000	2.048E+02	3.432E+00
α_2	1.57E-03	9.24E-03	7.72E-03	2.21E-02	0.00E+00	1.924E+00	2.063E+02
α_3	2.92E-04	5.04E-03	3.57E-03	1.48E-02	0.00E+00	1.049E+00	2.072E+02
α_4	1.40E-06	1.84E-03	6.33E-04	7.74E-03	0.00E+00	3.822E-01	2.079E+02
α_5	3.20E-20	3.68E-04	3.43E-07	2.14E-03	0.00E+00	7.674E-02	2.082E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9692437	0.9842220	0.9855289	0.9947324	1.0000000	2.392E+02	3.835E+00

α_2	1.00E-03	7.00E-03	5.70E-03	1.74E-02	0.00E+00	1.701E+00	2.414E+02
α_3	3.92E-04	4.97E-03	3.69E-03	1.39E-02	0.00E+00	1.207E+00	2.418E+02
α_4	2.25E-05	2.45E-03	1.29E-03	8.83E-03	0.00E+00	5.960E-01	2.425E+02
α_5	3.56E-09	9.10E-04	1.22E-04	4.56E-03	0.00E+00	2.211E-01	2.428E+02
α_6	3.55E-15	4.52E-04	4.57E-06	2.61E-03	0.00E+00	1.098E-01	2.429E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9741349	0.9853214	0.9861379	0.9937176	1.0000000	3.858E+02	5.747E+00
α_2	1.17E-03	5.73E-03	4.91E-03	1.31E-02	0.00E+00	2.243E+00	3.893E+02
α_3	5.58E-04	4.16E-03	3.35E-03	1.05E-02	0.00E+00	1.630E+00	3.899E+02
α_4	1.72E-04	2.77E-03	1.98E-03	8.05E-03	0.00E+00	1.083E+00	3.905E+02
α_5	1.04E-05	1.44E-03	7.28E-04	5.30E-03	0.00E+00	5.654E-01	3.910E+02
α_6	2.69E-10	4.89E-04	4.52E-05	2.55E-03	0.00E+00	1.916E-01	3.914E+02
α_7	6.09E-41	8.89E-05	3.31E-12	3.90E-04	0.00E+00	3.480E-02	3.915E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9753464	0.9860266	0.9868079	0.9940320	1.0000000	4.040E+02	5.726E+00
α_2	8.88E-04	4.93E-03	4.15E-03	1.16E-02	0.00E+00	2.018E+00	4.077E+02
α_3	3.50E-04	3.39E-03	2.63E-03	9.05E-03	0.00E+00	1.391E+00	4.084E+02
α_4	1.54E-04	2.59E-03	1.84E-03	7.59E-03	0.00E+00	1.062E+00	4.087E+02
α_5	3.03E-05	1.71E-03	1.00E-03	5.82E-03	0.00E+00	7.026E-01	4.090E+02
α_6	3.35E-07	8.54E-04	2.62E-04	3.71E-03	0.00E+00	3.497E-01	4.094E+02
α_7	1.29E-15	2.63E-04	2.42E-06	1.52E-03	0.00E+00	1.078E-01	4.096E+02
α_8	2.69E-17	2.31E-04	9.79E-07	1.35E-03	0.00E+00	9.469E-02	4.097E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.85E-01	9.82E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.27E-02	1.16E-02	1.18E-02	9.24E-03	7.00E-03	5.73E-03	4.93E-03
α_3		3.79E-03	3.78E-03	5.04E-03	4.97E-03	4.16E-03	3.39E-03
α_4			2.17E-03	1.84E-03	2.45E-03	2.77E-03	2.59E-03
α_5				3.68E-04	9.10E-04	1.44E-03	1.71E-03
α_6					4.52E-04	4.89E-04	8.54E-04
α_7						8.89E-05	2.63E-04
α_8							2.31E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.85E-01	9.82E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.27E-02	1.54E-02	1.78E-02	1.65E-02	1.58E-02	1.47E-02	1.40E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	14.00	14.00	14.00	14.00	14.00	14.00	14.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 5.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.393

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9664458	0.9913379	0.9961339	0.9999712	5.532E+01	4.834E-01	--
α_2	2.88E-05	8.66E-03	3.87E-03	3.36E-02	4.834E-01	5.532E+01	0.893

CCCG = 3, Gamma = 0.393

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9747345	0.9909041	0.9931909	0.9992570	1.335E+02	1.226E+00	--
α_2	3.42E-04	7.03E-03	4.85E-03	2.11E-02	9.769E-01	1.381E+02	0.981
α_3	3.31E-08	2.07E-03	3.60E-04	1.00E-02	2.487E-01	1.198E+02	1.136

CCCG = 4, Gamma = 0.393

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9736332	0.9887297	0.9904595	0.9979110	1.805E+02	2.057E+00	--
α_2	8.49E-04	7.69E-03	6.02E-03	2.02E-02	1.442E+00	1.861E+02	1.010
α_3	2.96E-06	2.36E-03	8.87E-04	9.70E-03	4.114E-01	1.739E+02	1.087
α_4	1.60E-09	1.22E-03	1.33E-04	6.26E-03	2.036E-01	1.666E+02	1.136

CCCG = 5, Gamma = 0.393

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787431	0.9892326	0.9901707	0.9965166	3.384E+02	3.683E+00	--
α_2	1.30E-03	6.35E-03	5.45E-03	1.45E-02	2.243E+00	3.510E+02	1.019
α_3	1.51E-04	3.01E-03	2.08E-03	9.03E-03	9.912E-01	3.282E+02	1.093
α_4	8.07E-07	1.18E-03	4.00E-04	5.02E-03	3.765E-01	3.175E+02	1.132
α_5	1.93E-21	2.22E-04	1.27E-07	1.28E-03	7.237E-02	3.256E+02	1.105

CCCG = 6, Gamma = 0.393

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9799429	0.9895218	0.9903363	0.9963186	3.909E+02	4.139E+00	--
α_2	9.61E-04	5.00E-03	4.25E-03	1.16E-02	2.128E+00	4.237E+02	0.963
α_3	2.09E-04	3.03E-03	2.20E-03	8.66E-03	1.134E+00	3.734E+02	1.094
α_4	9.88E-06	1.51E-03	7.50E-04	5.60E-03	5.533E-01	3.655E+02	1.120
α_5	2.31E-09	5.93E-04	7.91E-05	2.97E-03	2.210E-01	3.727E+02	1.099
α_6	4.45E-16	3.49E-04	2.43E-06	2.03E-03	1.027E-01	2.938E+02	1.395

CCCG = 7, Gamma = 0.393

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9835303	0.9904222	0.9909047	0.9956666	6.651E+02	6.432E+00	--
α_2	9.97E-04	3.84E-03	3.40E-03	8.17E-03	2.840E+00	7.375E+02	0.936
α_3	4.12E-04	2.78E-03	2.27E-03	6.87E-03	1.746E+00	6.272E+02	1.102
α_4	1.08E-04	1.73E-03	1.24E-03	5.02E-03	1.084E+00	6.267E+02	1.104
α_5	4.88E-06	8.58E-04	4.15E-04	3.21E-03	5.376E-01	6.264E+02	1.105
α_6	2.92E-10	3.33E-04	3.36E-05	1.72E-03	1.979E-01	5.943E+02	1.166
α_7	1.09E-52	4.86E-05	4.87E-15	1.66E-04	2.656E-02	5.460E+02	1.269

CCCG = 8, Gamma = 0.393

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9842911	0.9909722	0.9914510	0.9960180	6.709E+02	6.112E+00	--
α_2	6.72E-04	3.10E-03	2.68E-03	6.98E-03	2.364E+00	7.593E+02	0.909
α_3	2.77E-04	2.32E-03	1.84E-03	6.03E-03	1.512E+00	6.494E+02	1.064
α_4	1.01E-04	1.72E-03	1.22E-03	5.04E-03	1.056E+00	6.144E+02	1.126
α_5	1.60E-05	1.06E-03	6.02E-04	3.64E-03	6.745E-01	6.376E+02	1.085
α_6	6.46E-08	4.81E-04	1.22E-04	2.18E-03	3.076E-01	6.393E+02	1.083
α_7	1.44E-15	2.05E-04	2.03E-06	1.18E-03	1.093E-01	5.327E+02	1.300
α_8	2.20E-18	1.43E-04	3.96E-07	8.31E-04	8.885E-02	6.229E+02	1.112

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.91E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01
α_2	8.66E-03	7.03E-03	7.69E-03	6.35E-03	5.00E-03	3.84E-03	3.10E-03
α_3		2.07E-03	2.36E-03	3.01E-03	3.03E-03	2.78E-03	2.32E-03
α_4			1.22E-03	1.18E-03	1.51E-03	1.73E-03	1.72E-03
α_5				2.22E-04	5.93E-04	8.58E-04	1.06E-03
α_6					3.49E-04	3.33E-04	4.81E-04
α_7						4.86E-05	2.05E-04
α_8							1.43E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.91E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01
Beta	8.66E-03	9.10E-03	1.13E-02	1.08E-02	1.05E-02	9.58E-03	9.03E-03
Gamma		2.28E-01	3.18E-01	4.10E-01	5.23E-01	5.99E-01	6.56E-01
Delta			3.41E-01	3.18E-01	4.48E-01	5.17E-01	6.08E-01
Epsilon				1.58E-01	3.84E-01	4.18E-01	5.24E-01
Mu					3.71E-01	3.08E-01	4.39E-01
Omega						1.27E-01	4.20E-01
Sigma							4.10E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.50	5.50	5.50	5.50	5.50	5.50	5.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9123818	0.9778253	0.9905789	0.9999500	1.983E+01	4.498E-01	--
α_2	5.00E-05	2.22E-02	9.42E-03	8.76E-02	4.498E-01	1.983E+01	0.893

CCCG = 3, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9163809	0.9699835	0.9775467	0.9976957	3.808E+01	1.178E+00	--
α_2	1.03E-03	2.32E-02	1.59E-02	7.01E-02	9.387E-01	3.958E+01	0.981
α_3	7.25E-08	6.85E-03	1.11E-03	3.36E-02	2.396E-01	3.475E+01	1.136

CCCG = 4, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9165434	0.9648374	0.9704203	0.9940148	5.209E+01	1.898E+00	--
α_2	2.10E-03	2.31E-02	1.77E-02	6.27E-02	1.285E+00	5.433E+01	1.010
α_3	7.04E-06	7.60E-03	2.73E-03	3.17E-02	3.927E-01	5.131E+01	1.087
α_4	1.73E-08	4.46E-03	6.00E-04	2.24E-02	2.207E-01	4.924E+01	1.136

CCCG = 5, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9351063	0.9673031	0.9701694	0.9896989	1.037E+02	3.506E+00	--
α_2	3.21E-03	1.79E-02	1.51E-02	4.23E-02	1.992E+00	1.091E+02	1.019
α_3	6.46E-04	1.04E-02	7.48E-03	3.02E-02	1.078E+00	1.024E+02	1.093
α_4	1.91E-06	3.63E-03	1.18E-03	1.56E-02	3.632E-01	9.958E+01	1.132
α_5	6.55E-21	7.08E-04	4.10E-07	4.10E-03	7.248E-02	1.023E+02	1.105

CCCG = 6, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9408901	0.9687817	0.9710790	0.9888210	1.303E+02	4.199E+00	--
α_2	2.30E-03	1.33E-02	1.12E-02	3.17E-02	1.941E+00	1.438E+02	0.963
α_3	9.98E-04	1.04E-02	7.98E-03	2.80E-02	1.332E+00	1.269E+02	1.094
α_4	5.30E-05	4.93E-03	2.66E-03	1.75E-02	6.181E-01	1.247E+02	1.120
α_5	1.24E-08	1.81E-03	2.69E-04	8.98E-03	2.313E-01	1.274E+02	1.099
α_6	6.98E-20	7.64E-04	7.21E-07	4.45E-03	7.684E-02	1.005E+02	1.395

CCCG = 7, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9493504	0.9705967	0.9720681	0.9868169	2.054E+02	6.223E+00	--
α_2	2.78E-03	1.13E-02	9.99E-03	2.46E-02	2.654E+00	2.312E+02	0.936
α_3	1.13E-03	8.28E-03	6.70E-03	2.08E-02	1.645E+00	1.970E+02	1.102
α_4	3.75E-04	5.62E-03	4.07E-03	1.62E-02	1.115E+00	1.972E+02	1.104
α_5	2.95E-05	3.05E-03	1.61E-03	1.09E-02	6.034E-01	1.974E+02	1.105
α_6	1.68E-10	9.48E-04	7.07E-05	5.03E-03	1.780E-01	1.876E+02	1.166
α_7	8.64E-51	1.58E-04	3.26E-14	5.60E-04	2.734E-02	1.725E+02	1.269

CCCG = 8, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9515839	0.9718804	0.9732861	0.9873754	2.159E+02	6.246E+00	--
α_2	2.32E-03	1.01E-02	8.78E-03	2.22E-02	2.504E+00	2.465E+02	0.909
α_3	7.16E-04	6.67E-03	5.20E-03	1.76E-02	1.419E+00	2.114E+02	1.064
α_4	2.81E-04	5.10E-03	3.59E-03	1.51E-02	1.027E+00	2.002E+02	1.126
α_5	7.26E-05	3.52E-03	2.11E-03	1.17E-02	7.337E-01	2.079E+02	1.085
α_6	1.90E-06	1.90E-03	6.87E-04	7.91E-03	3.975E-01	2.087E+02	1.083
α_7	4.43E-20	4.42E-04	4.25E-07	2.57E-03	7.703E-02	1.741E+02	1.300
α_8	3.99E-18	4.30E-04	1.07E-06	2.51E-03	8.749E-02	2.036E+02	1.112

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.78E-01	9.70E-01	9.65E-01	9.67E-01	9.69E-01	9.71E-01	9.72E-01
α_2	2.22E-02	2.32E-02	2.31E-02	1.79E-02	1.33E-02	1.13E-02	1.01E-02
α_3		6.85E-03	7.60E-03	1.04E-02	1.04E-02	8.28E-03	6.67E-03
α_4			4.46E-03	3.63E-03	4.93E-03	5.62E-03	5.10E-03
α_5				7.08E-04	1.81E-03	3.05E-03	3.52E-03
α_6					7.64E-04	9.48E-04	1.90E-03
α_7						1.58E-04	4.42E-04
α_8							4.30E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.78E-01	9.70E-01	9.65E-01	9.67E-01	9.69E-01	9.71E-01	9.72E-01
Beta	2.22E-02	3.00E-02	3.52E-02	3.27E-02	3.12E-02	2.94E-02	2.81E-02
Gamma		2.28E-01	3.43E-01	4.51E-01	5.73E-01	6.14E-01	6.42E-01
Delta			3.70E-01	2.94E-01	4.20E-01	5.41E-01	6.31E-01
Epsilon				1.63E-01	3.43E-01	4.25E-01	5.52E-01
Mu					2.97E-01	2.66E-01	4.41E-01
Omega						1.43E-01	3.14E-01
Sigma							4.93E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9383275	0.9841815	0.9930457	0.9999542	2.928E+01	4.706E-01	--
α_2	4.58E-05	1.58E-02	6.95E-03	6.17E-02	4.706E-01	2.928E+01	0.893

CCCG = 3, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9497646	0.9824918	0.9872792	0.9988495	6.187E+01	1.103E+00	--
α_2	3.57E-04	1.24E-02	7.87E-03	3.96E-02	8.104E-01	6.479E+01	0.981
α_3	4.35E-07	5.16E-03	1.22E-03	2.38E-02	2.921E-01	5.637E+01	1.136

CCCG = 4, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9586523	0.9825655	0.9853482	0.9969597	1.100E+02	1.953E+00	--
α_2	1.06E-03	1.14E-02	8.70E-03	3.08E-02	1.312E+00	1.141E+02	1.010
α_3	6.76E-06	4.02E-03	1.59E-03	1.62E-02	4.307E-01	1.068E+02	1.087
α_4	4.08E-09	2.05E-03	2.42E-04	1.04E-02	2.099E-01	1.024E+02	1.136

CCCG = 5, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9681776	0.9845938	0.9861660	0.9956363	1.986E+02	3.107E+00	--
α_2	1.14E-03	8.04E-03	6.54E-03	2.01E-02	1.684E+00	2.077E+02	1.019
α_3	2.14E-04	4.83E-03	3.28E-03	1.47E-02	9.426E-01	1.942E+02	1.093
α_4	1.52E-06	2.02E-03	6.97E-04	8.54E-03	3.816E-01	1.881E+02	1.132
α_5	2.04E-16	5.11E-04	2.80E-06	2.97E-03	9.865E-02	1.930E+02	1.105

CCCG = 6, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9722744	0.9857982	0.9869836	0.9952717	2.653E+02	3.822E+00	--
α_2	8.48E-04	5.85E-03	4.77E-03	1.45E-02	1.714E+00	2.911E+02	0.963
α_3	2.82E-04	4.30E-03	3.11E-03	1.24E-02	1.108E+00	2.565E+02	1.094
α_4	3.42E-05	2.59E-03	1.44E-03	9.02E-03	6.509E-01	2.511E+02	1.120
α_5	1.96E-08	9.89E-04	1.78E-04	4.77E-03	2.536E-01	2.562E+02	1.099
α_6	7.68E-17	4.74E-04	2.15E-06	2.76E-03	9.572E-02	2.020E+02	1.395

CCCG = 7, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9763357	0.9868979	0.9877077	0.9946943	3.913E+02	5.195E+00	--
α_2	9.07E-04	4.78E-03	4.05E-03	1.11E-02	2.105E+00	4.382E+02	0.936
α_3	3.31E-04	3.53E-03	2.69E-03	9.58E-03	1.320E+00	3.728E+02	1.102
α_4	1.36E-04	2.67E-03	1.85E-03	7.99E-03	9.967E-01	3.724E+02	1.104
α_5	7.12E-06	1.41E-03	6.69E-04	5.31E-03	5.249E-01	3.723E+02	1.105
α_6	4.11E-10	5.53E-04	5.41E-05	2.87E-03	1.956E-01	3.534E+02	1.166
α_7	4.65E-28	1.63E-04	3.69E-09	8.84E-04	5.291E-02	3.247E+02	1.269

CCCG = 8, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9782637	0.9876316	0.9883144	0.9946677	4.657E+02	5.832E+00	--
α_2	8.50E-04	4.19E-03	3.59E-03	9.59E-03	2.229E+00	5.296E+02	0.909
α_3	2.38E-04	2.77E-03	2.09E-03	7.65E-03	1.260E+00	4.533E+02	1.064
α_4	1.38E-04	2.42E-03	1.71E-03	7.15E-03	1.042E+00	4.287E+02	1.126
α_5	4.02E-05	1.71E-03	1.05E-03	5.64E-03	7.626E-01	4.449E+02	1.085
α_6	1.68E-07	7.32E-04	2.04E-04	3.26E-03	3.271E-01	4.463E+02	1.083
α_7	3.50E-13	3.61E-04	9.68E-06	2.03E-03	1.344E-01	3.719E+02	1.300
α_8	1.59E-20	1.77E-04	1.66E-07	1.03E-03	7.682E-02	4.350E+02	1.112

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.58E-02	1.24E-02	1.14E-02	8.04E-03	5.85E-03	4.78E-03	4.19E-03
α_3		5.16E-03	4.02E-03	4.83E-03	4.30E-03	3.53E-03	2.77E-03
α_4			2.05E-03	2.02E-03	2.59E-03	2.67E-03	2.42E-03
α_5				5.11E-04	9.89E-04	1.41E-03	1.71E-03
α_6					4.74E-04	5.53E-04	7.32E-04
α_7						1.63E-04	3.61E-04
α_8							1.77E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.58E-02	1.75E-02	1.74E-02	1.54E-02	1.42E-02	1.31E-02	1.24E-02
Gamma		2.94E-01	3.48E-01	4.78E-01	5.88E-01	6.35E-01	6.61E-01
Delta			3.38E-01	3.44E-01	4.85E-01	5.76E-01	6.61E-01
Epsilon				2.01E-01	3.61E-01	4.43E-01	5.51E-01
Mu					3.24E-01	3.37E-01	4.26E-01
Omega						2.28E-01	4.23E-01
Sigma							3.28E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 2.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.179

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9847799	0.9960506	0.9982161	0.9999855	1.244E+02	4.932E-01	--
α_2	1.45E-05	3.95E-03	1.78E-03	1.52E-02	4.932E-01	1.244E+02	0.893

CCCG = 3, Gamma = 0.179

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9872181	0.9956360	0.9968989	0.9997415	2.417E+02	1.059E+00	--
α_2	5.23E-05	2.80E-03	1.65E-03	9.44E-03	7.137E-01	2.546E+02	0.981
α_3	5.64E-07	1.57E-03	4.75E-04	6.85E-03	3.458E-01	2.201E+02	1.136

CCCG = 4, Gamma = 0.179

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9895246	0.9954968	0.9961780	0.9991408	4.675E+02	2.115E+00	--
α_2	3.98E-04	3.21E-03	2.56E-03	8.26E-03	1.549E+00	4.808E+02	1.010
α_3	1.84E-08	5.90E-04	1.15E-04	2.81E-03	2.646E-01	4.481E+02	1.087
α_4	7.75E-08	7.02E-04	1.72E-04	3.21E-03	3.010E-01	4.287E+02	1.136

CCCG = 5, Gamma = 0.179

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928775	0.9960442	0.9962870	0.9983816	1.341E+03	5.325E+00	--
α_2	8.39E-04	2.63E-03	2.40E-03	5.23E-03	3.632E+00	1.377E+03	1.019
α_3	1.03E-04	1.05E-03	8.08E-04	2.84E-03	1.354E+00	1.285E+03	1.093
α_4	2.26E-08	2.38E-04	5.69E-05	1.09E-03	2.961E-01	1.242E+03	1.132
α_5	9.92E-35	3.33E-05	3.67E-11	1.65E-04	4.243E-02	1.273E+03	1.105

CCCG = 6, Gamma = 0.179

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9926733	0.9960056	0.9962699	0.9984355	1.231E+03	4.936E+00	--
α_2	5.88E-04	2.21E-03	1.96E-03	4.67E-03	2.915E+00	1.317E+03	0.963
α_3	9.24E-05	1.08E-03	8.14E-04	2.99E-03	1.257E+00	1.160E+03	1.094
α_4	1.80E-06	4.43E-04	2.03E-04	1.70E-03	5.031E-01	1.134E+03	1.120
α_5	2.89E-15	9.99E-05	1.32E-06	5.73E-04	1.155E-01	1.156E+03	1.099
α_6	7.45E-13	1.59E-04	5.83E-06	8.83E-04	1.451E-01	9.106E+02	1.395

CCCG = 7, Gamma = 0.179

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9943088	0.9963981	0.9965208	0.9980686	2.671E+03	9.654E+00	--
α_2	6.43E-04	1.66E-03	1.55E-03	3.06E-03	4.851E+00	2.916E+03	0.936
α_3	2.89E-04	1.13E-03	9.98E-04	2.41E-03	2.800E+00	2.479E+03	1.102
α_4	5.71E-05	5.59E-04	4.32E-04	1.50E-03	1.384E+00	2.476E+03	1.104
α_5	7.01E-07	1.98E-04	8.86E-05	7.67E-04	4.902E-01	2.473E+03	1.105
α_6	1.16E-15	4.89E-05	6.19E-07	2.80E-04	1.146E-01	2.345E+03	1.166
α_7	3.57E-93	6.80E-06	7.23E-25	8.07E-06	1.464E-02	2.154E+03	1.269

CCCG = 8, Gamma = 0.179

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941051	0.9964961	0.9966570	0.9983378	2.033E+03	7.148E+00	--
α_2	3.55E-04	1.31E-03	1.17E-03	2.75E-03	2.980E+00	2.274E+03	0.909
α_3	1.75E-04	1.01E-03	8.42E-04	2.40E-03	1.960E+00	1.944E+03	1.064
α_4	4.63E-05	6.34E-04	4.65E-04	1.80E-03	1.166E+00	1.839E+03	1.126
α_5	1.60E-06	2.82E-04	1.36E-04	1.05E-03	5.375E-01	1.907E+03	1.085
α_6	2.09E-11	9.44E-05	7.32E-06	4.99E-04	1.805E-01	1.912E+03	1.083
α_7	1.34E-35	2.60E-05	1.94E-11	1.27E-04	4.139E-02	1.593E+03	1.300
α_8	9.26E-09	1.52E-04	3.35E-05	7.08E-04	2.827E-01	1.862E+03	1.112

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.96E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	3.95E-03	2.80E-03	3.21E-03	2.63E-03	2.21E-03	1.66E-03	1.31E-03
α_3		1.57E-03	5.90E-04	1.05E-03	1.08E-03	1.13E-03	1.01E-03
α_4			7.02E-04	2.38E-04	4.43E-04	5.59E-04	6.34E-04
α_5				3.33E-05	9.99E-05	1.98E-04	2.82E-04
α_6					1.59E-04	4.89E-05	9.44E-05
α_7						6.80E-06	2.60E-05
α_8							1.52E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.96E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	3.95E-03	4.36E-03	4.50E-03	3.96E-03	3.99E-03	3.60E-03	3.50E-03
Gamma		3.59E-01	2.87E-01	3.35E-01	4.47E-01	5.39E-01	6.26E-01
Delta			5.43E-01	2.05E-01	3.94E-01	4.19E-01	5.41E-01
Epsilon				1.23E-01	3.69E-01	3.12E-01	4.66E-01
Mu					6.15E-01	2.19E-01	4.91E-01
Omega						1.22E-01	6.53E-01
Sigma							8.54E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.50	2.50	2.50	2.50	2.50	2.50	2.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.2.3.3 HCI-RCI-TDP-FHRH: HPCI AND RCIC Turbine-Driven Pumps Fail to Run Less Than or Greater Than One Hour

Generic CCF Parameters

Plant Type: BWR
 System Group: Clean Water
 System: High Pressure Coolant Injection, Reactor Core Isolation
 Component Group: Pump
 Component Type: Turbine Driven Pump
 Component Subtype: Centrifugal
 Failure Mode: Fail to Run < 1H, Fail to Run > 1H
 Date Range: 2006 through 2020
 Prior: Default 2015

Total Number of Independent Failure Events: 19.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9563275	0.9888396	0.9951428	0.9999661	1.0000000	4.151E+01	4.685E-01
α_2	3.13E-05	1.12E-02	4.86E-03	4.37E-02	0.00E+00	4.685E-01	4.151E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9588768	0.9855762	0.9894550	0.9990035	1.0000000	7.708E+01	1.128E+00
α_2	3.64E-04	1.09E-02	7.09E-03	3.43E-02	0.00E+00	8.512E-01	7.736E+01
α_3	1.77E-07	3.54E-03	7.58E-04	1.66E-02	0.00E+00	2.768E-01	7.793E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9593807	0.9830427	0.9858348	0.9971619	1.0000000	1.098E+02	1.894E+00
α_2	9.75E-04	1.13E-02	8.53E-03	3.10E-02	0.00E+00	1.260E+00	1.104E+02
α_3	3.92E-06	3.60E-03	1.32E-03	1.49E-02	0.00E+00	4.024E-01	1.113E+02
α_4	1.44E-08	2.07E-03	3.09E-04	1.03E-02	0.00E+00	2.315E-01	1.114E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9676935	0.9839146	0.9853999	0.9950582	1.0000000	2.099E+02	3.432E+00
α_2	1.53E-03	9.02E-03	7.54E-03	2.16E-02	0.00E+00	1.924E+00	2.114E+02
α_3	2.85E-04	4.92E-03	3.48E-03	1.44E-02	0.00E+00	1.049E+00	2.123E+02
α_4	1.36E-06	1.79E-03	6.17E-04	7.56E-03	0.00E+00	3.822E-01	2.130E+02
α_5	3.12E-20	3.60E-04	3.35E-07	2.09E-03	0.00E+00	7.674E-02	2.133E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9698723	0.9845462	0.9858271	0.9948416	1.0000000	2.443E+02	3.835E+00

α_2	9.83E-04	6.85E-03	5.58E-03	1.71E-02	0.00E+00	1.701E+00	2.465E+02
α_3	3.84E-04	4.86E-03	3.62E-03	1.36E-02	0.00E+00	1.207E+00	2.469E+02
α_4	2.20E-05	2.40E-03	1.26E-03	8.65E-03	0.00E+00	5.960E-01	2.476E+02
α_5	3.49E-09	8.91E-04	1.19E-04	4.47E-03	0.00E+00	2.211E-01	2.479E+02
α_6	3.48E-15	4.42E-04	4.48E-06	2.55E-03	0.00E+00	1.098E-01	2.480E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9744669	0.9855101	0.9863164	0.9937983	1.0000000	3.909E+02	5.747E+00
α_2	1.16E-03	5.66E-03	4.85E-03	1.29E-02	0.00E+00	2.243E+00	3.944E+02
α_3	5.51E-04	4.11E-03	3.31E-03	1.04E-02	0.00E+00	1.630E+00	3.950E+02
α_4	1.70E-04	2.73E-03	1.95E-03	7.94E-03	0.00E+00	1.083E+00	3.956E+02
α_5	1.03E-05	1.43E-03	7.19E-04	5.24E-03	0.00E+00	5.654E-01	3.961E+02
α_6	2.65E-10	4.83E-04	4.46E-05	2.52E-03	0.00E+00	1.916E-01	3.965E+02
α_7	6.01E-41	8.77E-05	3.26E-12	3.85E-04	0.00E+00	3.480E-02	3.966E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9756484	0.9861983	0.9869703	0.9941057	1.0000000	4.091E+02	5.726E+00
α_2	8.77E-04	4.86E-03	4.10E-03	1.15E-02	0.00E+00	2.018E+00	4.128E+02
α_3	3.46E-04	3.35E-03	2.60E-03	8.94E-03	0.00E+00	1.391E+00	4.135E+02
α_4	1.52E-04	2.56E-03	1.82E-03	7.50E-03	0.00E+00	1.062E+00	4.138E+02
α_5	2.99E-05	1.69E-03	9.89E-04	5.75E-03	0.00E+00	7.026E-01	4.141E+02
α_6	3.31E-07	8.43E-04	2.59E-04	3.67E-03	0.00E+00	3.497E-01	4.145E+02
α_7	1.27E-15	2.60E-04	2.39E-06	1.50E-03	0.00E+00	1.078E-01	4.147E+02
α_8	2.66E-17	2.28E-04	9.67E-07	1.33E-03	0.00E+00	9.469E-02	4.148E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.86E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
α_2	1.12E-02	1.09E-02	1.13E-02	9.02E-03	6.85E-03	5.66E-03	4.86E-03
α_3		3.54E-03	3.60E-03	4.92E-03	4.86E-03	4.11E-03	3.35E-03
α_4			2.07E-03	1.79E-03	2.40E-03	2.73E-03	2.56E-03
α_5				3.60E-04	8.91E-04	1.43E-03	1.69E-03
α_6					4.42E-04	4.83E-04	8.43E-04
α_7						8.77E-05	2.60E-04
α_8							2.28E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.86E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
Beta	1.12E-02	1.44E-02	1.70E-02	1.61E-02	1.55E-02	1.45E-02	1.38E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	19.10	19.10	19.10	19.10	19.10	19.10	19.10
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 6.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.314

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9701847	0.9923063	0.9965705	0.9999745	6.235E+01	4.834E-01	--
α_2	2.55E-05	7.69E-03	3.43E-03	2.98E-02	4.834E-01	6.235E+01	0.801

CCCG = 3, Gamma = 0.314

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9762599	0.9914556	0.9936056	0.9993024	1.422E+02	1.226E+00	--
α_2	3.25E-04	6.67E-03	4.60E-03	2.01E-02	9.769E-01	1.454E+02	0.935
α_3	2.99E-08	1.87E-03	3.25E-04	9.07E-03	2.487E-01	1.327E+02	1.030

CCCG = 4, Gamma = 0.314

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9742877	0.9890108	0.9906983	0.9979635	1.851E+02	2.057E+00	--
α_2	8.30E-04	7.52E-03	5.89E-03	1.98E-02	1.442E+00	1.903E+02	0.991
α_3	2.85E-06	2.27E-03	8.54E-04	9.35E-03	4.114E-01	1.806E+02	1.050
α_4	1.57E-09	1.20E-03	1.30E-04	6.14E-03	2.036E-01	1.700E+02	1.116

CCCG = 5, Gamma = 0.314

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787130	0.9892173	0.9901568	0.9965117	3.379E+02	3.683E+00	--
α_2	1.31E-03	6.42E-03	5.51E-03	1.47E-02	2.243E+00	3.470E+02	1.032
α_3	1.51E-04	3.00E-03	2.08E-03	9.00E-03	9.912E-01	3.294E+02	1.091
α_4	7.87E-07	1.15E-03	3.90E-04	4.89E-03	3.765E-01	3.259E+02	1.104
α_5	1.79E-21	2.07E-04	1.18E-07	1.20E-03	7.237E-02	3.499E+02	1.030

CCCG = 6, Gamma = 0.314

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9797592	0.9894255	0.9902473	0.9962846	3.873E+02	4.139E+00	--
α_2	9.79E-04	5.09E-03	4.33E-03	1.18E-02	2.128E+00	4.157E+02	0.982
α_3	2.12E-04	3.07E-03	2.23E-03	8.79E-03	1.134E+00	3.681E+02	1.112
α_4	9.71E-06	1.49E-03	7.37E-04	5.50E-03	5.533E-01	3.718E+02	1.102
α_5	2.26E-09	5.80E-04	7.75E-05	2.91E-03	2.210E-01	3.807E+02	1.078
α_6	4.38E-16	3.43E-04	2.39E-06	1.99E-03	1.027E-01	2.989E+02	1.373

CCCG = 7, Gamma = 0.314

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9832467	0.9902568	0.9907475	0.9955915	6.537E+02	6.432E+00	--
α_2	1.02E-03	3.94E-03	3.49E-03	8.38E-03	2.840E+00	7.185E+02	0.961
α_3	4.22E-04	2.84E-03	2.33E-03	7.04E-03	1.746E+00	6.124E+02	1.129
α_4	1.08E-04	1.73E-03	1.24E-03	5.05E-03	1.084E+00	6.240E+02	1.109
α_5	4.89E-06	8.60E-04	4.17E-04	3.22E-03	5.376E-01	6.243E+02	1.110
α_6	2.86E-10	3.26E-04	3.29E-05	1.68E-03	1.979E-01	6.072E+02	1.142
α_7	9.54E-53	4.26E-05	4.27E-15	1.45E-04	2.656E-02	6.237E+02	1.112

CCCG = 8, Gamma = 0.314

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9840096	0.9908099	0.9912972	0.9959462	6.590E+02	6.112E+00	--
α_2	6.87E-04	3.18E-03	2.74E-03	7.15E-03	2.364E+00	7.417E+02	0.932
α_3	2.85E-04	2.39E-03	1.89E-03	6.21E-03	1.512E+00	6.306E+02	1.097
α_4	1.02E-04	1.73E-03	1.23E-03	5.09E-03	1.056E+00	6.087E+02	1.137
α_5	1.60E-05	1.06E-03	6.02E-04	3.64E-03	6.745E-01	6.379E+02	1.086
α_6	6.62E-08	4.93E-04	1.25E-04	2.23E-03	3.076E-01	6.242E+02	1.110
α_7	1.35E-15	1.93E-04	1.91E-06	1.11E-03	1.093E-01	5.657E+02	1.225
α_8	2.27E-18	1.47E-04	4.09E-07	8.59E-04	8.885E-02	6.032E+02	1.149

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.91E-01	9.89E-01	9.89E-01	9.89E-01	9.90E-01	9.91E-01
α_2	7.69E-03	6.67E-03	7.52E-03	6.42E-03	5.09E-03	3.94E-03	3.18E-03
α_3		1.87E-03	2.27E-03	3.00E-03	3.07E-03	2.84E-03	2.39E-03
α_4			1.20E-03	1.15E-03	1.49E-03	1.73E-03	1.73E-03
α_5				2.07E-04	5.80E-04	8.60E-04	1.06E-03
α_6					3.43E-04	3.26E-04	4.93E-04
α_7						4.26E-05	1.93E-04
α_8							1.47E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.91E-01	9.89E-01	9.89E-01	9.89E-01	9.90E-01	9.91E-01
Beta	7.69E-03	8.54E-03	1.10E-02	1.08E-02	1.06E-02	9.74E-03	9.19E-03
Gamma		2.19E-01	3.16E-01	4.04E-01	5.18E-01	5.96E-01	6.54E-01
Delta			3.45E-01	3.12E-01	4.40E-01	5.10E-01	6.02E-01
Epsilon				1.52E-01	3.83E-01	4.15E-01	5.22E-01
Mu					3.72E-01	3.00E-01	4.41E-01
Omega						1.16E-01	4.09E-01
Sigma							4.33E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.00	6.00	6.00	6.00	6.00	6.00	6.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 4.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.236

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9234113	0.9806413	0.9918086	0.9999565	2.279E+01	4.498E-01	--
α_2	4.35E-05	1.94E-02	8.19E-03	7.66E-02	4.498E-01	2.279E+01	0.801

CCCG = 3, Gamma = 0.236

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9220601	0.9720523	0.9791186	0.9978585	4.098E+01	1.178E+00	--
α_2	9.72E-04	2.18E-02	1.50E-02	6.61E-02	9.387E-01	4.209E+01	0.935
α_3	6.48E-08	6.13E-03	9.96E-04	3.01E-02	2.396E-01	3.883E+01	1.030

CCCG = 4, Gamma = 0.236

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9190942	0.9659294	0.9713500	0.9942051	5.382E+01	1.898E+00	--
α_2	2.04E-03	2.25E-02	1.72E-02	6.10E-02	1.285E+00	5.594E+01	0.991
α_3	6.74E-06	7.27E-03	2.61E-03	3.03E-02	3.927E-01	5.362E+01	1.050
α_4	1.68E-08	4.34E-03	5.84E-04	2.18E-02	2.207E-01	5.058E+01	1.116

CCCG = 5, Gamma = 0.236

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9352537	0.9673783	0.9702385	0.9897230	1.040E+02	3.506E+00	--
α_2	3.24E-03	1.81E-02	1.53E-02	4.26E-02	1.992E+00	1.081E+02	1.032
α_3	6.42E-04	1.03E-02	7.43E-03	3.00E-02	1.078E+00	1.031E+02	1.091
α_4	1.86E-06	3.53E-03	1.14E-03	1.51E-02	3.632E-01	1.025E+02	1.104
α_5	6.07E-21	6.57E-04	3.81E-07	3.80E-03	7.248E-02	1.103E+02	1.030

CCCG = 6, Gamma = 0.236

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9405163	0.9685821	0.9708932	0.9887485	1.295E+02	4.199E+00	--
α_2	2.34E-03	1.35E-02	1.14E-02	3.22E-02	1.941E+00	1.414E+02	0.982
α_3	1.01E-03	1.05E-02	8.08E-03	2.84E-02	1.332E+00	1.253E+02	1.112
α_4	5.20E-05	4.84E-03	2.61E-03	1.72E-02	6.181E-01	1.271E+02	1.102
α_5	1.22E-08	1.77E-03	2.63E-04	8.77E-03	2.313E-01	1.304E+02	1.078
α_6	6.84E-20	7.49E-04	7.07E-07	4.36E-03	7.684E-02	1.025E+02	1.373

CCCG = 7, Gamma = 0.236

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9485866	0.9701494	0.9716418	0.9866142	2.022E+02	6.223E+00	--
α_2	2.85E-03	1.16E-02	1.02E-02	2.52E-02	2.654E+00	2.256E+02	0.961
α_3	1.16E-03	8.47E-03	6.85E-03	2.13E-02	1.645E+00	1.926E+02	1.129
α_4	3.76E-04	5.64E-03	4.08E-03	1.62E-02	1.115E+00	1.967E+02	1.109
α_5	2.95E-05	3.05E-03	1.62E-03	1.09E-02	6.034E-01	1.971E+02	1.110
α_6	1.65E-10	9.26E-04	6.91E-05	4.92E-03	1.780E-01	1.920E+02	1.142
α_7	7.55E-51	1.39E-04	2.85E-14	4.90E-04	2.734E-02	1.973E+02	1.112

CCCG = 8, Gamma = 0.236

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9507752	0.9714067	0.9728347	0.9871606	2.122E+02	6.246E+00	--
α_2	2.37E-03	1.03E-02	8.97E-03	2.27E-02	2.504E+00	2.411E+02	0.932
α_3	7.36E-04	6.86E-03	5.35E-03	1.81E-02	1.419E+00	2.055E+02	1.097
α_4	2.83E-04	5.14E-03	3.62E-03	1.52E-02	1.027E+00	1.986E+02	1.137
α_5	7.24E-05	3.51E-03	2.11E-03	1.17E-02	7.337E-01	2.083E+02	1.086
α_6	1.94E-06	1.94E-03	7.02E-04	8.09E-03	3.975E-01	2.041E+02	1.110
α_7	4.16E-20	4.16E-04	3.99E-07	2.42E-03	7.703E-02	1.852E+02	1.225
α_8	4.11E-18	4.43E-04	1.11E-06	2.58E-03	8.749E-02	1.974E+02	1.149

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.72E-01	9.66E-01	9.67E-01	9.69E-01	9.70E-01	9.71E-01
α_2	1.94E-02	2.18E-02	2.25E-02	1.81E-02	1.35E-02	1.16E-02	1.03E-02
α_3		6.13E-03	7.27E-03	1.03E-02	1.05E-02	8.47E-03	6.86E-03
α_4			4.34E-03	3.53E-03	4.84E-03	5.64E-03	5.14E-03
α_5				6.57E-04	1.77E-03	3.05E-03	3.51E-03
α_6					7.49E-04	9.26E-04	1.94E-03
α_7						1.39E-04	4.16E-04
α_8							4.43E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.72E-01	9.66E-01	9.67E-01	9.69E-01	9.70E-01	9.71E-01
Beta	1.94E-02	2.79E-02	3.41E-02	3.26E-02	3.14E-02	2.99E-02	2.86E-02
Gamma		2.19E-01	3.41E-01	4.46E-01	5.69E-01	6.10E-01	6.41E-01
Delta			3.74E-01	2.88E-01	4.12E-01	5.35E-01	6.26E-01
Epsilon				1.57E-01	3.42E-01	4.22E-01	5.51E-01
Mu					2.97E-01	2.59E-01	4.44E-01
Omega						1.30E-01	3.06E-01
Sigma							5.16E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.50	4.50	4.50	4.50	4.50	4.50	4.50
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 5.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.288

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9510434	0.9874613	0.9945123	0.9999639	3.706E+01	4.706E-01	--
α_2	3.61E-05	1.25E-02	5.49E-03	4.90E-02	4.706E-01	3.706E+01	0.801

CCCG = 3, Gamma = 0.288

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9551848	0.9843961	0.9886757	0.9989765	6.955E+01	1.103E+00	--
α_2	3.22E-04	1.12E-02	7.11E-03	3.59E-02	8.104E-01	7.174E+01	0.935
α_3	3.74E-07	4.43E-03	1.04E-03	2.04E-02	2.921E-01	6.559E+01	1.030

CCCG = 4, Gamma = 0.288

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9607517	0.9834574	0.9861019	0.9971170	1.161E+02	1.953E+00	--
α_2	1.01E-03	1.08E-02	8.28E-03	2.94E-02	1.312E+00	1.199E+02	0.991
α_3	6.34E-06	3.77E-03	1.49E-03	1.52E-02	4.307E-01	1.139E+02	1.050
α_4	3.89E-09	1.95E-03	2.31E-04	9.93E-03	2.099E-01	1.074E+02	1.116

CCCG = 5, Gamma = 0.288

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9686725	0.9848349	0.9863831	0.9957051	2.018E+02	3.107E+00	--
α_2	1.13E-03	8.01E-03	6.51E-03	2.00E-02	1.684E+00	2.085E+02	1.032
α_3	2.10E-04	4.74E-03	3.22E-03	1.45E-02	9.426E-01	1.979E+02	1.091
α_4	1.46E-06	1.94E-03	6.69E-04	8.20E-03	3.816E-01	1.960E+02	1.104
α_5	1.87E-16	4.68E-04	2.57E-06	2.72E-03	9.865E-02	2.105E+02	1.030

CCCG = 6, Gamma = 0.288

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9723820	0.9858536	0.9870345	0.9952903	2.664E+02	3.822E+00	--
α_2	8.54E-04	5.90E-03	4.81E-03	1.47E-02	1.714E+00	2.888E+02	0.982
α_3	2.83E-04	4.32E-03	3.12E-03	1.24E-02	1.108E+00	2.556E+02	1.112
α_4	3.32E-05	2.51E-03	1.40E-03	8.77E-03	6.509E-01	2.583E+02	1.102
α_5	1.90E-08	9.57E-04	1.73E-04	4.61E-03	2.536E-01	2.646E+02	1.078
α_6	7.47E-17	4.60E-04	2.09E-06	2.68E-03	9.572E-02	2.078E+02	1.373

CCCG = 7, Gamma = 0.288

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9761683	0.9868048	0.9876202	0.9946564	3.885E+02	5.195E+00	--
α_2	9.24E-04	4.87E-03	4.13E-03	1.13E-02	2.105E+00	4.303E+02	0.961
α_3	3.37E-04	3.59E-03	2.74E-03	9.74E-03	1.320E+00	3.668E+02	1.129
α_4	1.36E-04	2.66E-03	1.84E-03	7.97E-03	9.967E-01	3.737E+02	1.109
α_5	7.09E-06	1.40E-03	6.66E-04	5.29E-03	5.249E-01	3.740E+02	1.110
α_6	3.99E-10	5.37E-04	5.26E-05	2.78E-03	1.956E-01	3.639E+02	1.142
α_7	4.04E-28	1.42E-04	3.21E-09	7.68E-04	5.291E-02	3.738E+02	1.112

CCCG = 8, Gamma = 0.288

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9780460	0.9875073	0.9881968	0.9946139	4.610E+02	5.832E+00	--
α_2	8.65E-04	4.26E-03	3.65E-03	9.75E-03	2.229E+00	5.208E+02	0.932
α_3	2.43E-04	2.84E-03	2.13E-03	7.83E-03	1.260E+00	4.430E+02	1.097
α_4	1.38E-04	2.43E-03	1.72E-03	7.17E-03	1.042E+00	4.275E+02	1.137
α_5	3.99E-05	1.70E-03	1.04E-03	5.60E-03	7.626E-01	4.481E+02	1.086
α_6	1.70E-07	7.45E-04	2.08E-04	3.31E-03	3.271E-01	4.386E+02	1.110
α_7	3.28E-13	3.38E-04	9.06E-06	1.90E-03	1.344E-01	3.975E+02	1.225
α_8	1.63E-20	1.81E-04	1.70E-07	1.05E-03	7.682E-02	4.240E+02	1.149

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.84E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.25E-02	1.12E-02	1.08E-02	8.01E-03	5.90E-03	4.87E-03	4.26E-03
α_3		4.43E-03	3.77E-03	4.74E-03	4.32E-03	3.59E-03	2.84E-03
α_4			1.95E-03	1.94E-03	2.51E-03	2.66E-03	2.43E-03
α_5				4.68E-04	9.57E-04	1.40E-03	1.70E-03
α_6					4.60E-04	5.37E-04	7.45E-04
α_7						1.42E-04	3.38E-04
α_8							1.81E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.84E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.25E-02	1.56E-02	1.65E-02	1.52E-02	1.41E-02	1.32E-02	1.25E-02
Gamma		2.84E-01	3.46E-01	4.72E-01	5.83E-01	6.31E-01	6.59E-01
Delta			3.41E-01	3.37E-01	4.77E-01	5.69E-01	6.55E-01
Epsilon				1.94E-01	3.61E-01	4.39E-01	5.49E-01
Mu					3.25E-01	3.26E-01	4.27E-01
Omega						2.09E-01	4.11E-01
Sigma							3.49E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.50	5.50	5.50	5.50	5.50	5.50	5.50
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 3.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.162

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9864166	0.9964760	0.9984091	0.9999870	1.395E+02	4.932E-01	--
α_2	1.30E-05	3.52E-03	1.59E-03	1.36E-02	4.932E-01	1.395E+02	0.801

CCCG = 3, Gamma = 0.162

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9880544	0.9959221	0.9971027	0.9997585	2.588E+02	1.059E+00	--
α_2	4.97E-05	2.66E-03	1.57E-03	8.98E-03	7.137E-01	2.677E+02	0.935
α_3	5.10E-07	1.42E-03	4.29E-04	6.19E-03	3.458E-01	2.434E+02	1.030

CCCG = 4, Gamma = 0.162

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9897582	0.9955974	0.9962635	0.9991601	4.782E+02	2.115E+00	--
α_2	3.90E-04	3.14E-03	2.50E-03	8.09E-03	1.549E+00	4.910E+02	0.991
α_3	1.78E-08	5.69E-04	1.11E-04	2.71E-03	2.646E-01	4.646E+02	1.050
α_4	7.61E-08	6.88E-04	1.69E-04	3.15E-03	3.010E-01	4.369E+02	1.116

CCCG = 5, Gamma = 0.162

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928390	0.9960228	0.9962670	0.9983728	1.333E+03	5.325E+00	--
α_2	8.50E-04	2.66E-03	2.42E-03	5.29E-03	3.632E+00	1.360E+03	1.032
α_3	1.03E-04	1.05E-03	8.06E-04	2.83E-03	1.354E+00	1.288E+03	1.091
α_4	2.21E-08	2.32E-04	5.55E-05	1.07E-03	2.961E-01	1.274E+03	1.104
α_5	9.24E-35	3.11E-05	3.42E-11	1.54E-04	4.243E-02	1.366E+03	1.030

CCCG = 6, Gamma = 0.162

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9925836	0.9959567	0.9962242	0.9984163	1.216E+03	4.936E+00	--
α_2	5.99E-04	2.25E-03	2.00E-03	4.76E-03	2.915E+00	1.291E+03	0.982
α_3	9.38E-05	1.10E-03	8.26E-04	3.04E-03	1.257E+00	1.142E+03	1.112
α_4	1.77E-06	4.36E-04	2.00E-04	1.67E-03	5.031E-01	1.153E+03	1.102
α_5	2.84E-15	9.79E-05	1.29E-06	5.61E-04	1.155E-01	1.179E+03	1.078
α_6	7.33E-13	1.57E-04	5.74E-06	8.68E-04	1.451E-01	9.258E+02	1.373

CCCG = 7, Gamma = 0.162

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9941918	0.9963240	0.9964492	0.9980289	2.617E+03	9.654E+00	--
α_2	6.60E-04	1.71E-03	1.59E-03	3.14E-03	4.851E+00	2.840E+03	0.961
α_3	2.96E-04	1.16E-03	1.02E-03	2.47E-03	2.800E+00	2.419E+03	1.129
α_4	5.74E-05	5.61E-04	4.34E-04	1.50E-03	1.384E+00	2.464E+03	1.109
α_5	7.04E-07	1.99E-04	8.89E-05	7.70E-04	4.902E-01	2.463E+03	1.110
α_6	1.14E-15	4.78E-05	6.06E-07	2.75E-04	1.146E-01	2.395E+03	1.142
α_7	3.13E-93	5.95E-06	6.33E-25	7.07E-06	1.464E-02	2.459E+03	1.112

CCCG = 8, Gamma = 0.162

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9939809	0.9964221	0.9965864	0.9983027	1.991E+03	7.148E+00	--
α_2	3.63E-04	1.34E-03	1.19E-03	2.82E-03	2.980E+00	2.220E+03	0.932
α_3	1.80E-04	1.04E-03	8.68E-04	2.48E-03	1.960E+00	1.887E+03	1.097
α_4	4.68E-05	6.40E-04	4.69E-04	1.82E-03	1.166E+00	1.821E+03	1.137
α_5	1.60E-06	2.82E-04	1.36E-04	1.05E-03	5.375E-01	1.907E+03	1.086
α_6	2.14E-11	9.67E-05	7.50E-06	5.11E-04	1.805E-01	1.866E+03	1.110
α_7	1.27E-35	2.45E-05	1.83E-11	1.20E-04	4.139E-02	1.691E+03	1.225
α_8	9.56E-09	1.57E-04	3.46E-05	7.31E-04	2.827E-01	1.802E+03	1.149

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	3.52E-03	2.66E-03	3.14E-03	2.66E-03	2.25E-03	1.71E-03	1.34E-03
α_3		1.42E-03	5.69E-04	1.05E-03	1.10E-03	1.16E-03	1.04E-03
α_4			6.88E-04	2.32E-04	4.36E-04	5.61E-04	6.40E-04
α_5				3.11E-05	9.79E-05	1.99E-04	2.82E-04
α_6					1.57E-04	4.78E-05	9.67E-05
α_7						5.95E-06	2.45E-05
α_8							1.57E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	3.52E-03	4.08E-03	4.40E-03	3.98E-03	4.04E-03	3.68E-03	3.58E-03
Gamma		3.48E-01	2.86E-01	3.30E-01	4.43E-01	5.36E-01	6.25E-01
Delta			5.47E-01	2.01E-01	3.86E-01	4.13E-01	5.36E-01
Epsilon				1.18E-01	3.69E-01	3.10E-01	4.67E-01
Mu					6.15E-01	2.13E-01	4.97E-01
Omega						1.11E-01	6.52E-01
Sigma							8.65E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.10	3.10	3.10	3.10	3.10	3.10	3.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.2.3.4 HCI-RCI-TDP-RH: HPCI AND RCIC Turbine-Driven Pumps Fail to Run Greater Than One Hour

Generic CCF Parameters

Plant Type: BWR
System Group: Clean Water
System: High Pressure Coolant Injection, Reactor Core Isolation
Component Group: Pump
Component Type: Turbine Driven Pump
Component Subtype: Centrifugal
Failure Mode: Fail to Run > 1H
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 5.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9346401	0.9832557	0.9926627	0.9999494	1.0000000	2.751E+01	4.685E-01
α_2	4.74E-05	1.67E-02	7.34E-03	6.54E-02	0.00E+00	4.685E-01	2.751E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9499896	0.9824312	0.9871316	0.9987876	1.0000000	6.308E+01	1.128E+00
α_2	4.45E-04	1.33E-02	8.65E-03	4.18E-02	0.00E+00	8.512E-01	6.336E+01
α_3	2.16E-07	4.31E-03	9.24E-04	2.02E-02	0.00E+00	2.768E-01	6.393E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9536095	0.9806120	0.9837905	0.9967496	1.0000000	9.578E+01	1.894E+00
α_2	1.12E-03	1.29E-02	9.76E-03	3.54E-02	0.00E+00	1.260E+00	9.641E+01
α_3	4.48E-06	4.12E-03	1.51E-03	1.71E-02	0.00E+00	4.024E-01	9.727E+01
α_4	1.65E-08	2.37E-03	3.54E-04	1.17E-02	0.00E+00	2.315E-01	9.744E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9654391	0.9827850	0.9843712	0.9947077	1.0000000	1.959E+02	3.432E+00
α_2	1.64E-03	9.65E-03	8.07E-03	2.31E-02	0.00E+00	1.924E+00	1.974E+02
α_3	3.05E-04	5.26E-03	3.73E-03	1.55E-02	0.00E+00	1.049E+00	1.983E+02
α_4	1.46E-06	1.92E-03	6.61E-04	8.09E-03	0.00E+00	3.822E-01	1.990E+02
α_5	3.34E-20	3.85E-04	3.59E-07	2.24E-03	0.00E+00	7.674E-02	1.993E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9680813	0.9836223	0.9849773	0.9945257	1.0000000	2.303E+02	3.835E+00

α_2	1.04E-03	7.26E-03	5.92E-03	1.81E-02	0.00E+00	1.701E+00	2.325E+02
α_3	4.07E-04	5.15E-03	3.83E-03	1.44E-02	0.00E+00	1.207E+00	2.329E+02
α_4	2.33E-05	2.55E-03	1.34E-03	9.17E-03	0.00E+00	5.960E-01	2.336E+02
α_5	3.70E-09	9.44E-04	1.26E-04	4.74E-03	0.00E+00	2.211E-01	2.339E+02
α_6	3.69E-15	4.69E-04	4.75E-06	2.70E-03	0.00E+00	1.098E-01	2.340E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9735371	0.9849800	0.9858149	0.9935656	1.0000000	3.769E+02	5.747E+00
α_2	1.20E-03	5.86E-03	5.03E-03	1.34E-02	0.00E+00	2.243E+00	3.804E+02
α_3	5.71E-04	4.26E-03	3.43E-03	1.08E-02	0.00E+00	1.630E+00	3.810E+02
α_4	1.76E-04	2.83E-03	2.03E-03	8.23E-03	0.00E+00	1.083E+00	3.816E+02
α_5	1.07E-05	1.48E-03	7.45E-04	5.43E-03	0.00E+00	5.654E-01	3.821E+02
α_6	2.75E-10	5.01E-04	4.63E-05	2.61E-03	0.00E+00	1.916E-01	3.825E+02
α_7	6.23E-41	9.09E-05	3.38E-12	3.99E-04	0.00E+00	3.480E-02	3.826E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9748016	0.9857163	0.9865144	0.9938985	1.0000000	3.951E+02	5.726E+00
α_2	9.08E-04	5.03E-03	4.24E-03	1.19E-02	0.00E+00	2.018E+00	3.988E+02
α_3	3.58E-04	3.47E-03	2.69E-03	9.25E-03	0.00E+00	1.391E+00	3.995E+02
α_4	1.58E-04	2.65E-03	1.88E-03	7.76E-03	0.00E+00	1.062E+00	3.998E+02
α_5	3.09E-05	1.75E-03	1.02E-03	5.95E-03	0.00E+00	7.026E-01	4.001E+02
α_6	3.43E-07	8.73E-04	2.68E-04	3.79E-03	0.00E+00	3.497E-01	4.005E+02
α_7	1.32E-15	2.69E-04	2.47E-06	1.55E-03	0.00E+00	1.078E-01	4.007E+02
α_8	2.75E-17	2.36E-04	1.00E-06	1.38E-03	0.00E+00	9.469E-02	4.008E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.67E-02	1.33E-02	1.29E-02	9.65E-03	7.26E-03	5.86E-03	5.03E-03
α_3		4.31E-03	4.12E-03	5.26E-03	5.15E-03	4.26E-03	3.47E-03
α_4			2.37E-03	1.92E-03	2.55E-03	2.83E-03	2.65E-03
α_5				3.85E-04	9.44E-04	1.48E-03	1.75E-03
α_6					4.69E-04	5.01E-04	8.73E-04
α_7						9.09E-05	2.69E-04
α_8							2.36E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.67E-02	1.76E-02	1.94E-02	1.72E-02	1.64E-02	1.50E-02	1.43E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.10	5.10	5.10	5.10	5.10	5.10	5.10
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9566403	0.9887940	0.9949816	0.9999626	4.265E+01	4.834E-01	--
α_2	3.74E-05	1.12E-02	5.02E-03	4.34E-02	4.834E-01	4.265E+01	1.039

CCCG = 3, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9716911	0.9898028	0.9923620	0.9991662	1.190E+02	1.226E+00	--
α_2	3.99E-04	8.18E-03	5.65E-03	2.46E-02	9.769E-01	1.185E+02	1.100
α_3	3.23E-08	2.02E-03	3.51E-04	9.79E-03	2.487E-01	1.229E+02	1.067

CCCG = 4, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9693978	0.9869088	0.9889116	0.9975706	1.551E+02	2.057E+00	--
α_2	9.99E-04	9.03E-03	7.08E-03	2.37E-02	1.442E+00	1.582E+02	1.156
α_3	3.28E-06	2.61E-03	9.82E-04	1.07E-02	4.114E-01	1.570E+02	1.171
α_4	1.90E-09	1.44E-03	1.58E-04	7.41E-03	2.036E-01	1.408E+02	1.308

CCCG = 5, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9756801	0.9876741	0.9887449	0.9960095	2.951E+02	3.683E+00	--
α_2	1.54E-03	7.55E-03	6.47E-03	1.72E-02	2.243E+00	2.950E+02	1.194
α_3	1.70E-04	3.37E-03	2.33E-03	1.01E-02	9.912E-01	2.932E+02	1.206
α_4	8.29E-07	1.22E-03	4.11E-04	5.16E-03	3.765E-01	3.092E+02	1.146
α_5	1.69E-21	1.95E-04	1.11E-07	1.12E-03	7.237E-02	3.719E+02	0.954

CCCG = 6, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9767091	0.9878254	0.9887687	0.9957193	3.358E+02	4.139E+00	--
α_2	1.16E-03	6.03E-03	5.13E-03	1.40E-02	2.128E+00	3.505E+02	1.148
α_3	2.47E-04	3.58E-03	2.61E-03	1.03E-02	1.134E+00	3.153E+02	1.280
α_4	1.03E-05	1.58E-03	7.84E-04	5.85E-03	5.533E-01	3.494E+02	1.157
α_5	2.38E-09	6.11E-04	8.15E-05	3.06E-03	2.210E-01	3.618E+02	1.119
α_6	4.66E-16	3.66E-04	2.55E-06	2.12E-03	1.027E-01	2.807E+02	1.442

CCCG = 7, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9811107	0.9890107	0.9895628	0.9950255	5.789E+02	6.432E+00	--
α_2	1.18E-03	4.55E-03	4.04E-03	9.69E-03	2.840E+00	6.208E+02	1.103
α_3	4.85E-04	3.27E-03	2.67E-03	8.08E-03	1.746E+00	5.327E+02	1.287
α_4	1.17E-04	1.88E-03	1.34E-03	5.46E-03	1.084E+00	5.763E+02	1.192
α_5	5.28E-06	9.29E-04	4.50E-04	3.47E-03	5.376E-01	5.783E+02	1.189
α_6	2.88E-10	3.28E-04	3.31E-05	1.70E-03	1.979E-01	6.025E+02	1.142
α_7	7.52E-53	3.36E-05	3.36E-15	1.15E-04	2.656E-02	7.915E+02	0.869

CCCG = 8, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9819710	0.9896347	0.9901831	0.9954259	5.836E+02	6.112E+00	--
α_2	7.87E-04	3.64E-03	3.14E-03	8.17E-03	2.364E+00	6.479E+02	1.058
α_3	3.32E-04	2.79E-03	2.21E-03	7.24E-03	1.512E+00	5.403E+02	1.269
α_4	1.11E-04	1.90E-03	1.35E-03	5.58E-03	1.056E+00	5.549E+02	1.237
α_5	1.70E-05	1.13E-03	6.41E-04	3.88E-03	6.745E-01	5.988E+02	1.147
α_6	7.59E-08	5.64E-04	1.43E-04	2.56E-03	3.076E-01	5.448E+02	1.262
α_7	1.24E-15	1.77E-04	1.75E-06	1.02E-03	1.093E-01	6.182E+02	1.112
α_8	2.68E-18	1.74E-04	4.82E-07	1.01E-03	8.885E-02	5.119E+02	1.343

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.90E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01	9.90E-01
α_2	1.12E-02	8.18E-03	9.03E-03	7.55E-03	6.03E-03	4.55E-03	3.64E-03
α_3		2.02E-03	2.61E-03	3.37E-03	3.58E-03	3.27E-03	2.79E-03
α_4			1.44E-03	1.22E-03	1.58E-03	1.88E-03	1.90E-03
α_5				1.95E-04	6.11E-04	9.29E-04	1.13E-03
α_6					3.66E-04	3.28E-04	5.64E-04
α_7						3.36E-05	1.77E-04
α_8							1.74E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.90E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01	9.90E-01
Beta	1.12E-02	1.02E-02	1.31E-02	1.23E-02	1.22E-02	1.10E-02	1.04E-02
Gamma		1.98E-01	3.10E-01	3.88E-01	5.04E-01	5.86E-01	6.49E-01
Delta			3.56E-01	2.95E-01	4.16E-01	4.92E-01	5.85E-01
Epsilon				1.38E-01	3.82E-01	4.07E-01	5.18E-01
Mu					3.75E-01	2.80E-01	4.48E-01
Omega						9.27E-02	3.83E-01
Sigma							4.95E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.50	0.50	0.50	0.50	0.50	0.50	0.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8741844	0.9680093	0.9862138	0.9999266	1.361E+01	4.498E-01	--
α_2	7.34E-05	3.20E-02	1.38E-02	1.26E-01	4.498E-01	1.361E+01	1.039

CCCG = 3, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9012675	0.9644554	0.9733283	0.9972575	3.197E+01	1.178E+00	--
α_2	1.28E-03	2.85E-02	1.96E-02	8.60E-02	9.387E-01	3.201E+01	1.100
α_3	7.47E-08	7.05E-03	1.15E-03	3.46E-02	2.396E-01	3.373E+01	1.067

CCCG = 4, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8997146	0.9576040	0.9642445	0.9927468	4.288E+01	1.898E+00	--
α_2	2.57E-03	2.82E-02	2.16E-02	7.63E-02	1.285E+00	4.430E+01	1.156
α_3	8.11E-06	8.73E-03	3.14E-03	3.64E-02	3.927E-01	4.458E+01	1.171
α_4	2.12E-08	5.48E-03	7.39E-04	2.75E-02	2.207E-01	4.006E+01	1.308

CCCG = 5, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9247675	0.9620188	0.9653135	0.9880025	8.879E+01	3.506E+00	--
α_2	3.89E-03	2.17E-02	1.83E-02	5.10E-02	1.992E+00	8.984E+01	1.194
α_3	7.37E-04	1.19E-02	8.52E-03	3.44E-02	1.078E+00	8.981E+01	1.206
α_4	2.00E-06	3.80E-03	1.23E-03	1.63E-02	3.632E-01	9.527E+01	1.146
α_5	5.83E-21	6.31E-04	3.65E-07	3.65E-03	7.248E-02	1.148E+02	0.954

CCCG = 6, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9306805	0.9633199	0.9659897	0.9868328	1.103E+02	4.199E+00	--
α_2	2.82E-03	1.63E-02	1.37E-02	3.87E-02	1.941E+00	1.172E+02	1.148
α_3	1.20E-03	1.25E-02	9.58E-03	3.36E-02	1.332E+00	1.056E+02	1.280
α_4	5.62E-05	5.23E-03	2.82E-03	1.86E-02	6.181E-01	1.176E+02	1.157
α_5	1.30E-08	1.89E-03	2.81E-04	9.37E-03	2.313E-01	1.221E+02	1.119
α_6	7.40E-20	8.10E-04	7.65E-07	4.71E-03	7.684E-02	9.480E+01	1.442

CCCG = 7, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9415552	0.9660256	0.9677099	0.9847420	1.769E+02	6.223E+00	--
α_2	3.33E-03	1.36E-02	1.20E-02	2.94E-02	2.654E+00	1.926E+02	1.103
α_3	1.34E-03	9.83E-03	7.96E-03	2.47E-02	1.645E+00	1.657E+02	1.287
α_4	4.11E-04	6.17E-03	4.47E-03	1.77E-02	1.115E+00	1.797E+02	1.192
α_5	3.22E-05	3.33E-03	1.77E-03	1.19E-02	6.034E-01	1.806E+02	1.189
α_6	1.68E-10	9.43E-04	7.03E-05	5.01E-03	1.780E-01	1.885E+02	1.142
α_7	6.01E-51	1.10E-04	2.27E-14	3.90E-04	2.734E-02	2.478E+02	0.869

CCCG = 8, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9439583	0.9674086	0.9690231	0.9853440	1.854E+02	6.246E+00	--
α_2	2.75E-03	1.19E-02	1.04E-02	2.62E-02	2.504E+00	2.083E+02	1.058
α_3	8.68E-04	8.08E-03	6.30E-03	2.14E-02	1.419E+00	1.742E+02	1.269
α_4	3.14E-04	5.70E-03	4.01E-03	1.69E-02	1.027E+00	1.792E+02	1.237
α_5	7.79E-05	3.78E-03	2.27E-03	1.26E-02	7.337E-01	1.936E+02	1.147
α_6	2.24E-06	2.25E-03	8.13E-04	9.36E-03	3.975E-01	1.763E+02	1.262
α_7	3.85E-20	3.84E-04	3.69E-07	2.23E-03	7.703E-02	2.004E+02	1.112
α_8	4.90E-18	5.27E-04	1.32E-06	3.08E-03	8.749E-02	1.659E+02	1.343

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.64E-01	9.58E-01	9.62E-01	9.63E-01	9.66E-01	9.67E-01
α_2	3.20E-02	2.85E-02	2.82E-02	2.17E-02	1.63E-02	1.36E-02	1.19E-02
α_3		7.05E-03	8.73E-03	1.19E-02	1.25E-02	9.83E-03	8.08E-03
α_4			5.48E-03	3.80E-03	5.23E-03	6.17E-03	5.70E-03
α_5				6.31E-04	1.89E-03	3.33E-03	3.78E-03
α_6					8.10E-04	9.43E-04	2.25E-03
α_7						1.10E-04	3.84E-04
α_8							5.27E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.64E-01	9.58E-01	9.62E-01	9.63E-01	9.66E-01	9.67E-01
Beta	3.20E-02	3.55E-02	4.24E-02	3.80E-02	3.67E-02	3.40E-02	3.26E-02
Gamma		1.98E-01	3.35E-01	4.29E-01	5.56E-01	6.00E-01	6.36E-01
Delta			3.86E-01	2.72E-01	3.89E-01	5.18E-01	6.10E-01
Epsilon				1.42E-01	3.41E-01	4.15E-01	5.49E-01
Mu					3.00E-01	2.40E-01	4.56E-01
Omega						1.05E-01	2.88E-01
Sigma							5.78E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.50	0.50	0.50	0.50	0.50	0.50	0.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 3.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.686

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9321089	0.9825738	0.9923220	0.9999494	2.653E+01	4.706E-01	--
α_2	5.06E-05	1.74E-02	7.68E-03	6.79E-02	4.706E-01	2.653E+01	1.039

CCCG = 3, Gamma = 0.686

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9476002	0.9817303	0.9867199	0.9987986	5.924E+01	1.103E+00	--
α_2	3.92E-04	1.35E-02	8.63E-03	4.34E-02	8.104E-01	5.905E+01	1.100
α_3	3.99E-07	4.73E-03	1.11E-03	2.18E-02	2.921E-01	6.144E+01	1.067

CCCG = 4, Gamma = 0.686

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9539290	0.9805564	0.9836486	0.9966048	9.847E+01	1.953E+00	--
α_2	1.20E-03	1.28E-02	9.83E-03	3.48E-02	1.312E+00	1.008E+02	1.156
α_3	7.20E-06	4.27E-03	1.69E-03	1.73E-02	4.307E-01	1.003E+02	1.171
α_4	4.64E-09	2.33E-03	2.75E-04	1.18E-02	2.099E-01	9.005E+01	1.308

CCCG = 5, Gamma = 0.686

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9646550	0.9828772	0.9846189	0.9951456	1.783E+02	3.107E+00	--
α_2	1.32E-03	9.36E-03	7.61E-03	2.34E-02	1.684E+00	1.783E+02	1.194
α_3	2.34E-04	5.29E-03	3.59E-03	1.61E-02	9.426E-01	1.772E+02	1.206
α_4	1.53E-06	2.04E-03	7.01E-04	8.59E-03	3.816E-01	1.870E+02	1.146
α_5	1.75E-16	4.38E-04	2.40E-06	2.55E-03	9.865E-02	2.251E+02	0.954

CCCG = 6, Gamma = 0.686

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9686065	0.9839086	0.9852468	0.9946379	2.337E+02	3.822E+00	--
α_2	1.01E-03	6.94E-03	5.67E-03	1.73E-02	1.714E+00	2.451E+02	1.148
α_3	3.29E-04	5.00E-03	3.61E-03	1.44E-02	1.108E+00	2.204E+02	1.280
α_4	3.51E-05	2.66E-03	1.48E-03	9.27E-03	6.509E-01	2.443E+02	1.157
α_5	1.98E-08	1.00E-03	1.80E-04	4.82E-03	2.536E-01	2.531E+02	1.119
α_6	7.90E-17	4.87E-04	2.21E-06	2.84E-03	9.572E-02	1.965E+02	1.442

CCCG = 7, Gamma = 0.686

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9733699	0.9852481	0.9861570	0.9940223	3.470E+02	5.195E+00	--
α_2	1.07E-03	5.61E-03	4.76E-03	1.31E-02	2.105E+00	3.729E+02	1.103
α_3	3.86E-04	4.11E-03	3.14E-03	1.12E-02	1.320E+00	3.200E+02	1.287
α_4	1.46E-04	2.87E-03	1.99E-03	8.60E-03	9.967E-01	3.462E+02	1.192
α_5	7.63E-06	1.51E-03	7.17E-04	5.69E-03	5.249E-01	3.475E+02	1.189
α_6	4.01E-10	5.40E-04	5.28E-05	2.80E-03	1.956E-01	3.622E+02	1.142
α_7	3.17E-28	1.11E-04	2.52E-09	6.03E-04	5.291E-02	4.759E+02	0.869

CCCG = 8, Gamma = 0.686

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9754352	0.9860154	0.9867850	0.9939673	4.112E+02	5.832E+00	--
α_2	9.86E-04	4.86E-03	4.16E-03	1.11E-02	2.229E+00	4.565E+02	1.058
α_3	2.83E-04	3.30E-03	2.48E-03	9.09E-03	1.260E+00	3.810E+02	1.269
α_4	1.51E-04	2.66E-03	1.87E-03	7.83E-03	1.042E+00	3.913E+02	1.237
α_5	4.23E-05	1.80E-03	1.10E-03	5.94E-03	7.626E-01	4.222E+02	1.147
α_6	1.95E-07	8.51E-04	2.37E-04	3.78E-03	3.271E-01	3.843E+02	1.262
α_7	2.99E-13	3.08E-04	8.26E-06	1.73E-03	1.344E-01	4.362E+02	1.112
α_8	1.92E-20	2.13E-04	2.00E-07	1.23E-03	7.682E-02	3.612E+02	1.343

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.74E-02	1.35E-02	1.28E-02	9.36E-03	6.94E-03	5.61E-03	4.86E-03
α_3		4.73E-03	4.27E-03	5.29E-03	5.00E-03	4.11E-03	3.30E-03
α_4			2.33E-03	2.04E-03	2.66E-03	2.87E-03	2.66E-03
α_5				4.38E-04	1.00E-03	1.51E-03	1.80E-03
α_6					4.87E-04	5.40E-04	8.51E-04
α_7						1.11E-04	3.08E-04
α_8							2.13E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.74E-02	1.83E-02	1.94E-02	1.71E-02	1.61E-02	1.48E-02	1.40E-02
Gamma		2.59E-01	3.39E-01	4.54E-01	5.68E-01	6.19E-01	6.53E-01
Delta			3.52E-01	3.19E-01	4.53E-01	5.50E-01	6.39E-01
Epsilon				1.77E-01	3.59E-01	4.29E-01	5.44E-01
Mu					3.27E-01	3.01E-01	4.32E-01
Omega						1.71E-01	3.80E-01
Sigma							4.08E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.50	3.50	3.50	3.50	3.50	3.50	3.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9819847	0.9953239	0.9978858	0.9999828	1.050E+02	4.932E-01	--
α_2	1.72E-05	4.68E-03	2.11E-03	1.80E-02	4.932E-01	1.050E+02	1.039

CCCG = 3, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9864013	0.9953565	0.9966997	0.9997248	2.271E+02	1.059E+00	--
α_2	5.91E-05	3.16E-03	1.87E-03	1.07E-02	7.137E-01	2.252E+02	1.100
α_3	5.34E-07	1.48E-03	4.49E-04	6.48E-03	3.458E-01	2.326E+02	1.067

CCCG = 4, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9880522	0.9948624	0.9956387	0.9990194	4.095E+02	2.115E+00	--
α_2	4.57E-04	3.69E-03	2.94E-03	9.49E-03	1.549E+00	4.185E+02	1.156
α_3	1.99E-08	6.39E-04	1.25E-04	3.04E-03	2.646E-01	4.141E+02	1.171
α_4	8.97E-08	8.11E-04	1.99E-04	3.71E-03	3.010E-01	3.708E+02	1.308

CCCG = 5, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9918606	0.9954786	0.9957559	0.9981498	1.172E+03	5.325E+00	--
α_2	9.85E-04	3.09E-03	2.81E-03	6.14E-03	3.632E+00	1.173E+03	1.194
α_3	1.14E-04	1.16E-03	8.93E-04	3.13E-03	1.354E+00	1.163E+03	1.206
α_4	2.29E-08	2.42E-04	5.77E-05	1.11E-03	2.961E-01	1.225E+03	1.146
α_5	8.58E-35	2.88E-05	3.17E-11	1.43E-04	4.243E-02	1.472E+03	0.954

CCCG = 6, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9915051	0.9953678	0.9956739	0.9981853	1.061E+03	4.936E+00	--
α_2	7.02E-04	2.64E-03	2.35E-03	5.58E-03	2.915E+00	1.102E+03	1.148
α_3	1.08E-04	1.27E-03	9.53E-04	3.50E-03	1.257E+00	9.902E+02	1.280
α_4	1.87E-06	4.59E-04	2.10E-04	1.76E-03	5.031E-01	1.096E+03	1.157
α_5	2.95E-15	1.02E-04	1.34E-06	5.84E-04	1.155E-01	1.134E+03	1.119
α_6	7.71E-13	1.65E-04	6.04E-06	9.14E-04	1.451E-01	8.797E+02	1.442

CCCG = 7, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9934473	0.9958524	0.9959935	0.9977757	2.318E+03	9.654E+00	--
α_2	7.59E-04	1.96E-03	1.83E-03	3.61E-03	4.851E+00	2.472E+03	1.103
α_3	3.38E-04	1.32E-03	1.17E-03	2.82E-03	2.800E+00	2.119E+03	1.287
α_4	6.17E-05	6.04E-04	4.66E-04	1.62E-03	1.384E+00	2.291E+03	1.192
α_5	7.55E-07	2.13E-04	9.53E-05	8.25E-04	4.902E-01	2.298E+03	1.189
α_6	1.14E-15	4.79E-05	6.07E-07	2.75E-04	1.146E-01	2.393E+03	1.142
α_7	2.45E-93	4.66E-06	4.95E-25	5.53E-06	1.464E-02	3.143E+03	0.869

CCCG = 8, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9932091	0.9959628	0.9961480	0.9980845	1.763E+03	7.148E+00	--
α_2	4.13E-04	1.52E-03	1.36E-03	3.20E-03	2.980E+00	1.953E+03	1.058
α_3	2.08E-04	1.20E-03	1.01E-03	2.87E-03	1.960E+00	1.628E+03	1.269
α_4	5.10E-05	6.97E-04	5.11E-04	1.98E-03	1.166E+00	1.671E+03	1.237
α_5	1.69E-06	2.98E-04	1.44E-04	1.12E-03	5.375E-01	1.803E+03	1.147
α_6	2.43E-11	1.10E-04	8.54E-06	5.82E-04	1.805E-01	1.639E+03	1.262
α_7	1.15E-35	2.23E-05	1.66E-11	1.09E-04	4.139E-02	1.860E+03	1.112
α_8	1.12E-08	1.84E-04	4.05E-05	8.56E-04	2.827E-01	1.540E+03	1.343

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
α_2	4.68E-03	3.16E-03	3.69E-03	3.09E-03	2.64E-03	1.96E-03	1.52E-03
α_3		1.48E-03	6.39E-04	1.16E-03	1.27E-03	1.32E-03	1.20E-03
α_4			8.11E-04	2.42E-04	4.59E-04	6.04E-04	6.97E-04
α_5				2.88E-05	1.02E-04	2.13E-04	2.98E-04
α_6					1.65E-04	4.79E-05	1.10E-04
α_7						4.66E-06	2.23E-05
α_8							1.84E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
Beta	4.68E-03	4.64E-03	5.14E-03	4.52E-03	4.63E-03	4.15E-03	4.04E-03
Gamma		3.20E-01	2.82E-01	3.17E-01	4.30E-01	5.28E-01	6.23E-01
Delta			5.59E-01	1.89E-01	3.64E-01	3.97E-01	5.22E-01
Epsilon				1.07E-01	3.68E-01	3.06E-01	4.68E-01
Mu					6.18E-01	1.98E-01	5.15E-01
Omega						8.87E-02	6.52E-01
Sigma							8.92E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.60	0.60	0.60	0.60	0.60	0.60	0.60
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3 Motor-Operated Valves

2.3.1 Pooled Motor-Operated Valves

2.3.1.1 ALL-MOV-FTOC: All Systems Motor-Operated Valves Fail to Open/Close

Generic CCF Parameters

Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Close, Fail to Open, Fail to Open or Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 354.0

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9880035	0.9964364	0.9978901	0.9999339	0.9986014	2.009E+02	7.185E-01
α_2	6.83E-05	3.56E-03	2.11E-03	1.20E-02	1.40E-03	7.185E-01	2.009E+02

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9861293	0.9942542	0.9952276	0.9990535	0.9971989	3.250E+02	1.878E+00
α_2	6.40E-04	4.90E-03	3.93E-03	1.25E-02	2.80E-03	1.601E+00	3.253E+02
α_3	4.20E-08	8.47E-04	1.80E-04	3.97E-03	0.00E+00	2.768E-01	3.266E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9847291	0.9924430	0.9931588	0.9977098	0.9957924	4.457E+02	3.394E+00
α_2	1.56E-03	6.15E-03	5.43E-03	1.32E-02	4.21E-03	2.760E+00	4.463E+02
α_3	9.69E-07	8.96E-04	3.28E-04	3.71E-03	0.00E+00	4.024E-01	4.487E+02
α_4	3.56E-09	5.15E-04	7.65E-05	2.55E-03	0.00E+00	2.315E-01	4.488E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9855122	0.9920266	0.9925308	0.9968142	0.9962564	6.344E+02	5.099E+00
α_2	1.42E-03	4.96E-03	4.46E-03	1.02E-02	2.81E-03	3.174E+00	6.363E+02
α_3	2.59E-04	2.29E-03	1.80E-03	6.01E-03	9.36E-04	1.466E+00	6.380E+02
α_4	4.53E-07	5.98E-04	2.06E-04	2.52E-03	0.00E+00	3.822E-01	6.391E+02
α_5	1.04E-20	1.20E-04	1.12E-07	6.97E-04	0.00E+00	7.674E-02	6.394E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9868213	0.9925614	0.9929843	0.9968470	0.9965530	7.573E+02	5.675E+00
α_2	9.45E-04	3.68E-03	3.25E-03	7.86E-03	2.07E-03	2.805E+00	7.601E+02
α_3	3.74E-04	2.38E-03	1.96E-03	5.82E-03	1.14E-03	1.818E+00	7.611E+02

α_4	1.83E-05	9.45E-04	5.60E-04	3.18E-03	2.34E-04	7.210E-01	7.622E+02
α_5	1.13E-09	2.90E-04	3.87E-05	1.45E-03	0.00E+00	2.211E-01	7.627E+02
α_6	1.13E-15	1.44E-04	1.45E-06	8.30E-04	0.00E+00	1.098E-01	7.628E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9871906	0.9922393	0.9925668	0.9961808	0.9967650	9.923E+02	7.761E+00
α_2	9.57E-04	3.26E-03	2.94E-03	6.68E-03	1.64E-03	3.263E+00	9.968E+02
α_3	4.93E-04	2.32E-03	2.00E-03	5.25E-03	1.11E-03	2.323E+00	9.978E+02
α_4	1.30E-04	1.34E-03	1.03E-03	3.63E-03	4.20E-04	1.344E+00	9.987E+02
α_5	5.89E-06	6.05E-04	3.20E-04	2.17E-03	6.32E-05	6.047E-01	9.995E+02
α_6	1.05E-10	1.92E-04	1.77E-05	9.98E-04	0.00E+00	1.916E-01	9.999E+02
α_7	2.38E-41	3.48E-05	1.29E-12	1.53E-04	0.00E+00	3.480E-02	1.000E+03

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9882543	0.9928555	0.9931519	0.9964566	0.9969308	1.099E+03	7.908E+00
α_2	7.34E-04	2.70E-03	2.41E-03	5.66E-03	1.36E-03	2.987E+00	1.104E+03
α_3	3.63E-04	1.91E-03	1.62E-03	4.45E-03	1.02E-03	2.113E+00	1.105E+03
α_4	1.41E-04	1.29E-03	1.01E-03	3.42E-03	5.21E-04	1.433E+00	1.105E+03
α_5	2.08E-05	7.32E-04	4.62E-04	2.36E-03	1.51E-04	8.098E-01	1.106E+03
α_6	1.69E-07	3.27E-04	1.05E-04	1.41E-03	1.79E-05	3.625E-01	1.107E+03
α_7	4.76E-16	9.74E-05	8.93E-07	5.62E-04	0.00E+00	1.078E-01	1.107E+03
α_8	9.95E-18	8.55E-05	3.62E-07	4.98E-04	0.00E+00	9.469E-02	1.107E+03

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.94E-01	9.92E-01	9.92E-01	9.93E-01	9.92E-01	9.93E-01
α_2	3.56E-03	4.90E-03	6.15E-03	4.96E-03	3.68E-03	3.26E-03	2.70E-03
α_3		8.47E-04	8.96E-04	2.29E-03	2.38E-03	2.32E-03	1.91E-03
α_4			5.15E-04	5.98E-04	9.45E-04	1.34E-03	1.29E-03
α_5				1.20E-04	2.90E-04	6.05E-04	7.32E-04
α_6					1.44E-04	1.92E-04	3.27E-04
α_7						3.48E-05	9.74E-05
α_8							8.55E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.94E-01	9.92E-01	9.92E-01	9.93E-01	9.92E-01	9.93E-01
Beta	3.56E-03	5.75E-03	7.56E-03	7.97E-03	7.44E-03	7.76E-03	7.14E-03
Gamma		1.47E-01	1.87E-01	3.77E-01	5.06E-01	5.80E-01	6.22E-01
Delta			3.65E-01	2.38E-01	3.66E-01	4.84E-01	5.71E-01
Epsilon				1.67E-01	3.15E-01	3.82E-01	4.90E-01
Mu					3.32E-01	2.72E-01	4.11E-01
Omega						1.54E-01	3.58E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	177.00	265.50	354.00	442.50	531.00	619.50	708.00
N₁	1.5000	1.5000	1.0000	1.0417	1.0417	1.0127	0.9645
N₂	0.2500	0.7500	1.5000	1.2500	1.1042	1.0197	0.9691
N₃		0.0000	0.0000	0.4167	0.6111	0.6933	0.7230
N₄			0.0000	0.0000	0.1250	0.2616	0.3706
N₅				0.0000	0.0000	0.0394	0.1073
N₆					0.0000	0.0000	0.0127
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 130.6

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9911318	0.9975829	0.9987774	0.9999823	2.339E+02	5.667E-01	--
α_2	1.77E-05	2.42E-03	1.22E-03	8.87E-03	5.667E-01	2.339E+02	0.471

CCCG = 3, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9902192	0.9962592	0.9970572	0.9995718	3.930E+02	1.476E+00	--
α_2	2.69E-04	3.30E-03	2.46E-03	9.19E-03	1.227E+00	3.706E+02	0.619
α_3	7.03E-09	4.41E-04	7.64E-05	2.14E-03	2.487E-01	5.633E+02	0.408

CCCG = 4, Gamma = 0.371

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9886031	0.9948067	0.9954597	0.9987789	4.898E+02	2.557E+00	--
α_2	7.44E-04	4.33E-03	3.62E-03	1.04E-02	1.942E+00	4.460E+02	0.706
α_3	7.07E-07	5.65E-04	2.12E-04	2.33E-03	4.114E-01	7.272E+02	0.434
α_4	3.84E-10	2.93E-04	3.19E-05	1.50E-03	2.036E-01	6.948E+02	0.455

CCCG = 5, Gamma = 0.371

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9891576	0.9942716	0.9946994	0.9979243	7.550E+02	4.350E+00	--
α_2	1.01E-03	3.91E-03	3.47E-03	8.35E-03	2.826E+00	7.192E+02	0.719
α_3	8.31E-05	1.36E-03	9.70E-04	3.97E-03	1.075E+00	7.886E+02	0.658
α_4	2.59E-07	3.81E-04	1.28E-04	1.61E-03	3.765E-01	9.887E+02	0.525
α_5	6.28E-22	7.25E-05	4.13E-08	4.19E-04	7.237E-02	9.980E+02	0.520

CCCG = 6, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898564	0.9944551	0.9948178	0.9978156	8.930E+02	4.979E+00	--
α_2	8.24E-04	3.22E-03	2.85E-03	6.90E-03	2.788E+00	8.618E+02	0.697
α_3	1.35E-04	1.48E-03	1.12E-03	4.03E-03	1.301E+00	8.793E+02	0.684
α_4	4.02E-06	5.48E-04	2.77E-04	2.01E-03	5.672E-01	1.034E+03	0.582
α_5	7.20E-10	1.85E-04	2.47E-05	9.30E-04	2.210E-01	1.192E+03	0.505
α_6	1.40E-16	1.10E-04	7.66E-07	6.39E-04	1.027E-01	9.314E+02	0.646

CCCG = 7, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9903304	0.9941974	0.9944521	0.9971947	1.276E+03	7.446E+00	--
α_2	8.91E-04	2.84E-03	2.58E-03	5.66E-03	3.563E+00	1.253E+03	0.731
α_3	2.89E-04	1.63E-03	1.37E-03	3.87E-03	1.995E+00	1.221E+03	0.750
α_4	5.59E-05	8.29E-04	6.01E-04	2.38E-03	1.123E+00	1.353E+03	0.678
α_5	2.11E-06	3.64E-04	1.77E-04	1.36E-03	5.399E-01	1.484E+03	0.618
α_6	1.11E-10	1.26E-04	1.27E-05	6.51E-04	1.979E-01	1.569E+03	0.585
α_7	3.87E-53	1.73E-05	1.73E-15	5.91E-05	2.656E-02	1.535E+03	0.598

CCCG = 8, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9910433	0.9946497	0.9948896	0.9974371	1.356E+03	7.295E+00	--
α_2	6.59E-04	2.33E-03	2.08E-03	4.82E-03	3.136E+00	1.345E+03	0.705
α_3	2.30E-04	1.44E-03	1.19E-03	3.52E-03	1.840E+00	1.272E+03	0.746
α_4	5.61E-05	8.20E-04	5.95E-04	2.35E-03	1.130E+00	1.377E+03	0.690
α_5	6.99E-06	4.40E-04	2.53E-04	1.51E-03	6.830E-01	1.551E+03	0.613
α_6	2.58E-08	1.90E-04	4.83E-05	8.62E-04	3.080E-01	1.620E+03	0.587
α_7	4.46E-16	6.38E-05	6.29E-07	3.68E-04	1.093E-01	1.714E+03	0.555
α_8	1.01E-18	6.54E-05	1.81E-07	3.81E-04	8.885E-02	1.359E+03	0.699

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.96E-01	9.95E-01	9.94E-01	9.94E-01	9.94E-01	9.95E-01
α_2	2.42E-03	3.30E-03	4.33E-03	3.91E-03	3.22E-03	2.84E-03	2.33E-03
α_3		4.41E-04	5.65E-04	1.36E-03	1.48E-03	1.63E-03	1.44E-03
α_4			2.93E-04	3.81E-04	5.48E-04	8.29E-04	8.20E-04
α_5				7.25E-05	1.85E-04	3.64E-04	4.40E-04
α_6					1.10E-04	1.26E-04	1.90E-04
α_7						1.73E-05	6.38E-05
α_8							6.54E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.96E-01	9.95E-01	9.94E-01	9.94E-01	9.94E-01	9.95E-01
Beta	2.42E-03	3.74E-03	5.19E-03	5.73E-03	5.54E-03	5.80E-03	5.35E-03
Gamma		1.18E-01	1.65E-01	3.17E-01	4.19E-01	5.11E-01	5.65E-01
Delta			3.41E-01	2.50E-01	3.64E-01	4.50E-01	5.22E-01
Epsilon				1.60E-01	3.50E-01	3.79E-01	4.81E-01
Mu					3.73E-01	2.83E-01	4.20E-01
Omega						1.21E-01	4.05E-01
Sigma							5.06E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	65.30	97.95	130.60	163.25	195.90	228.55	261.20
N_1	0.8333	1.0000	1.0000	1.0417	1.0417	1.0127	0.9645
N_2	0.0833	0.2500	0.5000	0.5833	0.6597	0.7234	0.7716
N_3		0.0000	0.0000	0.0833	0.1667	0.2488	0.3279

N₄			0.0000	0.0000	0.0139	0.0394	0.0743
N₅				0.0000	0.0000	0.0023	0.0085
N₆					0.0000	0.0000	0.0004
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 40.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.113

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9754455	0.9938283	0.9974371	0.9999864	7.243E+01	4.498E-01	--
α_2	1.36E-05	6.17E-03	2.56E-03	2.46E-02	4.498E-01	7.243E+01	0.471

CCCG = 3, Gamma = 0.113

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9711130	0.9897347	0.9924059	0.9992259	1.136E+02	1.178E+00	--
α_2	3.86E-04	8.79E-03	5.97E-03	2.68E-02	9.387E-01	1.059E+02	0.619
α_3	1.54E-08	1.48E-03	2.37E-04	7.25E-03	2.396E-01	1.617E+02	0.408

CCCG = 4, Gamma = 0.114

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9695364	0.9872961	0.9893969	0.9978710	1.475E+02	1.898E+00	--
α_2	8.78E-04	9.78E-03	7.43E-03	2.67E-02	1.285E+00	1.301E+02	0.706
α_3	1.69E-06	1.84E-03	6.55E-04	7.69E-03	3.927E-01	2.130E+02	0.434
α_4	4.15E-09	1.08E-03	1.44E-04	5.43E-03	2.207E-01	2.036E+02	0.455

CCCG = 5, Gamma = 0.114

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9703596	0.9851640	0.9865104	0.9953671	2.328E+02	3.506E+00	--
α_2	1.60E-03	8.97E-03	7.54E-03	2.12E-02	1.992E+00	2.201E+02	0.719
α_3	2.74E-04	4.44E-03	3.17E-03	1.29E-02	1.078E+00	2.418E+02	0.658
α_4	6.25E-07	1.19E-03	3.85E-04	5.12E-03	3.632E-01	3.039E+02	0.525
α_5	2.18E-21	2.36E-04	1.36E-07	1.36E-03	7.248E-02	3.069E+02	0.520

CCCG = 6, Gamma = 0.114

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9730426	0.9858462	0.9869232	0.9949703	2.925E+02	4.199E+00	--
α_2	1.18E-03	6.86E-03	5.74E-03	1.64E-02	1.941E+00	2.810E+02	0.697
α_3	4.42E-04	4.62E-03	3.54E-03	1.25E-02	1.332E+00	2.868E+02	0.684
α_4	1.95E-05	1.83E-03	9.83E-04	6.49E-03	6.181E-01	3.380E+02	0.582
α_5	4.06E-09	5.93E-04	8.79E-05	2.94E-03	2.313E-01	3.899E+02	0.505
α_6	2.30E-20	2.52E-04	2.37E-07	1.46E-03	7.684E-02	3.047E+02	0.646

CCCG = 7, Gamma = 0.114

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9732328	0.9845244	0.9853207	0.9930965	3.959E+02	6.223E+00	--
α_2	1.66E-03	6.78E-03	5.96E-03	1.47E-02	2.654E+00	3.885E+02	0.731
α_3	5.88E-04	4.32E-03	3.49E-03	1.09E-02	1.645E+00	3.792E+02	0.750
α_4	1.76E-04	2.64E-03	1.91E-03	7.61E-03	1.115E+00	4.205E+02	0.678
α_5	1.26E-05	1.31E-03	6.91E-04	4.68E-03	6.034E-01	4.617E+02	0.618
α_6	6.46E-11	3.64E-04	2.71E-05	1.93E-03	1.780E-01	4.884E+02	0.585
α_7	3.11E-51	5.72E-05	1.17E-14	2.02E-04	2.734E-02	4.778E+02	0.598

CCCG = 8, Gamma = 0.114

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9753893	0.9857643	0.9864959	0.9936408	4.325E+02	6.246E+00	--
α_2	1.34E-03	5.82E-03	5.07E-03	1.28E-02	2.504E+00	4.279E+02	0.705
α_3	3.74E-04	3.49E-03	2.72E-03	9.25E-03	1.419E+00	4.052E+02	0.746
α_4	1.28E-04	2.33E-03	1.64E-03	6.92E-03	1.027E+00	4.388E+02	0.690
α_5	3.05E-05	1.48E-03	8.87E-04	4.95E-03	7.337E-01	4.945E+02	0.613
α_6	7.64E-07	7.68E-04	2.77E-04	3.20E-03	3.975E-01	5.170E+02	0.587
α_7	1.41E-20	1.41E-04	1.35E-07	8.17E-04	7.703E-02	5.471E+02	0.555
α_8	1.87E-18	2.02E-04	5.03E-07	1.18E-03	8.749E-02	4.339E+02	0.699

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.90E-01	9.87E-01	9.85E-01	9.86E-01	9.85E-01	9.86E-01
α_2	6.17E-03	8.79E-03	9.78E-03	8.97E-03	6.86E-03	6.78E-03	5.82E-03
α_3		1.48E-03	1.84E-03	4.44E-03	4.62E-03	4.32E-03	3.49E-03
α_4			1.08E-03	1.19E-03	1.83E-03	2.64E-03	2.33E-03
α_5				2.36E-04	5.93E-04	1.31E-03	1.48E-03
α_6					2.52E-04	3.64E-04	7.68E-04
α_7						5.72E-05	1.41E-04
α_8							2.02E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.90E-01	9.87E-01	9.85E-01	9.86E-01	9.85E-01	9.86E-01
Beta	6.17E-03	1.03E-02	1.27E-02	1.48E-02	1.42E-02	1.55E-02	1.42E-02
Gamma		1.44E-01	2.30E-01	3.95E-01	5.15E-01	5.62E-01	5.91E-01
Delta			3.70E-01	2.44E-01	3.66E-01	5.03E-01	5.85E-01
Epsilon				1.65E-01	3.16E-01	3.95E-01	5.26E-01
Mu					2.98E-01	2.44E-01	4.28E-01
Omega						1.36E-01	3.08E-01
Sigma							5.89E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	20.25	30.38	40.50	50.63	60.75	70.88	81.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 13.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.036

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9367666	0.9849717	0.9947415	0.9999887	2.491E+01	3.801E-01	--
α_2	1.13E-05	1.50E-02	5.26E-03	6.32E-02	3.801E-01	2.491E+01	0.471

CCCG = 3, Gamma = 0.036

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9313788	0.9771558	0.9841805	0.9989194	4.106E+01	9.600E-01	--
α_2	2.63E-04	1.77E-02	1.02E-02	6.08E-02	6.673E-01	3.700E+01	0.619
α_3	4.41E-07	5.13E-03	1.21E-03	2.36E-02	2.927E-01	5.679E+01	0.408

CCCG = 4, Gamma = 0.036

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9296882	0.9716623	0.9768178	0.9959867	5.723E+01	1.669E+00	--
α_2	1.18E-03	2.05E-02	1.46E-02	6.01E-02	1.039E+00	4.956E+01	0.706
α_3	4.06E-06	4.73E-03	1.67E-03	1.98E-02	3.887E-01	8.180E+01	0.434
α_4	3.51E-08	3.08E-03	5.03E-04	1.50E-02	2.414E-01	7.826E+01	0.455

CCCG = 5, Gamma = 0.036

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9374814	0.9685603	0.9713379	0.9901419	1.074E+02	3.487E+00	--
α_2	2.69E-03	1.73E-02	1.43E-02	4.22E-02	1.791E+00	1.016E+02	0.719
α_3	8.46E-04	1.07E-02	7.96E-03	2.98E-02	1.207E+00	1.119E+02	0.658
α_4	5.40E-06	3.06E-03	1.22E-03	1.24E-02	4.340E-01	1.412E+02	0.525
α_5	8.50E-27	3.84E-04	1.36E-08	2.11E-03	5.493E-02	1.429E+02	0.520

CCCG = 6, Gamma = 0.037

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9461426	0.9721213	0.9743402	0.9905157	1.362E+02	3.905E+00	--
α_2	9.74E-04	1.01E-02	7.76E-03	2.72E-02	1.335E+00	1.309E+02	0.697
α_3	1.39E-03	1.14E-02	9.06E-03	2.93E-02	1.531E+00	1.331E+02	0.684
α_4	8.75E-05	4.54E-03	2.70E-03	1.53E-02	7.191E-01	1.575E+02	0.582
α_5	1.97E-08	1.35E-03	2.31E-04	6.58E-03	2.467E-01	1.821E+02	0.505
α_6	5.61E-21	5.11E-04	3.07E-07	2.96E-03	7.279E-02	1.423E+02	0.646

CCCG = 7, Gamma = 0.037

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9503805	0.9717000	0.9732298	0.9877939	1.981E+02	5.770E+00	--
α_2	9.78E-04	7.86E-03	6.27E-03	2.02E-02	1.549E+00	1.954E+02	0.731
α_3	1.84E-03	1.04E-02	8.73E-03	2.45E-02	1.989E+00	1.898E+02	0.750
α_4	5.44E-04	6.06E-03	4.60E-03	1.66E-02	1.287E+00	2.110E+02	0.678
α_5	4.95E-05	2.97E-03	1.72E-03	1.01E-02	6.913E-01	2.321E+02	0.618
α_6	6.97E-09	9.46E-04	1.42E-04	4.68E-03	2.327E-01	2.458E+02	0.585
α_7	5.95E-65	8.78E-05	1.33E-17	2.21E-04	2.112E-02	2.406E+02	0.598

CCCG = 8, Gamma = 0.037

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9570003	0.9743890	0.9755356	0.9878623	2.669E+02	7.016E+00	--
α_2	7.63E-04	5.94E-03	4.76E-03	1.51E-02	1.583E+00	2.651E+02	0.705
α_3	1.40E-03	7.88E-03	6.62E-03	1.87E-02	1.986E+00	2.499E+02	0.746
α_4	8.57E-04	6.14E-03	4.98E-03	1.54E-02	1.672E+00	2.708E+02	0.690
α_5	1.74E-04	3.29E-03	2.30E-03	9.82E-03	1.011E+00	3.058E+02	0.613
α_6	1.35E-05	1.78E-03	9.05E-04	6.52E-03	5.709E-01	3.200E+02	0.587
α_7	1.22E-10	5.34E-04	4.17E-05	2.82E-03	1.809E-01	3.389E+02	0.555
α_8	6.68E-108	4.63E-05	1.40E-27	3.47E-05	1.245E-02	2.689E+02	0.699

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.77E-01	9.72E-01	9.69E-01	9.72E-01	9.72E-01	9.74E-01
α_2	1.50E-02	1.77E-02	2.05E-02	1.73E-02	1.01E-02	7.86E-03	5.94E-03
α_3		5.13E-03	4.73E-03	1.07E-02	1.14E-02	1.04E-02	7.88E-03
α_4			3.08E-03	3.06E-03	4.54E-03	6.06E-03	6.14E-03
α_5				3.84E-04	1.35E-03	2.97E-03	3.29E-03
α_6					5.11E-04	9.46E-04	1.78E-03
α_7						8.78E-05	5.34E-04
α_8							4.63E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.77E-01	9.72E-01	9.69E-01	9.72E-01	9.72E-01	9.74E-01
Beta	1.50E-02	2.28E-02	2.83E-02	3.14E-02	2.79E-02	2.83E-02	2.56E-02
Gamma		2.24E-01	2.75E-01	4.49E-01	6.38E-01	7.22E-01	7.68E-01
Delta			3.94E-01	2.44E-01	3.60E-01	4.92E-01	5.99E-01
Epsilon				1.11E-01	2.91E-01	3.98E-01	4.80E-01
Mu					2.74E-01	2.58E-01	4.17E-01
Omega						8.49E-02	2.46E-01
Sigma							7.99E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.50	9.75	13.00	16.25	19.50	22.75	26.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 131.6

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.373

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9884182	0.9967055	0.9981868	0.9999599	1.928E+02	6.373E-01	--
α_2	4.01E-05	3.29E-03	1.81E-03	1.16E-02	6.373E-01	1.928E+02	0.471

CCCG = 3, Gamma = 0.372

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9854117	0.9942599	0.9953889	0.9992485	2.776E+02	1.602E+00	--
α_2	4.64E-04	5.00E-03	3.81E-03	1.36E-02	1.310E+00	2.606E+02	0.619
α_3	6.15E-08	7.36E-04	1.72E-04	3.40E-03	2.921E-01	3.966E+02	0.408

CCCG = 4, Gamma = 0.372

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9837251	0.9922572	0.9930996	0.9979105	3.784E+02	2.953E+00	--
α_2	1.40E-03	6.60E-03	5.69E-03	1.49E-02	2.312E+00	3.480E+02	0.706
α_3	1.27E-06	7.57E-04	2.98E-04	3.06E-03	4.307E-01	5.686E+02	0.434
α_4	7.67E-10	3.86E-04	4.54E-05	1.96E-03	2.099E-01	5.433E+02	0.455

CCCG = 5, Gamma = 0.372

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9858280	0.9926192	0.9932007	0.9974241	5.523E+02	4.107E+00	--
α_2	9.66E-04	4.49E-03	3.87E-03	1.01E-02	2.351E+00	5.216E+02	0.719
α_3	1.96E-04	2.23E-03	1.68E-03	6.12E-03	1.276E+00	5.718E+02	0.658
α_4	3.99E-07	5.32E-04	1.82E-04	2.24E-03	3.816E-01	7.174E+02	0.525
α_5	5.43E-17	1.36E-04	7.45E-07	7.91E-04	9.865E-02	7.242E+02	0.520

CCCG = 6, Gamma = 0.372

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9876742	0.9933133	0.9937636	0.9974143	7.163E+02	4.822E+00	--
α_2	6.14E-04	3.14E-03	2.68E-03	7.27E-03	2.158E+00	6.846E+02	0.697
α_3	2.76E-04	2.22E-03	1.77E-03	5.71E-03	1.552E+00	6.979E+02	0.684
α_4	2.17E-05	9.27E-04	5.67E-04	3.06E-03	7.620E-01	8.212E+02	0.582
α_5	5.30E-09	2.68E-04	4.82E-05	1.29E-03	2.536E-01	9.468E+02	0.505
α_6	2.09E-17	1.29E-04	5.87E-07	7.53E-04	9.572E-02	7.398E+02	0.646

CCCG = 7, Gamma = 0.372

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9880991	0.9931437	0.9935041	0.9969577	8.974E+02	6.195E+00	--
α_2	6.02E-04	2.73E-03	2.37E-03	6.12E-03	2.401E+00	8.756E+02	0.731
α_3	3.11E-04	2.06E-03	1.69E-03	5.09E-03	1.764E+00	8.530E+02	0.750
α_4	1.03E-04	1.29E-03	9.58E-04	3.60E-03	1.219E+00	9.452E+02	0.678
α_5	3.80E-06	5.42E-04	2.72E-04	1.99E-03	5.619E-01	1.037E+03	0.618
α_6	1.32E-10	1.78E-04	1.74E-05	9.24E-04	1.956E-01	1.097E+03	0.585
α_7	1.41E-28	4.93E-05	1.12E-09	2.68E-04	5.291E-02	1.072E+03	0.598

CCCG = 8, Gamma = 0.372

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9892454	0.9936661	0.9939686	0.9970542	1.072E+03	6.832E+00	--
α_2	5.10E-04	2.29E-03	1.99E-03	5.12E-03	2.427E+00	1.055E+03	0.705
α_3	2.27E-04	1.66E-03	1.34E-03	4.17E-03	1.655E+00	9.978E+02	0.746
α_4	1.19E-04	1.24E-03	9.47E-04	3.35E-03	1.338E+00	1.080E+03	0.690
α_5	2.43E-05	7.08E-04	4.60E-04	2.23E-03	8.614E-01	1.217E+03	0.613
α_6	8.26E-08	2.67E-04	7.85E-05	1.17E-03	3.394E-01	1.271E+03	0.587
α_7	9.67E-14	9.99E-05	2.68E-06	5.61E-04	1.344E-01	1.345E+03	0.555
α_8	6.48E-21	7.20E-05	6.75E-08	4.18E-04	7.682E-02	1.067E+03	0.699

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.94E-01	9.92E-01	9.93E-01	9.93E-01	9.93E-01	9.94E-01
α_2	3.29E-03	5.00E-03	6.60E-03	4.49E-03	3.14E-03	2.73E-03	2.29E-03
α_3		7.36E-04	7.57E-04	2.23E-03	2.22E-03	2.06E-03	1.66E-03
α_4			3.86E-04	5.32E-04	9.27E-04	1.29E-03	1.24E-03
α_5				1.36E-04	2.68E-04	5.42E-04	7.08E-04
α_6					1.29E-04	1.78E-04	2.67E-04
α_7						4.93E-05	9.99E-05
α_8							7.20E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.94E-01	9.92E-01	9.93E-01	9.93E-01	9.93E-01	9.94E-01
Beta	3.29E-03	5.74E-03	7.74E-03	7.38E-03	6.69E-03	6.86E-03	6.33E-03
Gamma		1.28E-01	1.48E-01	3.92E-01	5.30E-01	6.01E-01	6.38E-01
Delta			3.38E-01	2.31E-01	3.74E-01	4.99E-01	5.90E-01
Epsilon				2.04E-01	3.00E-01	3.74E-01	4.81E-01
Mu					3.26E-01	2.96E-01	3.83E-01
Omega						2.17E-01	3.92E-01
Sigma							4.19E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	65.80	98.70	131.60	164.50	197.40	230.30	263.20
N_1	0.6667	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.1667	0.5000	1.0000	0.6667	0.4444	0.2963	0.1975
N_3		0.0000	0.0000	0.3333	0.4444	0.4444	0.3951

N₄			0.0000	0.0000	0.1111	0.2222	0.2963
N₅				0.0000	0.0000	0.0370	0.0988
N₆					0.0000	0.0000	0.0123
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 38.3

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.107

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9930008	0.9981855	0.9991826	0.9999933	2.713E+02	4.932E-01	--
α_2	6.65E-06	1.81E-03	8.17E-04	7.00E-03	4.932E-01	2.713E+02	0.471

CCCG = 3, Gamma = 0.107

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9938226	0.9978933	0.9985050	0.9998755	5.019E+02	1.060E+00	--
α_2	2.98E-05	1.60E-03	9.41E-04	5.39E-03	7.137E-01	4.464E+02	0.619
α_3	1.83E-07	5.10E-04	1.54E-04	2.23E-03	3.458E-01	6.772E+02	0.408

CCCG = 4, Gamma = 0.107

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940156	0.9974296	0.9978197	0.9995102	8.205E+02	2.115E+00	--
α_2	2.59E-04	2.09E-03	1.66E-03	5.38E-03	1.549E+00	7.399E+02	0.706
α_3	6.85E-09	2.20E-04	4.29E-05	1.05E-03	2.646E-01	1.204E+03	0.434
α_4	2.89E-08	2.62E-04	6.42E-05	1.20E-03	3.010E-01	1.150E+03	0.455

CCCG = 5, Gamma = 0.108

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9954324	0.9974643	0.9976204	0.9989631	2.094E+03	5.325E+00	--
α_2	5.74E-04	1.80E-03	1.64E-03	3.58E-03	3.632E+00	2.014E+03	0.719
α_3	6.02E-05	6.13E-04	4.71E-04	1.65E-03	1.354E+00	2.206E+03	0.658
α_4	1.02E-08	1.07E-04	2.56E-05	4.92E-04	2.961E-01	2.764E+03	0.525
α_5	4.53E-35	1.52E-05	1.67E-11	7.54E-05	4.243E-02	2.789E+03	0.520

CCCG = 6, Gamma = 0.108

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9953826	0.9974839	0.9976508	0.9990151	1.957E+03	4.936E+00	--
α_2	4.07E-04	1.53E-03	1.36E-03	3.24E-03	2.915E+00	1.900E+03	0.697
α_3	5.53E-05	6.49E-04	4.87E-04	1.79E-03	1.257E+00	1.937E+03	0.684
α_4	8.98E-07	2.21E-04	1.01E-04	8.47E-04	5.031E-01	2.277E+03	0.582
α_5	1.27E-15	4.40E-05	5.80E-07	2.52E-04	1.155E-01	2.624E+03	0.505
α_6	3.31E-13	7.08E-05	2.59E-06	3.92E-04	1.451E-01	2.050E+03	0.646

CCCG = 7, Gamma = 0.108

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9960681	0.9975122	0.9975971	0.9986665	3.871E+03	9.654E+00	--
α_2	4.90E-04	1.27E-03	1.18E-03	2.33E-03	4.851E+00	3.826E+03	0.731
α_3	1.92E-04	7.51E-04	6.64E-04	1.61E-03	2.800E+00	3.726E+03	0.750
α_4	3.42E-05	3.35E-04	2.59E-04	8.97E-04	1.384E+00	4.128E+03	0.678
α_5	3.83E-07	1.08E-04	4.84E-05	4.19E-04	4.902E-01	4.526E+03	0.618
α_6	5.70E-16	2.40E-05	3.03E-07	1.37E-04	1.146E-01	4.785E+03	0.585
α_7	1.65E-93	3.13E-06	3.33E-25	3.72E-06	1.464E-02	4.679E+03	0.598

CCCG = 8, Gamma = 0.108

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9960576	0.9976574	0.9977652	0.9988891	3.044E+03	7.148E+00	--
α_2	2.66E-04	9.80E-04	8.73E-04	2.06E-03	2.980E+00	3.039E+03	0.705
α_3	1.18E-04	6.82E-04	5.70E-04	1.63E-03	1.960E+00	2.872E+03	0.746
α_4	2.74E-05	3.75E-04	2.75E-04	1.06E-03	1.166E+00	3.108E+03	0.690
α_5	8.72E-07	1.54E-04	7.43E-05	5.75E-04	5.375E-01	3.500E+03	0.613
α_6	1.09E-11	4.94E-05	3.83E-06	2.61E-04	1.805E-01	3.657E+03	0.587
α_7	5.53E-36	1.07E-05	8.01E-12	5.23E-05	4.139E-02	3.868E+03	0.555
α_8	5.62E-09	9.22E-05	2.03E-05	4.30E-04	2.827E-01	3.067E+03	0.699

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.98E-01	9.98E-01
α_2	1.81E-03	1.60E-03	2.09E-03	1.80E-03	1.53E-03	1.27E-03	9.80E-04
α_3		5.10E-04	2.20E-04	6.13E-04	6.49E-04	7.51E-04	6.82E-04
α_4			2.62E-04	1.07E-04	2.21E-04	3.35E-04	3.75E-04
α_5				1.52E-05	4.40E-05	1.08E-04	1.54E-04
α_6					7.08E-05	2.40E-05	4.94E-05
α_7						3.13E-06	1.07E-05
α_8							9.22E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.98E-01	9.98E-01
Beta	1.81E-03	2.11E-03	2.57E-03	2.54E-03	2.52E-03	2.49E-03	2.34E-03
Gamma		2.42E-01	1.87E-01	2.90E-01	3.91E-01	4.91E-01	5.82E-01
Delta			5.44E-01	1.66E-01	3.41E-01	3.85E-01	5.00E-01
Epsilon				1.24E-01	3.42E-01	2.88E-01	4.49E-01
Mu					6.17E-01	2.00E-01	4.98E-01
Omega						1.16E-01	6.76E-01
Sigma							8.96E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	19.15	28.72	38.30	47.87	57.45	67.02	76.60
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.1.2 ALL-MOV-CC: All Systems Motor-Operated Valves Fail to Open

Generic CCF Parameters

Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 210.2

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9921066	0.9979898	0.9991347	0.9999888	1.0000000	2.326E+02	4.685E-01
α_2	5.56E-06	2.01E-03	8.64E-04	7.90E-03	0.00E+00	4.685E-01	2.326E+02

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9879945	0.9958113	0.9969593	0.9997119	1.0000000	2.682E+02	1.128E+00
α_2	1.05E-04	3.16E-03	2.05E-03	1.00E-02	0.00E+00	8.512E-01	2.685E+02
α_3	5.10E-08	1.03E-03	2.19E-04	4.82E-03	0.00E+00	2.768E-01	2.690E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9849450	0.9937457	0.9947924	0.9989633	1.0000000	3.009E+02	1.894E+00
α_2	3.57E-04	4.16E-03	3.13E-03	1.15E-02	0.00E+00	1.260E+00	3.015E+02
α_3	1.44E-06	1.33E-03	4.86E-04	5.51E-03	0.00E+00	4.024E-01	3.024E+02
α_4	5.29E-09	7.65E-04	1.14E-04	3.79E-03	0.00E+00	2.315E-01	3.025E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9829112	0.9915144	0.9923084	0.9973995	1.0000000	4.010E+02	3.432E+00
α_2	8.07E-04	4.76E-03	3.97E-03	1.14E-02	0.00E+00	1.924E+00	4.025E+02
α_3	1.50E-04	2.59E-03	1.83E-03	7.63E-03	0.00E+00	1.049E+00	4.034E+02
α_4	7.17E-07	9.45E-04	3.25E-04	3.99E-03	0.00E+00	3.822E-01	4.041E+02
α_5	1.65E-20	1.90E-04	1.77E-07	1.10E-03	0.00E+00	7.674E-02	4.044E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9829408	0.9912695	0.9920015	0.9970921	1.0000000	4.354E+02	3.835E+00
α_2	5.54E-04	3.87E-03	3.15E-03	9.66E-03	0.00E+00	1.701E+00	4.376E+02
α_3	2.16E-04	2.75E-03	2.04E-03	7.70E-03	0.00E+00	1.207E+00	4.380E+02
α_4	1.24E-05	1.36E-03	7.11E-04	4.89E-03	0.00E+00	5.960E-01	4.387E+02
α_5	1.97E-09	5.03E-04	6.72E-05	2.52E-03	0.00E+00	2.211E-01	4.390E+02
α_6	1.96E-15	2.50E-04	2.53E-06	1.44E-03	0.00E+00	1.098E-01	4.391E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9827456	0.9902214	0.9907747	0.9958226	1.0000000	5.820E+02	5.747E+00
α_2	7.80E-04	3.82E-03	3.27E-03	8.72E-03	0.00E+00	2.243E+00	5.855E+02
α_3	3.72E-04	2.77E-03	2.23E-03	7.02E-03	0.00E+00	1.630E+00	5.861E+02
α_4	1.15E-04	1.84E-03	1.32E-03	5.36E-03	0.00E+00	1.083E+00	5.867E+02
α_5	6.95E-06	9.62E-04	4.85E-04	3.53E-03	0.00E+00	5.654E-01	5.872E+02
α_6	1.79E-10	3.26E-04	3.01E-05	1.70E-03	0.00E+00	1.916E-01	5.876E+02
α_7	4.05E-41	5.92E-05	2.20E-12	2.60E-04	0.00E+00	3.480E-02	5.877E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9833060	0.9905510	0.9910834	0.9959723	1.0000000	6.002E+02	5.726E+00
α_2	6.00E-04	3.33E-03	2.80E-03	7.87E-03	0.00E+00	2.018E+00	6.039E+02
α_3	2.37E-04	2.29E-03	1.78E-03	6.13E-03	0.00E+00	1.391E+00	6.046E+02
α_4	1.04E-04	1.75E-03	1.24E-03	5.14E-03	0.00E+00	1.062E+00	6.049E+02
α_5	2.04E-05	1.16E-03	6.77E-04	3.94E-03	0.00E+00	7.026E-01	6.052E+02
α_6	2.26E-07	5.77E-04	1.77E-04	2.51E-03	0.00E+00	3.497E-01	6.056E+02
α_7	8.70E-16	1.78E-04	1.63E-06	1.03E-03	0.00E+00	1.078E-01	6.058E+02
α_8	1.82E-17	1.56E-04	6.62E-07	9.10E-04	0.00E+00	9.469E-02	6.059E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.96E-01	9.94E-01	9.92E-01	9.91E-01	9.90E-01	9.91E-01
α_2	2.01E-03	3.16E-03	4.16E-03	4.76E-03	3.87E-03	3.82E-03	3.33E-03
α_3		1.03E-03	1.33E-03	2.59E-03	2.75E-03	2.77E-03	2.29E-03
α_4			7.65E-04	9.45E-04	1.36E-03	1.84E-03	1.75E-03
α_5				1.90E-04	5.03E-04	9.62E-04	1.16E-03
α_6					2.50E-04	3.26E-04	5.77E-04
α_7						5.92E-05	1.78E-04
α_8							1.56E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.96E-01	9.94E-01	9.92E-01	9.91E-01	9.90E-01	9.91E-01
Beta	2.01E-03	4.19E-03	6.25E-03	8.49E-03	8.73E-03	9.78E-03	9.45E-03
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8

Adj. Ind	210.20	210.20	210.20	210.20	210.20	210.20	210.20
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 77.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.369

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9948043	0.9986629	0.9994090	0.9999956	3.610E+02	4.834E-01	--
α_2	4.39E-06	1.34E-03	5.91E-04	5.20E-03	4.834E-01	3.610E+02	0.337

CCCG = 3, Gamma = 0.369

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9927358	0.9973931	0.9980553	0.9997883	4.689E+02	1.226E+00	--
α_2	1.01E-04	2.08E-03	1.43E-03	6.27E-03	9.769E-01	4.691E+02	0.443
α_3	8.42E-09	5.29E-04	9.15E-05	2.56E-03	2.487E-01	4.703E+02	0.443

CCCG = 4, Gamma = 0.369

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9904346	0.9959241	0.9965577	0.9992481	5.026E+02	2.057E+00	--
α_2	3.11E-04	2.83E-03	2.21E-03	7.45E-03	1.442E+00	5.089E+02	0.512
α_3	1.03E-06	8.21E-04	3.08E-04	3.38E-03	4.114E-01	5.009E+02	0.522
α_4	5.63E-10	4.29E-04	4.67E-05	2.20E-03	2.036E-01	4.740E+02	0.551

CCCG = 5, Gamma = 0.369

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9886516	0.9942619	0.9947667	0.9981481	6.382E+02	3.683E+00	--
α_2	7.09E-04	3.47E-03	2.98E-03	7.94E-03	2.243E+00	6.435E+02	0.669
α_3	7.88E-05	1.57E-03	1.08E-03	4.71E-03	9.912E-01	6.313E+02	0.683
α_4	3.99E-07	5.86E-04	1.98E-04	2.49E-03	3.765E-01	6.418E+02	0.672
α_5	9.55E-22	1.10E-04	6.28E-08	6.37E-04	7.237E-02	6.563E+02	0.658

CCCG = 6, Gamma = 0.369

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9884677	0.9939845	0.9944561	0.9978907	6.839E+02	4.139E+00	--
α_2	5.78E-04	3.01E-03	2.56E-03	6.99E-03	2.128E+00	7.051E+02	0.681
α_3	1.17E-04	1.70E-03	1.23E-03	4.86E-03	1.134E+00	6.678E+02	0.720
α_4	5.26E-06	8.05E-04	3.99E-04	2.98E-03	5.533E-01	6.867E+02	0.701
α_5	1.23E-09	3.16E-04	4.22E-05	1.59E-03	2.210E-01	6.983E+02	0.690
α_6	2.42E-16	1.90E-04	1.32E-06	1.10E-03	1.027E-01	5.407E+02	0.891

CCCG = 7, Gamma = 0.369

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9884023	0.9932609	0.9936023	0.9969540	9.480E+02	6.432E+00	--
α_2	7.50E-04	2.89E-03	2.56E-03	6.15E-03	2.840E+00	9.814E+02	0.777
α_3	2.81E-04	1.89E-03	1.55E-03	4.68E-03	1.746E+00	9.212E+02	0.829
α_4	7.18E-05	1.15E-03	8.25E-04	3.36E-03	1.084E+00	9.388E+02	0.814
α_5	3.26E-06	5.73E-04	2.77E-04	2.14E-03	5.376E-01	9.376E+02	0.815
α_6	1.82E-10	2.08E-04	2.09E-05	1.07E-03	1.979E-01	9.535E+02	0.802
α_7	6.21E-53	2.77E-05	2.78E-15	9.48E-05	2.656E-02	9.573E+02	0.799

CCCG = 8, Gamma = 0.369

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9887906	0.9935629	0.9939060	0.9971634	9.434E+02	6.112E+00	--
α_2	5.16E-04	2.39E-03	2.06E-03	5.37E-03	2.364E+00	9.883E+02	0.772
α_3	1.94E-04	1.63E-03	1.29E-03	4.23E-03	1.512E+00	9.255E+02	0.825
α_4	6.67E-05	1.14E-03	8.07E-04	3.35E-03	1.056E+00	9.261E+02	0.825
α_5	1.08E-05	7.11E-04	4.05E-04	2.45E-03	6.745E-01	9.476E+02	0.806
α_6	4.50E-08	3.35E-04	8.52E-05	1.52E-03	3.076E-01	9.170E+02	0.834
α_7	7.99E-16	1.14E-04	1.13E-06	6.58E-04	1.093E-01	9.571E+02	0.799
α_8	1.85E-18	1.20E-04	3.33E-07	6.99E-04	8.885E-02	7.411E+02	1.032

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.99E-01	9.97E-01	9.96E-01	9.94E-01	9.94E-01	9.93E-01	9.94E-01
α_2	1.34E-03	2.08E-03	2.83E-03	3.47E-03	3.01E-03	2.89E-03	2.39E-03
α_3		5.29E-04	8.21E-04	1.57E-03	1.70E-03	1.89E-03	1.63E-03
α_4			4.29E-04	5.86E-04	8.05E-04	1.15E-03	1.14E-03
α_5				1.10E-04	3.16E-04	5.73E-04	7.11E-04
α_6					1.90E-04	2.08E-04	3.35E-04
α_7						2.77E-05	1.14E-04
α_8							1.20E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.99E-01	9.97E-01	9.96E-01	9.94E-01	9.94E-01	9.93E-01	9.94E-01
Beta	1.34E-03	2.61E-03	4.08E-03	5.74E-03	6.02E-03	6.74E-03	6.44E-03
Gamma		2.03E-01	3.07E-01	3.95E-01	5.00E-01	5.72E-01	6.29E-01
Delta			3.43E-01	3.08E-01	4.36E-01	5.09E-01	5.97E-01
Epsilon				1.58E-01	3.86E-01	4.12E-01	5.29E-01
Mu					3.75E-01	2.91E-01	4.45E-01
Omega						1.18E-01	4.11E-01
Sigma							5.12E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	77.50	77.50	77.50	77.50	77.50	77.50	77.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 24.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.114

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9841627	0.9960228	0.9983536	0.9999913	1.126E+02	4.498E-01	--
α_2	8.71E-06	3.98E-03	1.65E-03	1.58E-02	4.498E-01	1.126E+02	0.337

CCCG = 3, Gamma = 0.114

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9753786	0.9912572	0.9935377	0.9993416	1.336E+02	1.178E+00	--
α_2	3.06E-04	6.97E-03	4.73E-03	2.13E-02	9.387E-01	1.338E+02	0.443
α_3	1.85E-08	1.78E-03	2.85E-04	8.71E-03	2.396E-01	1.347E+02	0.443

CCCG = 4, Gamma = 0.114

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9690044	0.9870729	0.9892098	0.9978333	1.450E+02	1.898E+00	--
α_2	7.75E-04	8.64E-03	6.56E-03	2.36E-02	1.285E+00	1.474E+02	0.512
α_3	2.47E-06	2.69E-03	9.58E-04	1.12E-02	3.927E-01	1.457E+02	0.522
α_4	6.13E-09	1.60E-03	2.13E-04	8.02E-03	2.207E-01	1.380E+02	0.551

CCCG = 5, Gamma = 0.114

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9646126	0.9822686	0.9838689	0.9944550	1.942E+02	3.506E+00	--
α_2	1.78E-03	1.00E-02	8.42E-03	2.37E-02	1.992E+00	1.971E+02	0.669
α_3	3.41E-04	5.53E-03	3.96E-03	1.61E-02	1.078E+00	1.938E+02	0.683
α_4	9.62E-07	1.83E-03	5.93E-04	7.88E-03	3.632E-01	1.976E+02	0.672
α_5	3.31E-21	3.58E-04	2.07E-07	2.07E-03	7.248E-02	2.023E+02	0.658

CCCG = 6, Gamma = 0.114

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9650733	0.9816355	0.9830216	0.9934617	2.245E+02	4.199E+00	--
α_2	1.42E-03	8.25E-03	6.90E-03	1.97E-02	1.941E+00	2.333E+02	0.681
α_3	5.73E-04	5.99E-03	4.59E-03	1.62E-02	1.332E+00	2.212E+02	0.720
α_4	2.90E-05	2.70E-03	1.46E-03	9.61E-03	6.181E-01	2.280E+02	0.701
α_5	6.82E-09	9.96E-04	1.48E-04	4.93E-03	2.313E-01	2.321E+02	0.690
α_6	3.89E-20	4.27E-04	4.02E-07	2.48E-03	7.684E-02	1.798E+02	0.891

CCCG = 7, Gamma = 0.114

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9639268	0.9791110	0.9801744	0.9906633	2.917E+02	6.223E+00	--
α_2	2.11E-03	8.63E-03	7.59E-03	1.87E-02	2.654E+00	3.047E+02	0.777
α_3	7.78E-04	5.71E-03	4.61E-03	1.44E-02	1.645E+00	2.866E+02	0.829
α_4	2.53E-04	3.80E-03	2.75E-03	1.09E-02	1.115E+00	2.924E+02	0.814
α_5	1.99E-05	2.06E-03	1.09E-03	7.39E-03	6.034E-01	2.924E+02	0.815
α_6	1.06E-10	5.98E-04	4.45E-05	3.17E-03	1.780E-01	2.977E+02	0.802
α_7	4.98E-51	9.14E-05	1.88E-14	3.23E-04	2.734E-02	2.990E+02	0.799

CCCG = 8, Gamma = 0.114

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9648098	0.9796081	0.9806435	0.9908705	3.000E+02	6.246E+00	--
α_2	1.81E-03	7.84E-03	6.84E-03	1.73E-02	2.504E+00	3.167E+02	0.772
α_3	5.09E-04	4.75E-03	3.70E-03	1.26E-02	1.419E+00	2.973E+02	0.825
α_4	1.89E-04	3.44E-03	2.41E-03	1.02E-02	1.027E+00	2.978E+02	0.825
α_5	4.95E-05	2.40E-03	1.44E-03	8.03E-03	7.337E-01	3.049E+02	0.806
α_6	1.34E-06	1.34E-03	4.85E-04	5.60E-03	3.975E-01	2.952E+02	0.834
α_7	2.50E-20	2.50E-04	2.40E-07	1.45E-03	7.703E-02	3.084E+02	0.799
α_8	3.40E-18	3.66E-04	9.15E-07	2.14E-03	8.749E-02	2.388E+02	1.032

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.91E-01	9.87E-01	9.82E-01	9.82E-01	9.79E-01	9.80E-01
α_2	3.98E-03	6.97E-03	8.64E-03	1.00E-02	8.25E-03	8.63E-03	7.84E-03
α_3		1.78E-03	2.69E-03	5.53E-03	5.99E-03	5.71E-03	4.75E-03
α_4			1.60E-03	1.83E-03	2.70E-03	3.80E-03	3.44E-03
α_5				3.58E-04	9.96E-04	2.06E-03	2.40E-03
α_6					4.27E-04	5.98E-04	1.34E-03
α_7						9.14E-05	2.50E-04
α_8							3.66E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.91E-01	9.87E-01	9.82E-01	9.82E-01	9.79E-01	9.80E-01
Beta	3.98E-03	8.74E-03	1.29E-02	1.77E-02	1.84E-02	2.09E-02	2.04E-02
Gamma		2.03E-01	3.32E-01	4.36E-01	5.51E-01	5.87E-01	6.15E-01
Delta			3.73E-01	2.84E-01	4.08E-01	5.34E-01	6.21E-01
Epsilon				1.63E-01	3.45E-01	4.20E-01	5.59E-01
Mu					3.00E-01	2.51E-01	4.50E-01
Omega						1.33E-01	3.14E-01
Sigma							5.95E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	24.00	24.00	24.00	24.00	24.00	24.00	24.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 8.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.038

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9597770	0.9904587	0.9966919	0.9999929	3.946E+01	3.801E-01	--
α_2	7.07E-06	9.54E-03	3.31E-03	4.02E-02	3.801E-01	3.946E+01	0.337

CCCG = 3, Gamma = 0.038

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9406136	0.9802624	0.9863610	0.9990693	4.768E+01	9.600E-01	--
α_2	2.03E-04	1.37E-02	7.86E-03	4.72E-02	6.673E-01	4.795E+01	0.443
α_3	5.19E-07	6.01E-03	1.43E-03	2.77E-02	2.927E-01	4.838E+01	0.443

CCCG = 4, Gamma = 0.038

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9298285	0.9717197	0.9768653	0.9959950	5.735E+01	1.669E+00	--
α_2	9.93E-04	1.73E-02	1.23E-02	5.08E-02	1.039E+00	5.888E+01	0.512
α_3	5.70E-06	6.60E-03	2.34E-03	2.77E-02	3.887E-01	5.847E+01	0.522
α_4	4.97E-08	4.34E-03	7.12E-04	2.12E-02	2.414E-01	5.544E+01	0.551

CCCG = 5, Gamma = 0.038

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9294330	0.9644583	0.9675729	0.9888328	9.462E+01	3.487E+00	--
α_2	2.82E-03	1.81E-02	1.50E-02	4.41E-02	1.791E+00	9.708E+01	0.669
α_3	9.90E-04	1.25E-02	9.31E-03	3.48E-02	1.207E+00	9.561E+01	0.683
α_4	7.79E-06	4.41E-03	1.76E-03	1.78E-02	4.340E-01	9.789E+01	0.672
α_5	1.21E-26	5.47E-04	1.94E-08	3.01E-03	5.493E-02	1.005E+02	0.658

CCCG = 6, Gamma = 0.038

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9341639	0.9658442	0.9685289	0.9883459	1.104E+02	3.905E+00	--
α_2	1.09E-03	1.13E-02	8.68E-03	3.04E-02	1.335E+00	1.169E+02	0.681
α_3	1.68E-03	1.37E-02	1.09E-02	3.52E-02	1.531E+00	1.103E+02	0.720
α_4	1.21E-04	6.26E-03	3.72E-03	2.10E-02	7.191E-01	1.142E+02	0.701
α_5	3.09E-08	2.11E-03	3.61E-04	1.03E-02	2.467E-01	1.165E+02	0.690
α_6	8.85E-21	8.05E-04	4.84E-07	4.67E-03	7.279E-02	9.034E+01	0.891

CCCG = 7, Gamma = 0.038

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9367927	0.9638641	0.9657864	0.9843676	1.539E+02	5.770E+00	--
α_2	1.16E-03	9.32E-03	7.44E-03	2.39E-02	1.549E+00	1.646E+02	0.777
α_3	2.27E-03	1.28E-02	1.07E-02	3.02E-02	1.989E+00	1.538E+02	0.829
α_4	7.29E-04	8.11E-03	6.16E-03	2.22E-02	1.287E+00	1.574E+02	0.814
α_5	7.28E-05	4.36E-03	2.53E-03	1.49E-02	6.913E-01	1.577E+02	0.815
α_6	1.07E-08	1.45E-03	2.18E-04	7.15E-03	2.327E-01	1.608E+02	0.802
α_7	8.87E-65	1.31E-04	1.98E-17	3.29E-04	2.112E-02	1.616E+02	0.799

CCCG = 8, Gamma = 0.038

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9439529	0.9665445	0.9680183	0.9841020	2.027E+02	7.016E+00	--
α_2	9.24E-04	7.19E-03	5.76E-03	1.83E-02	1.583E+00	2.187E+02	0.772
α_3	1.71E-03	9.64E-03	8.10E-03	2.28E-02	1.986E+00	2.041E+02	0.825
α_4	1.13E-03	8.11E-03	6.59E-03	2.03E-02	1.672E+00	2.045E+02	0.825
α_5	2.54E-04	4.80E-03	3.35E-03	1.43E-02	1.011E+00	2.098E+02	0.806
α_6	2.12E-05	2.80E-03	1.42E-03	1.02E-02	5.709E-01	2.034E+02	0.834
α_7	1.95E-10	8.50E-04	6.66E-05	4.49E-03	1.809E-01	2.126E+02	0.799
α_8	1.09E-107	7.56E-05	2.29E-27	5.66E-05	1.245E-02	1.648E+02	1.032

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.80E-01	9.72E-01	9.64E-01	9.66E-01	9.64E-01	9.67E-01
α_2	9.54E-03	1.37E-02	1.73E-02	1.81E-02	1.13E-02	9.32E-03	7.19E-03
α_3		6.01E-03	6.60E-03	1.25E-02	1.37E-02	1.28E-02	9.64E-03
α_4			4.34E-03	4.41E-03	6.26E-03	8.11E-03	8.11E-03
α_5				5.47E-04	2.11E-03	4.36E-03	4.80E-03
α_6					8.05E-04	1.45E-03	2.80E-03
α_7						1.31E-04	8.50E-04
α_8							7.56E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.80E-01	9.72E-01	9.64E-01	9.66E-01	9.64E-01	9.67E-01
Beta	9.54E-03	1.97E-02	2.83E-02	3.55E-02	3.42E-02	3.61E-02	3.35E-02
Gamma		3.05E-01	3.87E-01	4.90E-01	6.69E-01	7.42E-01	7.85E-01
Delta			3.96E-01	2.85E-01	4.01E-01	5.24E-01	6.33E-01
Epsilon				1.10E-01	3.18E-01	4.23E-01	5.12E-01
Mu					2.76E-01	2.65E-01	4.37E-01
Omega						8.29E-02	2.48E-01
Sigma							8.16E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.00	8.00	8.00	8.00	8.00	8.00	8.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 81.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941071	0.9984977	0.9993523	0.9999957	3.128E+02	4.706E-01	--
α_2	4.25E-06	1.50E-03	6.48E-04	5.89E-03	4.706E-01	3.128E+02	0.337

CCCG = 3, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9901486	0.9965909	0.9975439	0.9997789	3.223E+02	1.102E+00	--
α_2	7.17E-05	2.51E-03	1.58E-03	8.08E-03	8.104E-01	3.225E+02	0.443
α_3	7.55E-08	9.02E-04	2.11E-04	4.16E-03	2.921E-01	3.234E+02	0.443

CCCG = 4, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9876523	0.9948219	0.9956664	0.9991045	3.751E+02	1.953E+00	--
α_2	3.19E-04	3.44E-03	2.62E-03	9.35E-03	1.312E+00	3.804E+02	0.512
α_3	1.92E-06	1.15E-03	4.53E-04	4.65E-03	4.307E-01	3.745E+02	0.522
α_4	1.18E-09	5.92E-04	6.97E-05	3.01E-03	2.099E-01	3.545E+02	0.551

CCCG = 5, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9851752	0.9928455	0.9935869	0.9979823	4.311E+02	3.107E+00	--
α_2	5.43E-04	3.85E-03	3.13E-03	9.64E-03	1.684E+00	4.354E+02	0.669
α_3	9.72E-05	2.20E-03	1.49E-03	6.73E-03	9.426E-01	4.271E+02	0.683
α_4	6.58E-07	8.78E-04	3.01E-04	3.71E-03	3.816E-01	4.343E+02	0.672
α_5	8.86E-17	2.22E-04	1.21E-06	1.29E-03	9.865E-02	4.443E+02	0.658

CCCG = 6, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9854529	0.9925664	0.9931948	0.9975329	5.104E+02	3.822E+00	--
α_2	4.68E-04	3.24E-03	2.64E-03	8.05E-03	1.714E+00	5.279E+02	0.681
α_3	1.45E-04	2.21E-03	1.60E-03	6.38E-03	1.108E+00	4.998E+02	0.720
α_4	1.67E-05	1.26E-03	7.04E-04	4.42E-03	6.509E-01	5.140E+02	0.701
α_5	9.59E-09	4.85E-04	8.73E-05	2.34E-03	2.536E-01	5.229E+02	0.690
α_6	3.83E-17	2.36E-04	1.07E-06	1.38E-03	9.572E-02	4.049E+02	0.891

CCCG = 7, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9846485	0.9915126	0.9920419	0.9965693	6.069E+02	5.195E+00	--
α_2	6.32E-04	3.33E-03	2.82E-03	7.76E-03	2.105E+00	6.298E+02	0.777
α_3	2.09E-04	2.23E-03	1.70E-03	6.05E-03	1.320E+00	5.912E+02	0.829
α_4	8.42E-05	1.65E-03	1.14E-03	4.95E-03	9.967E-01	6.025E+02	0.814
α_5	4.40E-06	8.71E-04	4.14E-04	3.29E-03	5.249E-01	6.018E+02	0.815
α_6	2.37E-10	3.19E-04	3.12E-05	1.66E-03	1.956E-01	6.121E+02	0.802
α_7	2.45E-28	8.61E-05	1.95E-09	4.67E-04	5.291E-02	6.146E+02	0.799

CCCG = 8, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9853235	0.9916588	0.9921229	0.9964094	6.933E+02	5.832E+00	--
α_2	6.20E-04	3.06E-03	2.62E-03	7.00E-03	2.229E+00	7.267E+02	0.772
α_3	1.58E-04	1.85E-03	1.39E-03	5.10E-03	1.260E+00	6.809E+02	0.825
α_4	8.67E-05	1.53E-03	1.08E-03	4.51E-03	1.042E+00	6.812E+02	0.825
α_5	2.56E-05	1.09E-03	6.68E-04	3.60E-03	7.626E-01	6.970E+02	0.806
α_6	1.11E-07	4.85E-04	1.35E-04	2.15E-03	3.271E-01	6.747E+02	0.834
α_7	1.85E-13	1.91E-04	5.11E-06	1.07E-03	1.344E-01	7.043E+02	0.799
α_8	1.27E-20	1.41E-04	1.32E-07	8.18E-04	7.682E-02	5.453E+02	1.032

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.97E-01	9.95E-01	9.93E-01	9.93E-01	9.92E-01	9.92E-01
α_2	1.50E-03	2.51E-03	3.44E-03	3.85E-03	3.24E-03	3.33E-03	3.06E-03
α_3		9.02E-04	1.15E-03	2.20E-03	2.21E-03	2.23E-03	1.85E-03
α_4			5.92E-04	8.78E-04	1.26E-03	1.65E-03	1.53E-03
α_5				2.22E-04	4.85E-04	8.71E-04	1.09E-03
α_6					2.36E-04	3.19E-04	4.85E-04
α_7						8.61E-05	1.91E-04
α_8							1.41E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.97E-01	9.95E-01	9.93E-01	9.93E-01	9.92E-01	9.92E-01
Beta	1.50E-03	3.41E-03	5.18E-03	7.15E-03	7.43E-03	8.49E-03	8.34E-03
Gamma		2.65E-01	3.36E-01	4.62E-01	5.65E-01	6.08E-01	6.33E-01
Delta			3.40E-01	3.33E-01	4.73E-01	5.68E-01	6.50E-01
Epsilon				2.02E-01	3.63E-01	4.36E-01	5.56E-01
Mu					3.28E-01	3.18E-01	4.28E-01
Omega						2.12E-01	4.06E-01
Sigma							4.25E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	81.00	81.00	81.00	81.00	81.00	81.00	81.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 19.7

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9950176	0.9987086	0.9994187	0.9999953	3.814E+02	4.932E-01	--
α_2	4.73E-06	1.29E-03	5.81E-04	4.98E-03	4.932E-01	3.814E+02	0.337

CCCG = 3, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9948542	0.9982454	0.9987552	0.9998963	6.028E+02	1.060E+00	--
α_2	2.21E-05	1.18E-03	6.97E-04	3.99E-03	7.137E-01	6.029E+02	0.443
α_3	2.05E-07	5.72E-04	1.73E-04	2.50E-03	3.458E-01	6.040E+02	0.443

CCCG = 4, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9949340	0.9978244	0.9981548	0.9995855	9.698E+02	2.115E+00	--
α_2	1.95E-04	1.57E-03	1.25E-03	4.05E-03	1.549E+00	9.831E+02	0.512
α_3	8.54E-09	2.74E-04	5.35E-05	1.30E-03	2.646E-01	9.670E+02	0.522
α_4	3.63E-08	3.29E-04	8.07E-05	1.50E-03	3.010E-01	9.147E+02	0.551

CCCG = 5, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9954678	0.9974839	0.9976388	0.9989712	2.111E+03	5.325E+00	--
α_2	5.44E-04	1.71E-03	1.55E-03	3.39E-03	3.632E+00	2.124E+03	0.669
α_3	6.38E-05	6.50E-04	4.99E-04	1.75E-03	1.354E+00	2.082E+03	0.683
α_4	1.33E-08	1.40E-04	3.34E-05	6.43E-04	2.961E-01	2.116E+03	0.672
α_5	5.84E-35	1.96E-05	2.16E-11	9.72E-05	4.243E-02	2.163E+03	0.658

CCCG = 6, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9950780	0.9973177	0.9974956	0.9989500	1.835E+03	4.936E+00	--
α_2	4.10E-04	1.54E-03	1.37E-03	3.26E-03	2.915E+00	1.887E+03	0.681
α_3	6.00E-05	7.03E-04	5.28E-04	1.94E-03	1.257E+00	1.786E+03	0.720
α_4	1.11E-06	2.74E-04	1.25E-04	1.05E-03	5.031E-01	1.836E+03	0.701
α_5	1.79E-15	6.19E-05	8.16E-07	3.55E-04	1.155E-01	1.866E+03	0.690
α_6	4.70E-13	1.00E-04	3.68E-06	5.56E-04	1.451E-01	1.445E+03	0.891

CCCG = 7, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9955647	0.9971935	0.9972893	0.9984955	3.430E+03	9.654E+00	--
α_2	5.31E-04	1.37E-03	1.28E-03	2.53E-03	4.851E+00	3.535E+03	0.777
α_3	2.16E-04	8.44E-04	7.46E-04	1.81E-03	2.800E+00	3.316E+03	0.829
α_4	4.18E-05	4.09E-04	3.16E-04	1.10E-03	1.384E+00	3.379E+03	0.814
α_5	5.14E-07	1.45E-04	6.49E-05	5.62E-04	4.902E-01	3.374E+03	0.815
α_6	7.95E-16	3.34E-05	4.23E-07	1.92E-04	1.146E-01	3.430E+03	0.802
α_7	2.24E-93	4.25E-06	4.52E-25	5.05E-06	1.464E-02	3.443E+03	0.799

CCCG = 8, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9953354	0.9972279	0.9973554	0.9986853	2.571E+03	7.148E+00	--
α_2	2.99E-04	1.10E-03	9.82E-04	2.32E-03	2.980E+00	2.702E+03	0.772
α_3	1.34E-04	7.74E-04	6.48E-04	1.85E-03	1.960E+00	2.529E+03	0.825
α_4	3.37E-05	4.61E-04	3.38E-04	1.31E-03	1.166E+00	2.530E+03	0.825
α_5	1.18E-06	2.08E-04	1.00E-04	7.77E-04	5.375E-01	2.588E+03	0.806
α_6	1.59E-11	7.21E-05	5.59E-06	3.81E-04	1.805E-01	2.504E+03	0.834
α_7	8.19E-36	1.58E-05	1.18E-11	7.74E-05	4.139E-02	2.613E+03	0.799
α_8	8.52E-09	1.40E-04	3.08E-05	6.51E-04	2.827E-01	2.023E+03	1.032

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.99E-01	9.98E-01	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	1.29E-03	1.18E-03	1.57E-03	1.71E-03	1.54E-03	1.37E-03	1.10E-03
α_3		5.72E-04	2.74E-04	6.50E-04	7.03E-04	8.44E-04	7.74E-04
α_4			3.29E-04	1.40E-04	2.74E-04	4.09E-04	4.61E-04
α_5				1.96E-05	6.19E-05	1.45E-04	2.08E-04
α_6					1.00E-04	3.34E-05	7.21E-05
α_7						4.25E-06	1.58E-05
α_8							1.40E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.99E-01	9.98E-01	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	1.29E-03	1.75E-03	2.18E-03	2.52E-03	2.68E-03	2.81E-03	2.77E-03
Gamma		3.26E-01	2.77E-01	3.22E-01	4.25E-01	5.12E-01	6.03E-01
Delta			5.46E-01	1.97E-01	3.83E-01	4.13E-01	5.36E-01
Epsilon				1.23E-01	3.72E-01	3.09E-01	4.86E-01
Mu					6.19E-01	2.06E-01	5.23E-01
Omega						1.13E-01	6.83E-01
Sigma							8.98E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	19.70	19.70	19.70	19.70	19.70	19.70	19.70
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.1.3 ALL-MOV-OO: All Systems Motor-Operated Valves Fail to Close

Generic CCF Parameters

Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 121.8

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9717948	0.9915992	0.9949986	0.9998398	0.9960096	8.481E+01	7.185E-01
α_2	1.62E-04	8.40E-03	5.00E-03	2.82E-02	3.99E-03	7.185E-01	8.481E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9703998	0.9877017	0.9897562	0.9979657	0.9919872	1.508E+02	1.878E+00
α_2	1.38E-03	1.05E-02	8.44E-03	2.66E-02	8.01E-03	1.601E+00	1.511E+02
α_3	9.02E-08	1.81E-03	3.86E-04	8.51E-03	0.00E+00	2.768E-01	1.524E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9684688	0.9843518	0.9858189	0.9952363	0.9879324	2.135E+02	3.394E+00
α_2	3.24E-03	1.27E-02	1.13E-02	2.72E-02	1.21E-02	2.760E+00	2.141E+02
α_3	2.01E-06	1.86E-03	6.80E-04	7.69E-03	0.00E+00	4.024E-01	2.165E+02
α_4	7.39E-09	1.07E-03	1.59E-04	5.29E-03	0.00E+00	2.315E-01	2.166E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9735190	0.9853998	0.9863144	0.9941447	0.9892444	3.441E+02	5.099E+00
α_2	2.61E-03	9.09E-03	8.17E-03	1.87E-02	8.07E-03	3.174E+00	3.461E+02
α_3	4.75E-04	4.20E-03	3.30E-03	1.10E-02	2.69E-03	1.466E+00	3.478E+02
α_4	8.31E-07	1.09E-03	3.77E-04	4.62E-03	0.00E+00	3.822E-01	3.488E+02
α_5	1.91E-20	2.20E-04	2.05E-07	1.28E-03	0.00E+00	7.674E-02	3.492E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9757995	0.9863128	0.9870854	0.9941821	0.9900837	4.090E+02	5.675E+00
α_2	1.74E-03	6.77E-03	5.99E-03	1.44E-02	5.95E-03	2.805E+00	4.118E+02
α_3	6.89E-04	4.38E-03	3.62E-03	1.07E-02	3.29E-03	1.818E+00	4.128E+02
α_4	3.37E-05	1.74E-03	1.03E-03	5.85E-03	6.74E-04	7.210E-01	4.139E+02
α_5	2.09E-09	5.33E-04	7.12E-05	2.67E-03	0.00E+00	2.211E-01	4.144E+02
α_6	2.08E-15	2.65E-04	2.68E-06	1.53E-03	0.00E+00	1.098E-01	4.145E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9784493	0.9869278	0.9874690	0.9935536	0.9906841	5.860E+02	7.761E+00
α_2	1.61E-03	5.50E-03	4.95E-03	1.12E-02	4.72E-03	3.263E+00	5.905E+02
α_3	8.31E-04	3.91E-03	3.37E-03	8.84E-03	3.21E-03	2.323E+00	5.914E+02
α_4	2.20E-04	2.26E-03	1.74E-03	6.11E-03	1.21E-03	1.344E+00	5.924E+02
α_5	9.92E-06	1.02E-03	5.39E-04	3.65E-03	1.82E-04	6.047E-01	5.931E+02
α_6	1.77E-10	3.23E-04	2.98E-05	1.68E-03	0.00E+00	1.916E-01	5.935E+02
α_7	4.01E-41	5.86E-05	2.18E-12	2.57E-04	0.00E+00	3.480E-02	5.937E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9797836	0.9876913	0.9881965	0.9938827	0.9911542	6.346E+02	7.908E+00
α_2	1.27E-03	4.65E-03	4.15E-03	9.75E-03	3.93E-03	2.987E+00	6.395E+02
α_3	6.27E-04	3.29E-03	2.79E-03	7.66E-03	2.93E-03	2.113E+00	6.404E+02
α_4	2.42E-04	2.23E-03	1.74E-03	5.89E-03	1.50E-03	1.433E+00	6.411E+02
α_5	3.59E-05	1.26E-03	7.96E-04	4.07E-03	4.35E-04	8.098E-01	6.417E+02
α_6	2.91E-07	5.64E-04	1.81E-04	2.42E-03	5.16E-05	3.625E-01	6.421E+02
α_7	8.20E-16	1.68E-04	1.54E-06	9.69E-04	0.00E+00	1.078E-01	6.424E+02
α_8	1.71E-17	1.47E-04	6.24E-07	8.58E-04	0.00E+00	9.469E-02	6.424E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.88E-01	9.84E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	8.40E-03	1.05E-02	1.27E-02	9.09E-03	6.77E-03	5.50E-03	4.65E-03
α_3		1.81E-03	1.86E-03	4.20E-03	4.38E-03	3.91E-03	3.29E-03
α_4			1.07E-03	1.09E-03	1.74E-03	2.26E-03	2.23E-03
α_5				2.20E-04	5.33E-04	1.02E-03	1.26E-03
α_6					2.65E-04	3.23E-04	5.64E-04
α_7						5.86E-05	1.68E-04
α_8							1.47E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.88E-01	9.84E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	8.40E-03	1.23E-02	1.56E-02	1.46E-02	1.37E-02	1.31E-02	1.23E-02
Gamma		1.47E-01	1.87E-01	3.77E-01	5.06E-01	5.80E-01	6.22E-01
Delta			3.65E-01	2.38E-01	3.66E-01	4.84E-01	5.71E-01
Epsilon				1.67E-01	3.15E-01	3.82E-01	4.90E-01
Mu					3.32E-01	2.72E-01	4.11E-01
Omega						1.54E-01	3.58E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8

Adj. Ind	60.90	91.35	121.80	152.25	182.70	213.15	243.60
N₁	1.5000	1.5000	1.0000	1.0417	1.0417	1.0127	0.9645
N₂	0.2500	0.7500	1.5000	1.2500	1.1042	1.0197	0.9691
N₃		0.0000	0.0000	0.4167	0.6111	0.6933	0.7230
N₄			0.0000	0.0000	0.1250	0.2616	0.3706
N₅				0.0000	0.0000	0.0394	0.1073
N₆					0.0000	0.0000	0.0127
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 40.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.335

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9790742	0.9942877	0.9970999	0.9999580	9.865E+01	5.667E-01	--
α_2	4.20E-05	5.71E-03	2.90E-03	2.09E-02	5.667E-01	9.865E+01	0.658

CCCG = 3, Gamma = 0.335

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9800465	0.9923544	0.9939747	0.9991222	1.915E+02	1.476E+00	--
α_2	5.51E-04	6.74E-03	5.04E-03	1.87E-02	1.227E+00	1.807E+02	0.892
α_3	1.44E-08	9.02E-04	1.56E-04	4.37E-03	2.487E-01	2.756E+02	0.588

CCCG = 4, Gamma = 0.335

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9767035	0.9893609	0.9906854	0.9974905	2.378E+02	2.557E+00	--
α_2	1.53E-03	8.88E-03	7.43E-03	2.12E-02	1.942E+00	2.168E+02	1.031
α_3	1.45E-06	1.16E-03	4.35E-04	4.77E-03	4.114E-01	3.542E+02	0.636
α_4	7.88E-10	6.01E-04	6.55E-05	3.08E-03	2.036E-01	3.385E+02	0.666

CCCG = 5, Gamma = 0.334

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9802507	0.9895492	0.9903228	0.9962052	4.119E+02	4.350E+00	--
α_2	1.86E-03	7.16E-03	6.34E-03	1.52E-02	2.826E+00	3.920E+02	1.029
α_3	1.51E-04	2.47E-03	1.76E-03	7.20E-03	1.075E+00	4.343E+02	0.933
α_4	4.72E-07	6.94E-04	2.34E-04	2.94E-03	3.765E-01	5.425E+02	0.748
α_5	1.14E-21	1.31E-04	7.47E-08	7.58E-04	7.237E-02	5.518E+02	0.736

CCCG = 6, Gamma = 0.334

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9810821	0.9896430	0.9903141	0.9959119	4.758E+02	4.979E+00	--
α_2	1.55E-03	6.04E-03	5.35E-03	1.29E-02	2.788E+00	4.585E+02	1.011
α_3	2.51E-04	2.75E-03	2.09E-03	7.50E-03	1.301E+00	4.724E+02	0.985
α_4	7.46E-06	1.02E-03	5.14E-04	3.73E-03	5.672E-01	5.572E+02	0.836
α_5	1.34E-09	3.45E-04	4.60E-05	1.73E-03	2.210E-01	6.400E+02	0.729
α_6	2.62E-16	2.06E-04	1.43E-06	1.19E-03	1.027E-01	4.994E+02	0.934

CCCG = 7, Gamma = 0.334

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9837520	0.9902393	0.9906645	0.9952751	7.554E+02	7.446E+00	--
α_2	1.51E-03	4.79E-03	4.35E-03	9.56E-03	3.563E+00	7.403E+02	1.021
α_3	4.85E-04	2.74E-03	2.30E-03	6.49E-03	1.995E+00	7.272E+02	1.042
α_4	9.36E-05	1.39E-03	1.00E-03	3.98E-03	1.123E+00	8.093E+02	0.938
α_5	3.53E-06	6.08E-04	2.96E-04	2.27E-03	5.399E-01	8.868E+02	0.856
α_6	1.86E-10	2.12E-04	2.13E-05	1.09E-03	1.979E-01	9.353E+02	0.812
α_7	6.41E-53	2.86E-05	2.87E-15	9.78E-05	2.656E-02	9.276E+02	0.819

CCCG = 8, Gamma = 0.334

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9843605	0.9906475	0.9910636	0.9955141	7.727E+02	7.295E+00	--
α_2	1.16E-03	4.08E-03	3.66E-03	8.43E-03	3.136E+00	7.661E+02	1.000
α_3	4.03E-04	2.53E-03	2.09E-03	6.15E-03	1.840E+00	7.266E+02	1.056
α_4	9.77E-05	1.43E-03	1.04E-03	4.10E-03	1.130E+00	7.902E+02	0.973
α_5	1.22E-05	7.66E-04	4.40E-04	2.63E-03	6.830E-01	8.908E+02	0.863
α_6	4.50E-08	3.31E-04	8.43E-05	1.50E-03	3.080E-01	9.291E+02	0.828
α_7	7.79E-16	1.11E-04	1.10E-06	6.42E-04	1.093E-01	9.811E+02	0.784
α_8	1.74E-18	1.13E-04	3.13E-07	6.58E-04	8.885E-02	7.869E+02	0.978

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.92E-01	9.89E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
α_2	5.71E-03	6.74E-03	8.88E-03	7.16E-03	6.04E-03	4.79E-03	4.08E-03
α_3		9.02E-04	1.16E-03	2.47E-03	2.75E-03	2.74E-03	2.53E-03
α_4			6.01E-04	6.94E-04	1.02E-03	1.39E-03	1.43E-03
α_5				1.31E-04	3.45E-04	6.08E-04	7.66E-04
α_6					2.06E-04	2.12E-04	3.31E-04
α_7						2.86E-05	1.11E-04
α_8							1.13E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.92E-01	9.89E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
Beta	5.71E-03	7.65E-03	1.06E-02	1.05E-02	1.04E-02	9.76E-03	9.35E-03
Gamma		1.18E-01	1.66E-01	3.15E-01	4.16E-01	5.09E-01	5.64E-01
Delta			3.41E-01	2.50E-01	3.63E-01	4.50E-01	5.21E-01
Epsilon				1.59E-01	3.51E-01	3.80E-01	4.81E-01
Mu					3.73E-01	2.83E-01	4.20E-01
Omega						1.19E-01	4.04E-01
Sigma							5.03E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	20.05	30.07	40.10	50.12	60.15	70.17	80.20
N_1	0.8333	1.0000	1.0000	1.0417	1.0417	1.0127	0.9645
N_2	0.0833	0.2500	0.5000	0.5833	0.6597	0.7234	0.7716
N_3		0.0000	0.0000	0.0833	0.1667	0.2488	0.3279

N₄			0.0000	0.0000	0.0139	0.0394	0.0743
N₅				0.0000	0.0000	0.0023	0.0085
N₆					0.0000	0.0000	0.0004
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 14.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.116

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9450416	0.9861421	0.9941822	0.9999692	3.201E+01	4.498E-01	--
α_2	3.08E-05	1.39E-02	5.82E-03	5.50E-02	4.498E-01	3.201E+01	0.658

CCCG = 3, Gamma = 0.116

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9412829	0.9790208	0.9843865	0.9984026	5.499E+01	1.178E+00	--
α_2	7.97E-04	1.80E-02	1.23E-02	5.45E-02	9.387E-01	5.134E+01	0.892
α_3	3.17E-08	3.02E-03	4.87E-04	1.48E-02	2.396E-01	7.903E+01	0.588

CCCG = 4, Gamma = 0.117

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9384570	0.9741819	0.9783522	0.9956339	7.163E+01	1.898E+00	--
α_2	1.80E-03	1.99E-02	1.52E-02	5.40E-02	1.285E+00	6.339E+01	1.031
α_3	3.45E-06	3.75E-03	1.34E-03	1.56E-02	3.927E-01	1.044E+02	0.636
α_4	8.47E-09	2.20E-03	2.95E-04	1.11E-02	2.207E-01	9.993E+01	0.666

CCCG = 5, Gamma = 0.117

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9471624	0.9734383	0.9757951	0.9916573	1.285E+02	3.506E+00	--
α_2	2.88E-03	1.61E-02	1.36E-02	3.80E-02	1.992E+00	1.217E+02	1.029
α_3	4.89E-04	7.90E-03	5.66E-03	2.30E-02	1.078E+00	1.353E+02	0.933
α_4	1.12E-06	2.14E-03	6.91E-04	9.17E-03	3.632E-01	1.697E+02	0.748
α_5	3.87E-21	4.19E-04	2.42E-07	2.43E-03	7.248E-02	1.728E+02	0.736

CCCG = 6, Gamma = 0.117

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516037	0.9744905	0.9763891	0.9908887	1.604E+02	4.199E+00	--
α_2	2.14E-03	1.24E-02	1.04E-02	2.96E-02	1.941E+00	1.543E+02	1.011
α_3	7.96E-04	8.30E-03	6.37E-03	2.24E-02	1.332E+00	1.592E+02	0.985
α_4	3.51E-05	3.27E-03	1.76E-03	1.16E-02	6.181E-01	1.884E+02	0.836
α_5	7.31E-09	1.07E-03	1.58E-04	5.28E-03	2.313E-01	2.167E+02	0.729
α_6	4.14E-20	4.54E-04	4.28E-07	2.64E-03	7.684E-02	1.692E+02	0.934

CCCG = 7, Gamma = 0.117

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9558406	0.9743930	0.9756844	0.9885349	2.368E+02	6.223E+00	--
α_2	2.76E-03	1.13E-02	9.93E-03	2.44E-02	2.654E+00	2.326E+02	1.021
α_3	9.73E-04	7.13E-03	5.77E-03	1.80E-02	1.645E+00	2.290E+02	1.042
α_4	2.90E-04	4.35E-03	3.15E-03	1.25E-02	1.115E+00	2.552E+02	0.938
α_5	2.08E-05	2.15E-03	1.14E-03	7.71E-03	6.034E-01	2.800E+02	0.856
α_6	1.07E-10	6.02E-04	4.48E-05	3.19E-03	1.780E-01	2.957E+02	0.812
α_7	5.07E-51	9.32E-05	1.91E-14	3.29E-04	2.734E-02	2.934E+02	0.819

CCCG = 8, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9581042	0.9756945	0.9769190	0.9891030	2.507E+02	6.246E+00	--
α_2	2.30E-03	9.96E-03	8.70E-03	2.20E-02	2.504E+00	2.488E+02	1.000
α_3	6.39E-04	5.96E-03	4.65E-03	1.58E-02	1.419E+00	2.366E+02	1.056
α_4	2.18E-04	3.97E-03	2.79E-03	1.18E-02	1.027E+00	2.575E+02	0.973
α_5	5.19E-05	2.52E-03	1.51E-03	8.42E-03	7.337E-01	2.906E+02	0.863
α_6	1.30E-06	1.31E-03	4.72E-04	5.45E-03	3.975E-01	3.033E+02	0.828
α_7	2.40E-20	2.40E-04	2.31E-07	1.40E-03	7.703E-02	3.205E+02	0.784
α_8	3.16E-18	3.40E-04	8.50E-07	1.98E-03	8.749E-02	2.570E+02	0.978

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.79E-01	9.74E-01	9.73E-01	9.74E-01	9.74E-01	9.76E-01
α_2	1.39E-02	1.80E-02	1.99E-02	1.61E-02	1.24E-02	1.13E-02	9.96E-03
α_3		3.02E-03	3.75E-03	7.90E-03	8.30E-03	7.13E-03	5.96E-03
α_4			2.20E-03	2.14E-03	3.27E-03	4.35E-03	3.97E-03
α_5				4.19E-04	1.07E-03	2.15E-03	2.52E-03
α_6					4.54E-04	6.02E-04	1.31E-03
α_7						9.32E-05	2.40E-04
α_8							3.40E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.79E-01	9.74E-01	9.73E-01	9.74E-01	9.74E-01	9.76E-01
Beta	1.39E-02	2.10E-02	2.58E-02	2.66E-02	2.55E-02	2.56E-02	2.43E-02
Gamma		1.44E-01	2.30E-01	3.94E-01	5.13E-01	5.59E-01	5.90E-01
Delta			3.70E-01	2.44E-01	3.66E-01	5.02E-01	5.84E-01
Epsilon				1.64E-01	3.17E-01	3.95E-01	5.26E-01
Mu					2.99E-01	2.44E-01	4.29E-01
Omega						1.34E-01	3.07E-01
Sigma							5.86E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.25	10.88	14.50	18.13	21.75	25.38	29.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 5.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.040

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8680491	0.9684337	0.9886406	0.9999756	1.166E+01	3.801E-01	--
α_2	2.44E-05	3.16E-02	1.14E-02	1.32E-01	3.801E-01	1.166E+01	0.658

CCCG = 3, Gamma = 0.040

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8683950	0.9556729	0.9688435	0.9978562	2.070E+01	9.600E-01	--
α_2	5.21E-04	3.44E-02	2.01E-02	1.17E-01	6.673E-01	1.874E+01	0.892
α_3	8.66E-07	9.95E-03	2.38E-03	4.58E-02	2.927E-01	2.914E+01	0.588

CCCG = 4, Gamma = 0.040

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8690933	0.9465921	0.9558680	0.9922916	2.958E+01	1.669E+00	--
α_2	2.26E-03	3.87E-02	2.79E-02	1.12E-01	1.039E+00	2.582E+01	1.031
α_3	7.73E-06	8.93E-03	3.18E-03	3.73E-02	3.887E-01	4.316E+01	0.636
α_4	6.68E-08	5.80E-03	9.56E-04	2.84E-02	2.414E-01	4.136E+01	0.666

CCCG = 5, Gamma = 0.040

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8978158	0.9482171	0.9526077	0.9835962	6.385E+01	3.487E+00	--
α_2	4.48E-03	2.86E-02	2.38E-02	6.94E-02	1.791E+00	6.079E+01	1.029
α_3	1.40E-03	1.75E-02	1.31E-02	4.86E-02	1.207E+00	6.780E+01	0.933
α_4	8.92E-06	5.04E-03	2.02E-03	2.03E-02	4.340E-01	8.561E+01	0.748
α_5	1.39E-26	6.28E-04	2.23E-08	3.46E-03	5.493E-02	8.741E+01	0.736

CCCG = 6, Gamma = 0.040

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9111608	0.9537081	0.9572582	0.9841143	8.044E+01	3.905E+00	--
α_2	1.64E-03	1.69E-02	1.30E-02	4.53E-02	1.335E+00	7.785E+01	1.011
α_3	2.32E-03	1.88E-02	1.50E-02	4.83E-02	1.531E+00	7.979E+01	0.985
α_4	1.45E-04	7.51E-03	4.47E-03	2.52E-02	7.191E-01	9.502E+01	0.836
α_5	3.28E-08	2.24E-03	3.84E-04	1.09E-02	2.467E-01	1.097E+02	0.729
α_6	9.34E-21	8.49E-04	5.11E-07	4.92E-03	7.279E-02	8.567E+01	0.934

CCCG = 7, Gamma = 0.040

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9239852	0.9564428	0.9587245	0.9811036	1.267E+02	5.770E+00	--
α_2	1.52E-03	1.22E-02	9.73E-03	3.12E-02	1.549E+00	1.257E+02	1.021
α_3	2.84E-03	1.59E-02	1.34E-02	3.76E-02	1.989E+00	1.227E+02	1.042
α_4	8.35E-04	9.29E-03	7.06E-03	2.54E-02	1.287E+00	1.373E+02	0.938
α_5	7.60E-05	4.56E-03	2.64E-03	1.55E-02	6.913E-01	1.510E+02	0.856
α_6	1.07E-08	1.45E-03	2.19E-04	7.19E-03	2.327E-01	1.597E+02	0.812
α_7	9.04E-65	1.33E-04	2.02E-17	3.35E-04	2.112E-02	1.586E+02	0.819

CCCG = 8, Gamma = 0.041

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9338164	0.9604257	0.9621471	0.9811548	1.703E+02	7.016E+00	--
α_2	1.19E-03	9.21E-03	7.39E-03	2.35E-02	1.583E+00	1.704E+02	1.000
α_3	2.17E-03	1.22E-02	1.03E-02	2.88E-02	1.986E+00	1.608E+02	1.056
α_4	1.32E-03	9.45E-03	7.68E-03	2.37E-02	1.672E+00	1.752E+02	0.973
α_5	2.69E-04	5.07E-03	3.54E-03	1.51E-02	1.011E+00	1.983E+02	0.863
α_6	2.08E-05	2.75E-03	1.40E-03	1.01E-02	5.709E-01	2.072E+02	0.828
α_7	1.89E-10	8.25E-04	6.46E-05	4.36E-03	1.809E-01	2.191E+02	0.784
α_8	1.02E-107	7.08E-05	2.14E-27	5.30E-05	1.245E-02	1.759E+02	0.978

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.56E-01	9.47E-01	9.48E-01	9.54E-01	9.56E-01	9.60E-01
α_2	3.16E-02	3.44E-02	3.87E-02	2.86E-02	1.69E-02	1.22E-02	9.21E-03
α_3		9.95E-03	8.93E-03	1.75E-02	1.88E-02	1.59E-02	1.22E-02
α_4			5.80E-03	5.04E-03	7.51E-03	9.29E-03	9.45E-03
α_5				6.28E-04	2.24E-03	4.56E-03	5.07E-03
α_6					8.49E-04	1.45E-03	2.75E-03
α_7						1.33E-04	8.25E-04
α_8							7.08E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.56E-01	9.47E-01	9.48E-01	9.54E-01	9.56E-01	9.60E-01
Beta	3.16E-02	4.43E-02	5.34E-02	5.18E-02	4.63E-02	4.36E-02	3.96E-02
Gamma		2.24E-01	2.76E-01	4.47E-01	6.36E-01	7.20E-01	7.67E-01
Delta			3.94E-01	2.45E-01	3.60E-01	4.92E-01	5.98E-01
Epsilon				1.11E-01	2.92E-01	3.98E-01	4.80E-01
Mu					2.74E-01	2.58E-01	4.18E-01
Omega						8.39E-02	2.46E-01
Sigma							7.90E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.50	3.75	5.00	6.25	7.50	8.75	10.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 44.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.365

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9690100	0.9911607	0.9951077	0.9998918	7.146E+01	6.373E-01	--
α_2	1.08E-04	8.84E-03	4.89E-03	3.10E-02	6.373E-01	7.146E+01	0.658

CCCG = 3, Gamma = 0.364

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9648077	0.9860997	0.9887961	0.9981688	1.137E+02	1.603E+00	--
α_2	1.13E-03	1.21E-02	9.27E-03	3.28E-02	1.310E+00	1.068E+02	0.892
α_3	1.49E-07	1.78E-03	4.17E-04	8.22E-03	2.921E-01	1.637E+02	0.588

CCCG = 4, Gamma = 0.363

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9633062	0.9824762	0.9843483	0.9952460	1.655E+02	2.953E+00	--
α_2	3.18E-03	1.49E-02	1.29E-02	3.36E-02	2.312E+00	1.525E+02	1.031
α_3	2.88E-06	1.72E-03	6.77E-04	6.94E-03	4.307E-01	2.506E+02	0.636
α_4	1.74E-09	8.75E-04	1.03E-04	4.45E-03	2.099E-01	2.395E+02	0.666

CCCG = 5, Gamma = 0.362

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9715974	0.9851700	0.9863219	0.9948068	2.728E+02	4.107E+00	--
α_2	1.95E-03	9.04E-03	7.82E-03	2.03E-02	2.351E+00	2.577E+02	1.029
α_3	3.92E-04	4.45E-03	3.36E-03	1.22E-02	1.276E+00	2.854E+02	0.933
α_4	8.01E-07	1.07E-03	3.67E-04	4.51E-03	3.816E-01	3.571E+02	0.748
α_5	1.08E-16	2.71E-04	1.49E-06	1.58E-03	9.865E-02	3.633E+02	0.736

CCCG = 6, Gamma = 0.362

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9754996	0.9866801	0.9875658	0.9948351	3.572E+02	4.822E+00	--
α_2	1.23E-03	6.29E-03	5.36E-03	1.45E-02	2.158E+00	3.410E+02	1.011
α_3	5.48E-04	4.40E-03	3.51E-03	1.13E-02	1.552E+00	3.509E+02	0.985
α_4	4.30E-05	1.84E-03	1.12E-03	6.06E-03	7.620E-01	4.142E+02	0.836
α_5	1.05E-08	5.32E-04	9.58E-05	2.57E-03	2.536E-01	4.761E+02	0.729
α_6	4.17E-17	2.58E-04	1.17E-06	1.50E-03	9.572E-02	3.715E+02	0.934

CCCG = 7, Gamma = 0.362

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9782957	0.9874751	0.9881262	0.9944311	4.884E+02	6.195E+00	--
α_2	1.11E-03	5.02E-03	4.35E-03	1.12E-02	2.401E+00	4.758E+02	1.021
α_3	5.67E-04	3.76E-03	3.09E-03	9.28E-03	1.764E+00	4.670E+02	1.042
α_4	1.88E-04	2.34E-03	1.74E-03	6.53E-03	1.219E+00	5.197E+02	0.938
α_5	6.92E-06	9.85E-04	4.94E-04	3.63E-03	5.619E-01	5.698E+02	0.856
α_6	2.42E-10	3.25E-04	3.18E-05	1.69E-03	1.956E-01	6.012E+02	0.812
α_7	2.53E-28	8.87E-05	2.01E-09	4.81E-04	5.291E-02	5.962E+02	0.819

CCCG = 8, Gamma = 0.362

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9801549	0.9882949	0.9888480	0.9945461	5.768E+02	6.832E+00	--
α_2	9.47E-04	4.25E-03	3.69E-03	9.48E-03	2.427E+00	5.682E+02	1.000
α_3	4.20E-04	3.06E-03	2.48E-03	7.71E-03	1.655E+00	5.388E+02	1.056
α_4	2.19E-04	2.28E-03	1.75E-03	6.16E-03	1.338E+00	5.857E+02	0.973
α_5	4.47E-05	1.30E-03	8.47E-04	4.11E-03	8.614E-01	6.605E+02	0.863
α_6	1.52E-07	4.92E-04	1.45E-04	2.16E-03	3.394E-01	6.892E+02	0.828
α_7	1.79E-13	1.85E-04	4.95E-06	1.04E-03	1.344E-01	7.278E+02	0.784
α_8	1.19E-20	1.32E-04	1.23E-07	7.64E-04	7.682E-02	5.838E+02	0.978

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.86E-01	9.82E-01	9.85E-01	9.87E-01	9.87E-01	9.88E-01
α_2	8.84E-03	1.21E-02	1.49E-02	9.04E-03	6.29E-03	5.02E-03	4.25E-03
α_3		1.78E-03	1.72E-03	4.45E-03	4.40E-03	3.76E-03	3.06E-03
α_4			8.75E-04	1.07E-03	1.84E-03	2.34E-03	2.28E-03
α_5				2.71E-04	5.32E-04	9.85E-04	1.30E-03
α_6					2.58E-04	3.25E-04	4.92E-04
α_7						8.87E-05	1.85E-04
α_8							1.32E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.86E-01	9.82E-01	9.85E-01	9.87E-01	9.87E-01	9.88E-01
Beta	8.84E-03	1.39E-02	1.75E-02	1.48E-02	1.33E-02	1.25E-02	1.17E-02
Gamma		1.28E-01	1.48E-01	3.90E-01	5.28E-01	5.99E-01	6.37E-01
Delta			3.38E-01	2.31E-01	3.74E-01	4.98E-01	5.89E-01
Epsilon				2.03E-01	3.01E-01	3.74E-01	4.81E-01
Mu					3.26E-01	2.96E-01	3.83E-01
Omega						2.14E-01	3.91E-01
Sigma							4.16E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	22.05	33.07	44.10	55.12	66.15	77.17	88.20
N_1	0.6667	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.1667	0.5000	1.0000	0.6667	0.4444	0.2963	0.1975
N_3		0.0000	0.0000	0.3333	0.4444	0.4444	0.3951

N₄			0.0000	0.0000	0.1111	0.2222	0.2963
N₅				0.0000	0.0000	0.0370	0.0988
N₆					0.0000	0.0000	0.0123
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 18.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.144

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9893984	0.9972505	0.9987600	0.9999899	1.789E+02	4.932E-01	--
α_2	1.01E-05	2.75E-03	1.24E-03	1.06E-02	4.932E-01	1.789E+02	0.658

CCCG = 3, Gamma = 0.145

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9905883	0.9967885	0.9977195	0.9998100	3.288E+02	1.060E+00	--
α_2	4.55E-05	2.43E-03	1.44E-03	8.22E-03	7.137E-01	2.925E+02	0.892
α_3	2.79E-07	7.78E-04	2.35E-04	3.39E-03	3.458E-01	4.443E+02	0.588

CCCG = 4, Gamma = 0.146

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9909041	0.9960908	0.9966827	0.9992544	5.388E+02	2.115E+00	--
α_2	3.93E-04	3.18E-03	2.53E-03	8.17E-03	1.549E+00	4.862E+02	1.031
α_3	1.04E-08	3.35E-04	6.54E-05	1.59E-03	2.646E-01	7.904E+02	0.636
α_4	4.40E-08	3.99E-04	9.78E-05	1.82E-03	3.010E-01	7.549E+02	0.666

CCCG = 5, Gamma = 0.146

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9933686	0.9963173	0.9965435	0.9984934	1.440E+03	5.325E+00	--
α_2	8.35E-04	2.62E-03	2.38E-03	5.21E-03	3.632E+00	1.383E+03	1.029
α_3	8.70E-05	8.86E-04	6.80E-04	2.39E-03	1.354E+00	1.527E+03	0.933
α_4	1.47E-08	1.55E-04	3.71E-05	7.14E-04	2.961E-01	1.906E+03	0.748
α_5	6.52E-35	2.19E-05	2.41E-11	1.08E-04	4.243E-02	1.938E+03	0.736

CCCG = 6, Gamma = 0.146

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931641	0.9962735	0.9965202	0.9985406	1.320E+03	4.936E+00	--
α_2	6.05E-04	2.28E-03	2.02E-03	4.81E-03	2.915E+00	1.278E+03	1.011
α_3	8.15E-05	9.56E-04	7.18E-04	2.64E-03	1.257E+00	1.314E+03	0.985
α_4	1.32E-06	3.25E-04	1.49E-04	1.25E-03	5.031E-01	1.548E+03	0.836
α_5	1.88E-15	6.50E-05	8.57E-07	3.73E-04	1.155E-01	1.777E+03	0.729
α_6	4.89E-13	1.05E-04	3.83E-06	5.80E-04	1.451E-01	1.387E+03	0.934

CCCG = 7, Gamma = 0.147

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944570	0.9964920	0.9966115	0.9981190	2.742E+03	9.654E+00	--
α_2	6.94E-04	1.79E-03	1.67E-03	3.31E-03	4.851E+00	2.701E+03	1.021
α_3	2.70E-04	1.06E-03	9.33E-04	2.26E-03	2.800E+00	2.650E+03	1.042
α_4	4.80E-05	4.70E-04	3.63E-04	1.26E-03	1.384E+00	2.946E+03	0.938
α_5	5.38E-07	1.52E-04	6.79E-05	5.88E-04	4.902E-01	3.227E+03	0.856
α_6	8.01E-16	3.37E-05	4.27E-07	1.93E-04	1.146E-01	3.403E+03	0.812
α_7	2.28E-93	4.34E-06	4.62E-25	5.16E-06	1.464E-02	3.374E+03	0.819

CCCG = 8, Gamma = 0.147

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9943169	0.9966221	0.9967772	0.9983976	2.109E+03	7.148E+00	--
α_2	3.84E-04	1.42E-03	1.26E-03	2.98E-03	2.980E+00	2.100E+03	1.000
α_3	1.71E-04	9.84E-04	8.23E-04	2.35E-03	1.960E+00	1.990E+03	1.056
α_4	3.94E-05	5.39E-04	3.95E-04	1.53E-03	1.166E+00	2.163E+03	0.973
α_5	1.25E-06	2.20E-04	1.07E-04	8.25E-04	5.375E-01	2.437E+03	0.863
α_6	1.57E-11	7.10E-05	5.51E-06	3.75E-04	1.805E-01	2.541E+03	0.828
α_7	7.98E-36	1.54E-05	1.15E-11	7.54E-05	4.139E-02	2.683E+03	0.784
α_8	8.01E-09	1.31E-04	2.90E-05	6.12E-04	2.827E-01	2.152E+03	0.978

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	2.75E-03	2.43E-03	3.18E-03	2.62E-03	2.28E-03	1.79E-03	1.42E-03
α_3		7.78E-04	3.35E-04	8.86E-04	9.56E-04	1.06E-03	9.84E-04
α_4			3.99E-04	1.55E-04	3.25E-04	4.70E-04	5.39E-04
α_5				2.19E-05	6.50E-05	1.52E-04	2.20E-04
α_6					1.05E-04	3.37E-05	7.10E-05
α_7						4.34E-06	1.54E-05
α_8							1.31E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	2.75E-03	3.21E-03	3.91E-03	3.68E-03	3.73E-03	3.51E-03	3.38E-03
Gamma		2.42E-01	1.88E-01	2.89E-01	3.89E-01	4.89E-01	5.81E-01
Delta			5.44E-01	1.67E-01	3.41E-01	3.84E-01	4.98E-01
Epsilon				1.24E-01	3.43E-01	2.88E-01	4.49E-01
Mu					6.17E-01	2.00E-01	4.97E-01
Omega						1.14E-01	6.74E-01
Sigma							8.95E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	9.05	13.58	18.10	22.63	27.15	31.68	36.20
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.1.4 ALL-MOV-SO: All Systems Motor-Operated Valves Spurious Operation

Generic CCF Parameters

Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Spurious Closing, Spurious Opening, Spurious Operation
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 32.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9051104	0.9631777	0.9706300	0.9957058	0.9411765	3.841E+01	1.469E+00
α_2	4.29E-03	3.68E-02	2.94E-02	9.49E-02	5.88E-02	1.469E+00	3.841E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9417877	0.9746984	0.9783649	0.9950733	0.9600000	8.198E+01	2.128E+00
α_2	3.39E-04	1.01E-02	6.59E-03	3.19E-02	0.00E+00	8.512E-01	8.326E+01
α_3	1.35E-03	1.52E-02	1.15E-02	4.15E-02	4.00E-02	1.277E+00	8.283E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9515716	0.9769561	0.9794439	0.9938440	0.9696970	1.227E+02	2.894E+00
α_2	8.66E-04	1.00E-02	7.58E-03	2.76E-02	0.00E+00	1.260E+00	1.243E+02
α_3	3.48E-06	3.20E-03	1.18E-03	1.33E-02	0.00E+00	4.024E-01	1.252E+02
α_4	8.09E-04	9.81E-03	7.36E-03	2.72E-02	3.03E-02	1.231E+00	1.243E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9646720	0.9811615	0.9825064	0.9930526	0.9756098	2.308E+02	4.432E+00
α_2	1.39E-03	8.18E-03	6.83E-03	1.96E-02	0.00E+00	1.924E+00	2.333E+02
α_3	2.58E-04	4.46E-03	3.16E-03	1.31E-02	0.00E+00	1.049E+00	2.342E+02
α_4	1.38E-04	3.75E-03	2.47E-03	1.17E-02	1.22E-02	8.822E-01	2.344E+02
α_5	1.94E-05	2.45E-03	1.26E-03	8.94E-03	1.22E-02	5.767E-01	2.347E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9680767	0.9826116	0.9837537	0.9932326	0.9795918	2.732E+02	4.835E+00
α_2	8.76E-04	6.12E-03	4.98E-03	1.52E-02	0.00E+00	1.701E+00	2.764E+02
α_3	3.42E-04	4.34E-03	3.23E-03	1.21E-02	0.00E+00	1.207E+00	2.768E+02
α_4	9.92E-05	3.04E-03	1.96E-03	9.66E-03	5.10E-03	8.460E-01	2.772E+02
α_5	5.03E-05	2.59E-03	1.54E-03	8.72E-03	1.02E-02	7.211E-01	2.773E+02
α_6	6.32E-07	1.29E-03	4.13E-04	5.57E-03	5.10E-03	3.598E-01	2.777E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9736281	0.9844727	0.9852077	0.9927952	0.9824561	4.278E+02	6.747E+00
α_2	1.06E-03	5.16E-03	4.43E-03	1.18E-02	0.00E+00	2.243E+00	4.323E+02
α_3	5.03E-04	3.75E-03	3.02E-03	9.49E-03	0.00E+00	1.630E+00	4.329E+02
α_4	2.19E-04	2.78E-03	2.06E-03	7.78E-03	2.19E-03	1.208E+00	4.333E+02
α_5	9.49E-05	2.16E-03	1.46E-03	6.62E-03	6.58E-03	9.404E-01	4.336E+02
α_6	9.52E-06	1.30E-03	6.59E-04	4.79E-03	6.58E-03	5.666E-01	4.340E+02
α_7	1.06E-11	3.68E-04	1.92E-05	2.00E-03	2.19E-03	1.598E-01	4.344E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9751835	0.9854029	0.9860974	0.9932448	0.9846154	4.540E+02	6.726E+00
α_2	7.89E-04	4.38E-03	3.69E-03	1.03E-02	0.00E+00	2.018E+00	4.587E+02
α_3	3.12E-04	3.02E-03	2.34E-03	8.05E-03	0.00E+00	1.391E+00	4.594E+02
α_4	1.65E-04	2.44E-03	1.77E-03	7.01E-03	9.62E-04	1.125E+00	4.596E+02
α_5	9.38E-05	2.07E-03	1.41E-03	6.29E-03	3.85E-03	9.526E-01	4.598E+02
α_6	3.10E-05	1.57E-03	9.36E-04	5.28E-03	5.77E-03	7.247E-01	4.600E+02
α_7	3.64E-07	7.77E-04	2.46E-04	3.35E-03	3.85E-03	3.578E-01	4.604E+02
α_8	7.27E-12	3.41E-04	1.68E-05	1.86E-03	9.62E-04	1.572E-01	4.606E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.63E-01	9.75E-01	9.77E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01
α_2	3.68E-02	1.01E-02	1.00E-02	8.18E-03	6.12E-03	5.16E-03	4.38E-03
α_3		1.52E-02	3.20E-03	4.46E-03	4.34E-03	3.75E-03	3.02E-03
α_4			9.81E-03	3.75E-03	3.04E-03	2.78E-03	2.44E-03
α_5				2.45E-03	2.59E-03	2.16E-03	2.07E-03
α_6					1.29E-03	1.30E-03	1.57E-03
α_7						3.68E-04	7.77E-04
α_8							3.41E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.63E-01	9.75E-01	9.77E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01
Beta	3.68E-02	2.53E-02	2.30E-02	1.88E-02	1.74E-02	1.55E-02	1.46E-02
Gamma		6.00E-01	5.65E-01	5.66E-01	6.48E-01	6.68E-01	7.00E-01
Delta			7.54E-01	5.82E-01	6.15E-01	6.38E-01	7.05E-01
Epsilon				3.95E-01	5.61E-01	5.80E-01	6.61E-01
Mu					3.33E-01	4.36E-01	5.65E-01
Omega						2.20E-01	4.15E-01
Sigma							3.05E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8

Adj. Ind	16.00	24.00	32.00	40.00	48.00	56.00	64.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		1.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			1.0000	0.5000	0.2500	0.1250	0.0625
N₅				0.5000	0.5000	0.3750	0.2500
N₆					0.2500	0.3750	0.3750
N₇						0.1250	0.2500
N₈							0.0625

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 12.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9096604	0.9765194	0.9893105	0.9999201	2.010E+01	4.834E-01	--
α_2	7.99E-05	2.35E-02	1.07E-02	9.03E-02	4.834E-01	2.010E+01	2.444

CCCG = 3, Gamma = 0.360

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9621628	0.9863471	0.9897545	0.9988803	8.854E+01	1.226E+00	--
α_2	3.16E-04	6.50E-03	4.48E-03	1.96E-02	9.769E-01	1.493E+02	0.931
α_3	1.16E-07	7.15E-03	1.26E-03	3.47E-02	2.487E-01	3.453E+01	4.024

CCCG = 4, Gamma = 0.364

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9665263	0.9856726	0.9878597	0.9973391	1.415E+02	2.057E+00	--
α_2	7.72E-04	6.99E-03	5.48E-03	1.84E-02	1.442E+00	2.048E+02	0.950
α_3	2.64E-06	2.10E-03	7.90E-04	8.65E-03	4.114E-01	1.952E+02	1.002
α_4	6.95E-09	5.23E-03	5.78E-04	2.69E-02	2.036E-01	3.871E+01	5.036

CCCG = 5, Gamma = 0.366

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9750499	0.9873533	0.9884513	0.9959050	2.875E+02	3.683E+00	--
α_2	1.25E-03	6.09E-03	5.22E-03	1.39E-02	2.243E+00	3.660E+02	1.003
α_3	1.44E-04	2.86E-03	1.98E-03	8.57E-03	9.912E-01	3.460E+02	1.064
α_4	1.66E-06	2.42E-03	8.21E-04	1.03E-02	3.765E-01	1.549E+02	2.378
α_5	1.11E-20	1.27E-03	7.32E-07	7.40E-03	7.237E-02	5.673E+01	6.502

CCCG = 6, Gamma = 0.367

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9767738	0.9878593	0.9888000	0.9957312	3.368E+02	4.139E+00	--
α_2	9.10E-04	4.74E-03	4.02E-03	1.10E-02	2.128E+00	4.473E+02	0.940
α_3	1.99E-04	2.88E-03	2.10E-03	8.26E-03	1.134E+00	3.920E+02	1.075
α_4	1.26E-05	1.93E-03	9.56E-04	7.13E-03	5.533E-01	2.866E+02	1.471
α_5	6.40E-09	1.64E-03	2.20E-04	8.23E-03	2.210E-01	1.345E+02	3.136
α_6	1.22E-15	9.53E-04	6.66E-06	5.54E-03	1.027E-01	1.076E+02	3.921

CCCG = 7, Gamma = 0.368

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9816241	0.9893103	0.9898476	0.9951616	5.953E+02	6.432E+00	--
α_2	9.79E-04	3.77E-03	3.34E-03	8.02E-03	2.840E+00	7.514E+02	0.939
α_3	4.03E-04	2.72E-03	2.22E-03	6.72E-03	1.746E+00	6.411E+02	1.102
α_4	1.14E-04	1.83E-03	1.31E-03	5.33E-03	1.084E+00	5.900E+02	1.199
α_5	7.66E-06	1.35E-03	6.52E-04	5.03E-03	5.376E-01	3.989E+02	1.774
α_6	7.60E-10	8.63E-04	8.73E-05	4.46E-03	1.979E-01	2.290E+02	3.091
α_7	3.71E-52	1.65E-04	1.66E-14	5.66E-04	2.656E-02	1.606E+02	4.412

CCCG = 8, Gamma = 0.369

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9826149	0.9900060	0.9905351	0.9955903	6.055E+02	6.112E+00	--
α_2	6.49E-04	3.00E-03	2.59E-03	6.75E-03	2.364E+00	7.854E+02	0.903
α_3	2.68E-04	2.25E-03	1.78E-03	5.84E-03	1.512E+00	6.703E+02	1.059
α_4	1.00E-04	1.71E-03	1.21E-03	5.02E-03	1.056E+00	6.169E+02	1.151
α_5	2.01E-05	1.32E-03	7.54E-04	4.56E-03	6.745E-01	5.089E+02	1.396
α_6	1.27E-07	9.43E-04	2.40E-04	4.28E-03	3.076E-01	3.258E+02	2.181
α_7	3.75E-15	5.36E-04	5.30E-06	3.09E-03	1.093E-01	2.039E+02	3.485
α_8	3.57E-18	2.31E-04	6.42E-07	1.35E-03	8.885E-02	3.846E+02	1.849

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.77E-01	9.86E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01	9.90E-01
α_2	2.35E-02	6.50E-03	6.99E-03	6.09E-03	4.74E-03	3.77E-03	3.00E-03
α_3		7.15E-03	2.10E-03	2.86E-03	2.88E-03	2.72E-03	2.25E-03
α_4			5.23E-03	2.42E-03	1.93E-03	1.83E-03	1.71E-03
α_5				1.27E-03	1.64E-03	1.35E-03	1.32E-03
α_6					9.53E-04	8.63E-04	9.43E-04
α_7						1.65E-04	5.36E-04
α_8							2.31E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.77E-01	9.86E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01	9.90E-01
Beta	2.35E-02	1.37E-02	1.43E-02	1.26E-02	1.21E-02	1.07E-02	9.99E-03
Gamma		5.24E-01	5.12E-01	5.18E-01	6.10E-01	6.48E-01	7.00E-01
Delta			7.13E-01	5.64E-01	6.10E-01	6.08E-01	6.78E-01
Epsilon				3.45E-01	5.74E-01	5.64E-01	6.40E-01
Mu					3.67E-01	4.33E-01	5.64E-01
Omega						1.61E-01	4.48E-01
Sigma							3.01E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.00	9.00	12.00	15.00	18.00	21.00	24.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 6.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.176

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7517461	0.9357391	0.9709487	0.9998442	6.550E+00	4.498E-01	--
α_2	1.56E-04	6.43E-02	2.91E-02	2.48E-01	4.498E-01	6.550E+00	2.444

CCCG = 3, Gamma = 0.180

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8738214	0.9543285	0.9655321	0.9964431	2.462E+01	1.178E+00	--
α_2	9.68E-04	2.17E-02	1.49E-02	6.58E-02	9.387E-01	4.228E+01	0.931
α_3	2.65E-07	2.40E-02	4.07E-03	1.18E-01	2.396E-01	9.763E+00	4.024

CCCG = 4, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8894253	0.9531561	0.9604313	0.9919607	3.863E+01	1.898E+00	--
α_2	1.90E-03	2.10E-02	1.60E-02	5.70E-02	1.285E+00	5.996E+01	0.950
α_3	6.26E-06	6.76E-03	2.43E-03	2.82E-02	3.927E-01	5.770E+01	1.002
α_4	7.70E-08	1.91E-02	2.67E-03	9.62E-02	2.207E-01	1.133E+01	5.036

CCCG = 5, Gamma = 0.183

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9239112	0.9615802	0.9649101	0.9878613	8.774E+01	3.506E+00	--
α_2	3.06E-03	1.71E-02	1.44E-02	4.04E-02	1.992E+00	1.143E+02	1.003
α_3	6.10E-04	9.84E-03	7.06E-03	2.86E-02	1.078E+00	1.085E+02	1.064
α_4	3.93E-06	7.41E-03	2.42E-03	3.17E-02	3.632E-01	4.867E+01	2.378
α_5	3.83E-20	4.04E-03	2.40E-06	2.38E-02	7.248E-02	1.786E+01	6.502

CCCG = 6, Gamma = 0.184

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9324488	0.9642674	0.9668732	0.9871784	1.133E+02	4.199E+00	--
α_2	2.17E-03	1.26E-02	1.05E-02	2.99E-02	1.941E+00	1.526E+02	0.940
α_3	9.46E-04	9.85E-03	7.56E-03	2.66E-02	1.332E+00	1.339E+02	1.075
α_4	6.74E-05	6.26E-03	3.38E-03	2.22E-02	6.181E-01	9.816E+01	1.471
α_5	3.46E-08	4.99E-03	7.48E-04	2.47E-02	2.313E-01	4.610E+01	3.136
α_6	1.91E-19	2.07E-03	1.98E-06	1.21E-02	7.684E-02	3.698E+01	3.921

CCCG = 7, Gamma = 0.184

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9436323	0.9672448	0.9688728	0.9852961	1.838E+02	6.223E+00	--
α_2	2.71E-03	1.11E-02	9.73E-03	2.39E-02	2.654E+00	2.373E+02	0.939
α_3	1.10E-03	8.04E-03	6.51E-03	2.02E-02	1.645E+00	2.029E+02	1.102
α_4	3.95E-04	5.93E-03	4.29E-03	1.70E-02	1.115E+00	1.870E+02	1.199
α_5	4.61E-05	4.75E-03	2.52E-03	1.70E-02	6.034E-01	1.265E+02	1.774
α_6	4.36E-10	2.44E-03	1.83E-04	1.30E-02	1.780E-01	7.274E+01	3.091
α_7	2.94E-50	5.35E-04	1.11E-13	1.90E-03	2.734E-02	5.107E+01	4.412

CCCG = 8, Gamma = 0.185

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9466822	0.9690073	0.9705476	0.9860710	1.953E+02	6.246E+00	--
α_2	2.23E-03	9.64E-03	8.42E-03	2.13E-02	2.504E+00	2.572E+02	0.903
α_3	6.87E-04	6.41E-03	5.00E-03	1.70E-02	1.419E+00	2.200E+02	1.059
α_4	2.77E-04	5.04E-03	3.54E-03	1.49E-02	1.027E+00	2.027E+02	1.151
α_5	9.02E-05	4.37E-03	2.62E-03	1.46E-02	7.337E-01	1.672E+02	1.396
α_6	3.70E-06	3.70E-03	1.34E-03	1.54E-02	3.975E-01	1.071E+02	2.181
α_7	1.15E-19	1.15E-03	1.11E-06	6.68E-03	7.703E-02	6.719E+01	3.485
α_8	6.42E-18	6.90E-04	1.73E-06	4.03E-03	8.749E-02	1.267E+02	1.849

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.36E-01	9.54E-01	9.53E-01	9.62E-01	9.64E-01	9.67E-01	9.69E-01
α_2	6.43E-02	2.17E-02	2.10E-02	1.71E-02	1.26E-02	1.11E-02	9.64E-03
α_3		2.40E-02	6.76E-03	9.84E-03	9.85E-03	8.04E-03	6.41E-03
α_4			1.91E-02	7.41E-03	6.26E-03	5.93E-03	5.04E-03
α_5				4.04E-03	4.99E-03	4.75E-03	4.37E-03
α_6					2.07E-03	2.44E-03	3.70E-03
α_7						5.35E-04	1.15E-03
α_8							6.90E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.36E-01	9.54E-01	9.53E-01	9.62E-01	9.64E-01	9.67E-01	9.69E-01
Beta	6.43E-02	4.57E-02	4.68E-02	3.84E-02	3.57E-02	3.28E-02	3.10E-02
Gamma		5.24E-01	5.52E-01	5.54E-01	6.49E-01	6.62E-01	6.89E-01
Delta			7.39E-01	5.38E-01	5.75E-01	6.29E-01	7.00E-01
Epsilon				3.53E-01	5.30E-01	5.66E-01	6.63E-01
Mu					2.93E-01	3.85E-01	5.59E-01
Omega						1.80E-01	3.32E-01
Sigma							3.76E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	4.50	6.00	7.50	9.00	10.50	12.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 11.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.324

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8524294	0.9617328	0.9826444	0.9998850	1.183E+01	4.706E-01	--
α_2	1.15E-04	3.83E-02	1.74E-02	1.48E-01	4.706E-01	1.183E+01	2.444

CCCG = 3, Gamma = 0.330

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9219774	0.9726682	0.9800243	0.9981874	3.924E+01	1.103E+00	--
α_2	3.08E-04	1.07E-02	6.80E-03	3.43E-02	8.104E-01	7.502E+01	0.931
α_3	1.44E-06	1.66E-02	4.02E-03	7.66E-02	2.921E-01	1.726E+01	4.024

CCCG = 4, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9484370	0.9782155	0.9816654	0.9961899	8.768E+01	1.953E+00	--
α_2	9.27E-04	9.93E-03	7.59E-03	2.69E-02	1.312E+00	1.308E+02	0.950
α_3	5.78E-06	3.44E-03	1.36E-03	1.39E-02	4.307E-01	1.249E+02	1.002
α_4	1.71E-08	8.42E-03	1.01E-03	4.29E-02	2.099E-01	2.472E+01	5.036

CCCG = 5, Gamma = 0.335

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9611288	0.9811564	0.9830669	0.9946530	1.618E+02	3.107E+00	--
α_2	1.06E-03	7.50E-03	6.10E-03	1.87E-02	1.684E+00	2.227E+02	1.003
α_3	1.97E-04	4.46E-03	3.03E-03	1.36E-02	9.426E-01	2.105E+02	1.064
α_4	3.04E-06	4.03E-03	1.39E-03	1.70E-02	3.816E-01	9.426E+01	2.378
α_5	1.15E-15	2.85E-03	1.58E-05	1.67E-02	9.865E-02	3.452E+01	6.502

CCCG = 6, Gamma = 0.337

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9675585	0.9833682	0.9847500	0.9944564	2.260E+02	3.822E+00	--
α_2	7.87E-04	5.44E-03	4.43E-03	1.35E-02	1.714E+00	3.136E+02	0.940
α_3	2.64E-04	4.02E-03	2.90E-03	1.16E-02	1.108E+00	2.747E+02	1.075
α_4	4.27E-05	3.23E-03	1.80E-03	1.13E-02	6.509E-01	2.009E+02	1.471
α_5	5.34E-08	2.68E-03	4.86E-04	1.29E-02	2.536E-01	9.426E+01	3.136
α_6	2.06E-16	1.27E-03	5.78E-06	7.39E-03	9.572E-02	7.550E+01	3.921

CCCG = 7, Gamma = 0.338

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9731150	0.9851063	0.9860236	0.9939644	3.436E+02	5.195E+00	--
α_2	8.74E-04	4.60E-03	3.91E-03	1.07E-02	2.105E+00	4.550E+02	0.939
α_3	3.18E-04	3.39E-03	2.59E-03	9.20E-03	1.320E+00	3.883E+02	1.102
α_4	1.42E-04	2.78E-03	1.93E-03	8.33E-03	9.967E-01	3.573E+02	1.199
α_5	1.10E-05	2.17E-03	1.03E-03	8.18E-03	5.249E-01	2.416E+02	1.774
α_6	1.05E-09	1.41E-03	1.38E-04	7.30E-03	1.956E-01	1.387E+02	3.091
α_7	1.56E-27	5.44E-04	1.24E-08	2.96E-03	5.291E-02	9.729E+01	4.412

CCCG = 8, Gamma = 0.338

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9758196	0.9862351	0.9869930	0.9940626	4.178E+02	5.832E+00	--
α_2	8.10E-04	4.00E-03	3.42E-03	9.14E-03	2.229E+00	5.557E+02	0.903
α_3	2.27E-04	2.65E-03	1.99E-03	7.31E-03	1.260E+00	4.746E+02	1.059
α_4	1.35E-04	2.38E-03	1.68E-03	7.02E-03	1.042E+00	4.366E+02	1.151
α_5	4.96E-05	2.11E-03	1.29E-03	6.97E-03	7.626E-01	3.601E+02	1.396
α_6	3.24E-07	1.42E-03	3.96E-04	6.30E-03	3.271E-01	2.307E+02	2.181
α_7	9.03E-13	9.30E-04	2.50E-05	5.23E-03	1.344E-01	1.444E+02	3.485
α_8	2.54E-20	2.82E-04	2.65E-07	1.64E-03	7.682E-02	2.724E+02	1.849

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.62E-01	9.73E-01	9.78E-01	9.81E-01	9.83E-01	9.85E-01	9.86E-01
α_2	3.83E-02	1.07E-02	9.93E-03	7.50E-03	5.44E-03	4.60E-03	4.00E-03
α_3		1.66E-02	3.44E-03	4.46E-03	4.02E-03	3.39E-03	2.65E-03
α_4			8.42E-03	4.03E-03	3.23E-03	2.78E-03	2.38E-03
α_5				2.85E-03	2.68E-03	2.17E-03	2.11E-03
α_6					1.27E-03	1.41E-03	1.42E-03
α_7						5.44E-04	9.30E-04
α_8							2.82E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.62E-01	9.73E-01	9.78E-01	9.81E-01	9.83E-01	9.85E-01	9.86E-01
Beta	3.83E-02	2.73E-02	2.18E-02	1.88E-02	1.66E-02	1.49E-02	1.38E-02
Gamma		6.09E-01	5.44E-01	6.02E-01	6.73E-01	6.91E-01	7.10E-01
Delta			7.10E-01	6.07E-01	6.41E-01	6.71E-01	7.29E-01
Epsilon				4.14E-01	5.50E-01	5.97E-01	6.66E-01
Mu					3.21E-01	4.74E-01	5.54E-01
Omega						2.79E-01	4.61E-01
Sigma							2.33E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.50	8.25	11.00	13.75	16.50	19.25	22.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.147

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9159321	0.9672628	0.9738339	0.9960898	4.412E+01	1.493E+00	--
α_2	3.91E-03	3.27E-02	2.62E-02	8.41E-02	1.493E+00	4.412E+01	2.444

CCCG = 3, Gamma = 0.130

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9437258	0.9757987	0.9794233	0.9954691	8.304E+01	2.059E+00	--
α_2	4.95E-05	2.65E-03	1.56E-03	8.93E-03	7.137E-01	2.690E+02	0.931
α_3	2.13E-03	2.16E-02	1.67E-02	5.76E-02	1.346E+00	6.109E+01	4.024

CCCG = 4, Gamma = 0.121

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9650192	0.9830427	0.9847639	0.9951828	1.806E+02	3.115E+00	--
α_2	3.73E-04	3.01E-03	2.40E-03	7.75E-03	1.549E+00	5.129E+02	0.950
α_3	1.69E-08	5.42E-04	1.06E-04	2.58E-03	2.646E-01	4.877E+02	1.002
α_4	1.24E-03	1.34E-02	1.02E-02	3.64E-02	1.301E+00	9.576E+01	5.036

CCCG = 5, Gamma = 0.116

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9871159	0.9925406	0.9929243	0.9966553	8.415E+02	6.325E+00	--
α_2	8.25E-04	2.59E-03	2.35E-03	5.14E-03	3.632E+00	1.400E+03	1.003
α_3	1.01E-04	1.02E-03	7.86E-04	2.76E-03	1.354E+00	1.322E+03	1.064
α_4	3.63E-05	1.34E-03	8.41E-04	4.37E-03	7.961E-01	5.913E+02	2.378
α_5	1.49E-05	2.50E-03	1.22E-03	9.34E-03	5.424E-01	2.160E+02	6.502

CCCG = 6, Gamma = 0.112

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9880531	0.9931851	0.9935589	0.9970411	8.651E+02	5.936E+00	--
α_2	5.72E-04	2.15E-03	1.91E-03	4.55E-03	2.915E+00	1.352E+03	0.940
α_3	9.05E-05	1.06E-03	7.97E-04	2.93E-03	1.257E+00	1.184E+03	1.075
α_4	1.96E-05	8.70E-04	5.28E-04	2.88E-03	7.531E-01	8.649E+02	1.471
α_5	1.59E-05	1.52E-03	8.13E-04	5.40E-03	6.155E-01	4.054E+02	3.136
α_6	1.16E-06	1.22E-03	4.36E-04	5.07E-03	3.951E-01	3.244E+02	3.921

CCCG = 7, Gamma = 0.110

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9925762	0.9952095	0.9953571	0.9973390	2.213E+03	1.065E+01	--
α_2	6.45E-04	1.66E-03	1.55E-03	3.07E-03	4.851E+00	2.910E+03	0.939
α_3	2.89E-04	1.13E-03	9.96E-04	2.41E-03	2.800E+00	2.481E+03	1.102
α_4	7.83E-05	6.61E-04	5.22E-04	1.72E-03	1.509E+00	2.283E+03	1.199
α_5	1.95E-05	5.61E-04	3.65E-04	1.77E-03	8.652E-01	1.543E+03	1.774
α_6	1.94E-06	5.53E-04	2.47E-04	2.14E-03	4.896E-01	8.852E+02	3.091
α_7	4.86E-13	2.25E-04	7.07E-06	1.26E-03	1.396E-01	6.204E+02	4.412

CCCG = 8, Gamma = 0.108

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9920073	0.9951118	0.9953084	0.9975453	1.659E+03	8.148E+00	--
α_2	3.52E-04	1.30E-03	1.16E-03	2.72E-03	2.980E+00	2.295E+03	0.903
α_3	1.73E-04	1.00E-03	8.36E-04	2.39E-03	1.960E+00	1.958E+03	1.059
α_4	5.55E-05	6.81E-04	5.08E-04	1.90E-03	1.229E+00	1.802E+03	1.151
α_5	1.38E-05	5.30E-04	3.29E-04	1.73E-03	7.875E-01	1.486E+03	1.396
α_6	3.88E-06	5.84E-04	2.90E-04	2.16E-03	5.555E-01	9.510E+02	2.181
α_7	4.00E-08	4.89E-04	1.14E-04	2.26E-03	2.914E-01	5.951E+02	3.485
α_8	1.09E-07	3.08E-04	9.26E-05	1.34E-03	3.452E-01	1.122E+03	1.849

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.67E-01	9.76E-01	9.83E-01	9.93E-01	9.93E-01	9.95E-01	9.95E-01
α_2	3.27E-02	2.65E-03	3.01E-03	2.59E-03	2.15E-03	1.66E-03	1.30E-03
α_3		2.16E-02	5.42E-04	1.02E-03	1.06E-03	1.13E-03	1.00E-03
α_4			1.34E-02	1.34E-03	8.70E-04	6.61E-04	6.81E-04
α_5				2.50E-03	1.52E-03	5.61E-04	5.30E-04
α_6					1.22E-03	5.53E-04	5.84E-04
α_7						2.25E-04	4.89E-04
α_8							3.08E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.67E-01	9.76E-01	9.83E-01	9.93E-01	9.93E-01	9.95E-01	9.95E-01
Beta	3.27E-02	2.42E-02	1.70E-02	7.46E-03	6.81E-03	4.79E-03	4.89E-03
Gamma		8.91E-01	8.22E-01	6.53E-01	6.84E-01	6.53E-01	7.35E-01
Delta			9.61E-01	7.90E-01	7.73E-01	6.39E-01	7.22E-01
Epsilon				6.51E-01	7.59E-01	6.70E-01	7.37E-01
Mu					4.45E-01	5.81E-01	7.23E-01
Omega						2.89E-01	5.77E-01
Sigma							3.86E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.50	2.25	3.00	3.75	4.50	5.25	6.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		1.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			1.0000	0.5000	0.2500	0.1250	0.0625
N₅				0.5000	0.5000	0.3750	0.2500
N₆					0.2500	0.3750	0.3750
N₇						0.1250	0.2500
N₈							0.0625

2.3.1.5 ALL-MOV-LK: All Systems Motor-Operated Valves Fail to Remain Closed (Leakage)

Generic CCF Parameters

Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Leak (Internal)
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 32.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9666157	0.9914784	0.9963029	0.9999740	1.0000000	5.451E+01	4.685E-01
α_2	2.38E-05	8.52E-03	3.69E-03	3.34E-02	0.00E+00	4.685E-01	5.451E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9647004	0.9876321	0.9909738	0.9991464	1.0000000	9.008E+01	1.128E+00
α_2	3.12E-04	9.33E-03	6.07E-03	2.95E-02	0.00E+00	8.512E-01	9.036E+01
α_3	1.51E-07	3.04E-03	6.49E-04	1.42E-02	0.00E+00	2.768E-01	9.093E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9635914	0.9848109	0.9873196	0.9974609	1.0000000	1.228E+02	1.894E+00
α_2	8.72E-04	1.01E-02	7.63E-03	2.78E-02	0.00E+00	1.260E+00	1.234E+02
α_3	3.51E-06	3.23E-03	1.18E-03	1.34E-02	0.00E+00	4.024E-01	1.243E+02
α_4	1.29E-08	1.86E-03	2.77E-04	9.19E-03	0.00E+00	2.315E-01	1.244E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9695384	0.9848383	0.9862454	0.9953442	1.0000000	2.229E+02	3.432E+00
α_2	1.45E-03	8.50E-03	7.10E-03	2.03E-02	0.00E+00	1.924E+00	2.244E+02
α_3	2.68E-04	4.63E-03	3.28E-03	1.36E-02	0.00E+00	1.049E+00	2.253E+02
α_4	1.28E-06	1.69E-03	5.82E-04	7.12E-03	0.00E+00	3.822E-01	2.260E+02
α_5	2.94E-20	3.39E-04	3.16E-07	1.97E-03	0.00E+00	7.674E-02	2.263E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9713593	0.9853155	0.9865392	0.9951002	1.0000000	2.573E+02	3.835E+00
α_2	9.33E-04	6.51E-03	5.30E-03	1.62E-02	0.00E+00	1.701E+00	2.595E+02
α_3	3.65E-04	4.62E-03	3.43E-03	1.29E-02	0.00E+00	1.207E+00	2.599E+02
α_4	2.09E-05	2.28E-03	1.20E-03	8.22E-03	0.00E+00	5.960E-01	2.606E+02
α_5	3.31E-09	8.47E-04	1.13E-04	4.25E-03	0.00E+00	2.211E-01	2.609E+02

α_6	3.31E-15	4.20E-04	4.26E-06	2.42E-03	0.00E+00	1.098E-01	2.610E+02
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CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9752691	0.9859700	0.9867514	0.9939920	1.0000000	4.039E+02	5.747E+00
α_2	1.12E-03	5.48E-03	4.69E-03	1.25E-02	0.00E+00	2.243E+00	4.074E+02
α_3	5.34E-04	3.98E-03	3.21E-03	1.01E-02	0.00E+00	1.630E+00	4.080E+02
α_4	1.64E-04	2.64E-03	1.89E-03	7.69E-03	0.00E+00	1.083E+00	4.086E+02
α_5	9.97E-06	1.38E-03	6.96E-04	5.07E-03	0.00E+00	5.654E-01	4.091E+02
α_6	2.57E-10	4.68E-04	4.32E-05	2.44E-03	0.00E+00	1.916E-01	4.095E+02
α_7	5.82E-41	8.50E-05	3.16E-12	3.73E-04	0.00E+00	3.480E-02	4.096E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9763850	0.9866177	0.9873718	0.9942873	1.0000000	4.221E+02	5.726E+00
α_2	8.50E-04	4.72E-03	3.97E-03	1.11E-02	0.00E+00	2.018E+00	4.258E+02
α_3	3.36E-04	3.25E-03	2.52E-03	8.67E-03	0.00E+00	1.391E+00	4.265E+02
α_4	1.48E-04	2.48E-03	1.76E-03	7.27E-03	0.00E+00	1.062E+00	4.268E+02
α_5	2.90E-05	1.64E-03	9.59E-04	5.58E-03	0.00E+00	7.026E-01	4.271E+02
α_6	3.21E-07	8.17E-04	2.51E-04	3.55E-03	0.00E+00	3.497E-01	4.275E+02
α_7	1.23E-15	2.52E-04	2.31E-06	1.46E-03	0.00E+00	1.078E-01	4.277E+02
α_8	2.58E-17	2.21E-04	9.37E-07	1.29E-03	0.00E+00	9.469E-02	4.278E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.88E-01	9.85E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01
α_2	8.52E-03	9.33E-03	1.01E-02	8.50E-03	6.51E-03	5.48E-03	4.72E-03
α_3		3.04E-03	3.23E-03	4.63E-03	4.62E-03	3.98E-03	3.25E-03
α_4			1.86E-03	1.69E-03	2.28E-03	2.64E-03	2.48E-03
α_5				3.39E-04	8.47E-04	1.38E-03	1.64E-03
α_6					4.20E-04	4.68E-04	8.17E-04
α_7						8.50E-05	2.52E-04
α_8							2.21E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.88E-01	9.85E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01
Beta	8.52E-03	1.24E-02	1.52E-02	1.52E-02	1.47E-02	1.40E-02	1.34E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	32.10	32.10	32.10	32.10	32.10	32.10	32.10
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 16.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.498

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9808176	0.9950559	0.9978042	0.9999837	9.729E+01	4.834E-01	--
α_2	1.63E-05	4.94E-03	2.20E-03	1.92E-02	4.834E-01	9.729E+01	0.617

CCCG = 3, Gamma = 0.498

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9813836	0.9933058	0.9949952	0.9994543	1.819E+02	1.226E+00	--
α_2	2.61E-04	5.37E-03	3.70E-03	1.62E-02	9.769E-01	1.810E+02	0.807
α_3	2.12E-08	1.33E-03	2.30E-04	6.43E-03	2.487E-01	1.873E+02	0.783

CCCG = 4, Gamma = 0.498

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9788886	0.9909850	0.9923742	0.9983315	2.261E+02	2.057E+00	--
α_2	6.94E-04	6.29E-03	4.93E-03	1.66E-02	1.442E+00	2.277E+02	0.872
α_3	2.26E-06	1.80E-03	6.77E-04	7.42E-03	4.114E-01	2.276E+02	0.877
α_4	1.21E-09	9.19E-04	1.00E-04	4.72E-03	2.036E-01	2.213E+02	0.903

CCCG = 5, Gamma = 0.498

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9810781	0.9904194	0.9912561	0.9969023	3.807E+02	3.683E+00	--
α_2	1.19E-03	5.80E-03	4.97E-03	1.32E-02	2.243E+00	3.844E+02	0.958
α_3	1.30E-04	2.59E-03	1.79E-03	7.78E-03	9.912E-01	3.812E+02	0.969
α_4	6.69E-07	9.82E-04	3.32E-04	4.16E-03	3.765E-01	3.831E+02	0.966
α_5	1.77E-21	2.05E-04	1.17E-07	1.18E-03	7.237E-02	3.538E+02	1.046

CCCG = 6, Gamma = 0.498

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9815077	0.9903421	0.9910939	0.9966080	4.244E+02	4.139E+00	--
α_2	9.44E-04	4.91E-03	4.17E-03	1.14E-02	2.128E+00	4.313E+02	0.970
α_3	1.82E-04	2.63E-03	1.91E-03	7.54E-03	1.134E+00	4.297E+02	0.976
α_4	8.43E-06	1.29E-03	6.40E-04	4.78E-03	5.533E-01	4.282E+02	0.981
α_5	2.00E-09	5.15E-04	6.87E-05	2.58E-03	2.210E-01	4.289E+02	0.980
α_6	3.95E-16	3.10E-04	2.16E-06	1.80E-03	1.027E-01	3.310E+02	1.270

CCCG = 7, Gamma = 0.498

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9840530	0.9907270	0.9911944	0.9958050	6.872E+02	6.432E+00	--
α_2	1.07E-03	4.11E-03	3.64E-03	8.75E-03	2.840E+00	6.877E+02	1.019
α_3	3.69E-04	2.49E-03	2.03E-03	6.16E-03	1.746E+00	6.999E+02	1.003
α_4	9.74E-05	1.56E-03	1.12E-03	4.55E-03	1.084E+00	6.924E+02	1.015
α_5	4.43E-06	7.79E-04	3.78E-04	2.92E-03	5.376E-01	6.891E+02	1.020
α_6	2.49E-10	2.84E-04	2.86E-05	1.47E-03	1.979E-01	6.970E+02	1.009
α_7	1.02E-52	4.57E-05	4.58E-15	1.56E-04	2.656E-02	5.816E+02	1.210

CCCG = 8, Gamma = 0.498

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845241	0.9911064	0.9915783	0.9960774	6.812E+02	6.112E+00	--
α_2	7.51E-04	3.47E-03	3.00E-03	7.80E-03	2.364E+00	6.791E+02	1.032
α_3	2.56E-04	2.15E-03	1.70E-03	5.59E-03	1.512E+00	7.003E+02	1.002
α_4	8.85E-05	1.51E-03	1.07E-03	4.43E-03	1.056E+00	6.986E+02	1.005
α_5	1.48E-05	9.78E-04	5.57E-04	3.37E-03	6.745E-01	6.889E+02	1.020
α_6	6.01E-08	4.47E-04	1.14E-04	2.03E-03	3.076E-01	6.878E+02	1.022
α_7	1.08E-15	1.55E-04	1.53E-06	8.92E-04	1.093E-01	7.067E+02	0.995
α_8	2.80E-18	1.81E-04	5.03E-07	1.06E-03	8.885E-02	4.906E+02	1.433

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.93E-01	9.91E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	4.94E-03	5.37E-03	6.29E-03	5.80E-03	4.91E-03	4.11E-03	3.47E-03
α_3		1.33E-03	1.80E-03	2.59E-03	2.63E-03	2.49E-03	2.15E-03
α_4			9.19E-04	9.82E-04	1.29E-03	1.56E-03	1.51E-03
α_5				2.05E-04	5.15E-04	7.79E-04	9.78E-04
α_6					3.10E-04	2.84E-04	4.47E-04
α_7						4.57E-05	1.55E-04
α_8							1.81E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.93E-01	9.91E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	4.94E-03	6.69E-03	9.02E-03	9.58E-03	9.66E-03	9.27E-03	8.89E-03
Gamma		1.98E-01	3.02E-01	3.95E-01	4.92E-01	5.57E-01	6.10E-01
Delta			3.38E-01	3.14E-01	4.46E-01	5.18E-01	6.03E-01
Epsilon				1.72E-01	3.90E-01	4.15E-01	5.38E-01
Mu					3.76E-01	2.97E-01	4.45E-01
Omega						1.39E-01	4.29E-01
Sigma							5.39E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	16.00	16.00	16.00	16.00	16.00	16.00	16.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9357412	0.9837804	0.9931677	0.9999638	2.728E+01	4.498E-01	--
α_2	3.62E-05	1.62E-02	6.83E-03	6.43E-02	4.498E-01	2.728E+01	0.617

CCCG = 3, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9318201	0.9755969	0.9818033	0.9981362	4.711E+01	1.178E+00	--
α_2	8.69E-04	1.96E-02	1.34E-02	5.93E-02	9.387E-01	4.705E+01	0.807
α_3	5.10E-08	4.84E-03	7.84E-04	2.38E-02	2.396E-01	4.923E+01	0.783

CCCG = 4, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9282423	0.9698364	0.9746701	0.9948836	6.104E+01	1.898E+00	--
α_2	1.84E-03	2.03E-02	1.55E-02	5.52E-02	1.285E+00	6.197E+01	0.872
α_3	5.77E-06	6.24E-03	2.24E-03	2.60E-02	3.927E-01	6.255E+01	0.877
α_4	1.39E-08	3.61E-03	4.84E-04	1.81E-02	2.207E-01	6.092E+01	0.903

CCCG = 5, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9401297	0.9698629	0.9725183	0.9905175	1.128E+02	3.506E+00	--
α_2	3.04E-03	1.70E-02	1.43E-02	4.01E-02	1.992E+00	1.151E+02	0.958
α_3	5.77E-04	9.32E-03	6.68E-03	2.71E-02	1.078E+00	1.146E+02	0.969
α_4	1.64E-06	3.13E-03	1.01E-03	1.34E-02	3.632E-01	1.157E+02	0.966
α_5	6.26E-21	6.77E-04	3.92E-07	3.92E-03	7.248E-02	1.071E+02	1.046

CCCG = 6, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9440583	0.9704723	0.9726525	0.9894345	1.380E+02	4.199E+00	--
α_2	2.33E-03	1.35E-02	1.13E-02	3.22E-02	1.941E+00	1.416E+02	0.970
α_3	8.96E-04	9.33E-03	7.16E-03	2.52E-02	1.332E+00	1.414E+02	0.976
α_4	4.67E-05	4.35E-03	2.35E-03	1.55E-02	6.181E-01	1.414E+02	0.981
α_5	1.12E-08	1.63E-03	2.42E-04	8.06E-03	2.313E-01	1.419E+02	0.980
α_6	6.40E-20	7.00E-04	6.61E-07	4.08E-03	7.684E-02	1.096E+02	1.270

CCCG = 7, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9500958	0.9710332	0.9724840	0.9870147	2.086E+02	6.223E+00	--
α_2	3.04E-03	1.24E-02	1.09E-02	2.69E-02	2.654E+00	2.113E+02	1.019
α_3	1.03E-03	7.57E-03	6.12E-03	1.91E-02	1.645E+00	2.157E+02	1.003
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.137E+02	1.015
α_5	2.73E-05	2.82E-03	1.50E-03	1.01E-02	6.034E-01	2.130E+02	1.020
α_6	1.46E-10	8.24E-04	6.14E-05	4.37E-03	1.780E-01	2.158E+02	1.009
α_7	8.27E-51	1.52E-04	3.12E-14	5.36E-04	2.734E-02	1.801E+02	1.210

CCCG = 8, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9511677	0.9716366	0.9730538	0.9872649	2.140E+02	6.246E+00	--
α_2	2.65E-03	1.15E-02	1.00E-02	2.52E-02	2.504E+00	2.160E+02	1.032
α_3	6.77E-04	6.31E-03	4.92E-03	1.67E-02	1.419E+00	2.236E+02	1.002
α_4	2.52E-04	4.58E-03	3.22E-03	1.36E-02	1.027E+00	2.233E+02	1.005
α_5	6.85E-05	3.32E-03	1.99E-03	1.11E-02	7.337E-01	2.203E+02	1.020
α_6	1.80E-06	1.80E-03	6.51E-04	7.50E-03	3.975E-01	2.202E+02	1.022
α_7	3.40E-20	3.40E-04	3.26E-07	1.98E-03	7.703E-02	2.265E+02	0.995
α_8	5.17E-18	5.56E-04	1.39E-06	3.25E-03	8.749E-02	1.572E+02	1.433

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.76E-01	9.70E-01	9.70E-01	9.70E-01	9.71E-01	9.72E-01
α_2	1.62E-02	1.96E-02	2.03E-02	1.70E-02	1.35E-02	1.24E-02	1.15E-02
α_3		4.84E-03	6.24E-03	9.32E-03	9.33E-03	7.57E-03	6.31E-03
α_4			3.61E-03	3.13E-03	4.35E-03	5.19E-03	4.58E-03
α_5				6.77E-04	1.63E-03	2.82E-03	3.32E-03
α_6					7.00E-04	8.24E-04	1.80E-03
α_7						1.52E-04	3.40E-04
α_8							5.56E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.76E-01	9.70E-01	9.70E-01	9.70E-01	9.71E-01	9.72E-01
Beta	1.62E-02	2.44E-02	3.02E-02	3.01E-02	2.95E-02	2.90E-02	2.84E-02
Gamma		1.98E-01	3.27E-01	4.35E-01	5.42E-01	5.72E-01	5.96E-01
Delta			3.66E-01	2.90E-01	4.17E-01	5.43E-01	6.27E-01
Epsilon				1.78E-01	3.49E-01	4.23E-01	5.68E-01
Mu					3.01E-01	2.57E-01	4.48E-01
Omega						1.55E-01	3.32E-01
Sigma							6.21E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 2.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.078

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8761862	0.9704053	0.9893860	0.9999772	1.246E+01	3.801E-01	--
α_2	2.28E-05	2.96E-02	1.06E-02	1.24E-01	3.801E-01	1.246E+01	0.617

CCCG = 3, Gamma = 0.078

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8582950	0.9521772	0.9663044	0.9976787	1.911E+01	9.600E-01	--
α_2	5.08E-04	3.35E-02	1.96E-02	1.14E-01	6.673E-01	1.922E+01	0.807
α_3	1.25E-06	1.43E-02	3.44E-03	6.57E-02	2.927E-01	2.021E+01	0.783

CCCG = 4, Gamma = 0.078

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8578164	0.9418541	0.9518612	0.9915773	2.704E+01	1.669E+00	--
α_2	2.10E-03	3.60E-02	2.59E-02	1.04E-01	1.039E+00	2.784E+01	0.872
α_3	1.18E-05	1.35E-02	4.85E-03	5.65E-02	3.887E-01	2.835E+01	0.877
α_4	1.00E-07	8.65E-03	1.44E-03	4.23E-02	2.414E-01	2.768E+01	0.903

CCCG = 5, Gamma = 0.078

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8907383	0.9445529	0.9492185	0.9824029	5.940E+01	3.487E+00	--
α_2	4.43E-03	2.83E-02	2.35E-02	6.86E-02	1.791E+00	6.151E+01	0.958
α_3	1.54E-03	1.93E-02	1.45E-02	5.36E-02	1.207E+00	6.136E+01	0.969
α_4	1.23E-05	6.91E-03	2.77E-03	2.78E-02	4.340E-01	6.235E+01	0.966
α_5	2.11E-26	9.48E-04	3.38E-08	5.23E-03	5.493E-02	5.787E+01	1.046

CCCG = 6, Gamma = 0.078

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9023005	0.9490042	0.9528771	0.9824609	7.266E+01	3.905E+00	--
α_2	1.67E-03	1.73E-02	1.33E-02	4.63E-02	1.335E+00	7.605E+01	0.970
α_3	2.45E-03	1.99E-02	1.59E-02	5.10E-02	1.531E+00	7.540E+01	0.976
α_4	1.82E-04	9.39E-03	5.60E-03	3.15E-02	7.191E-01	7.585E+01	0.981
α_5	4.72E-08	3.22E-03	5.52E-04	1.57E-02	2.467E-01	7.637E+01	0.980
α_6	1.36E-20	1.23E-03	7.43E-07	7.15E-03	7.279E-02	5.905E+01	1.270

CCCG = 7, Gamma = 0.078

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9176321	0.9527487	0.9552048	0.9794720	1.163E+02	5.770E+00	--
α_2	1.59E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.198E+02	1.019
α_3	2.88E-03	1.61E-02	1.36E-02	3.80E-02	1.989E+00	1.214E+02	1.003
α_4	9.51E-04	1.06E-02	8.03E-03	2.88E-02	1.287E+00	1.206E+02	1.015
α_5	9.53E-05	5.70E-03	3.31E-03	1.94E-02	6.913E-01	1.205E+02	1.020
α_6	1.40E-08	1.90E-03	2.86E-04	9.39E-03	2.327E-01	1.223E+02	1.009
α_7	1.40E-64	2.07E-04	3.13E-17	5.21E-04	2.112E-02	1.022E+02	1.210

CCCG = 8, Gamma = 0.078

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9277347	0.9567442	0.9586112	0.9793755	1.552E+02	7.016E+00	--
α_2	1.28E-03	9.93E-03	7.97E-03	2.53E-02	1.583E+00	1.579E+02	1.032
α_3	2.15E-03	1.21E-02	1.02E-02	2.86E-02	1.986E+00	1.622E+02	1.002
α_4	1.43E-03	1.02E-02	8.30E-03	2.55E-02	1.672E+00	1.620E+02	1.005
α_5	3.32E-04	6.27E-03	4.38E-03	1.86E-02	1.011E+00	1.603E+02	1.020
α_6	2.69E-05	3.55E-03	1.81E-03	1.30E-02	5.709E-01	1.604E+02	1.022
α_7	2.51E-10	1.09E-03	8.57E-05	5.78E-03	1.809E-01	1.652E+02	0.995
α_8	1.57E-107	1.08E-04	3.29E-27	8.14E-05	1.245E-02	1.148E+02	1.433

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.70E-01	9.52E-01	9.42E-01	9.45E-01	9.49E-01	9.53E-01	9.57E-01
α_2	2.96E-02	3.35E-02	3.60E-02	2.83E-02	1.73E-02	1.28E-02	9.93E-03
α_3		1.43E-02	1.35E-02	1.93E-02	1.99E-02	1.61E-02	1.21E-02
α_4			8.65E-03	6.91E-03	9.39E-03	1.06E-02	1.02E-02
α_5				9.48E-04	3.22E-03	5.70E-03	6.27E-03
α_6					1.23E-03	1.90E-03	3.55E-03
α_7						2.07E-04	1.09E-03
α_8							1.08E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.70E-01	9.52E-01	9.42E-01	9.45E-01	9.49E-01	9.53E-01	9.57E-01
Beta	2.96E-02	4.78E-02	5.81E-02	5.54E-02	5.10E-02	4.73E-02	4.33E-02
Gamma		2.98E-01	3.81E-01	4.90E-01	6.62E-01	7.30E-01	7.70E-01
Delta			3.90E-01	2.90E-01	4.10E-01	5.32E-01	6.37E-01
Epsilon				1.21E-01	3.22E-01	4.25E-01	5.19E-01
Mu					2.77E-01	2.70E-01	4.31E-01
Omega						9.81E-02	2.53E-01
Sigma							9.02E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.50	2.50	2.50	2.50	2.50	2.50	2.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 6.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.202

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9634516	0.9906522	0.9959266	0.9999732	4.987E+01	4.706E-01	--
α_2	2.68E-05	9.35E-03	4.07E-03	3.65E-02	4.706E-01	4.987E+01	0.617

CCCG = 3, Gamma = 0.202

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9631160	0.9871758	0.9907085	0.9991610	8.487E+01	1.103E+00	--
α_2	2.74E-04	9.50E-03	6.04E-03	3.05E-02	8.104E-01	8.448E+01	0.807
α_3	2.79E-07	3.32E-03	7.80E-04	1.53E-02	2.921E-01	8.763E+01	0.783

CCCG = 4, Gamma = 0.202

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9664135	0.9858590	0.9881293	0.9975396	1.361E+02	1.953E+00	--
α_2	8.82E-04	9.46E-03	7.23E-03	2.57E-02	1.312E+00	1.374E+02	0.872
α_3	5.24E-06	3.12E-03	1.23E-03	1.26E-02	4.307E-01	1.376E+02	0.877
α_4	3.12E-09	1.57E-03	1.85E-04	7.97E-03	2.099E-01	1.339E+02	0.903

CCCG = 5, Gamma = 0.202

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9715549	0.9862376	0.9876463	0.9961052	2.226E+02	3.107E+00	--
α_2	1.05E-03	7.40E-03	6.02E-03	1.85E-02	1.684E+00	2.258E+02	0.958
α_3	1.85E-04	4.19E-03	2.84E-03	1.28E-02	9.426E-01	2.239E+02	0.969
α_4	1.27E-06	1.69E-03	5.82E-04	7.14E-03	3.816E-01	2.252E+02	0.966
α_5	1.89E-16	4.74E-04	2.60E-06	2.76E-03	9.865E-02	2.081E+02	1.046

CCCG = 6, Gamma = 0.202

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9744139	0.9868992	0.9879950	0.9956406	2.879E+02	3.822E+00	--
α_2	8.41E-04	5.81E-03	4.73E-03	1.44E-02	1.714E+00	2.935E+02	0.970
α_3	2.48E-04	3.78E-03	2.73E-03	1.09E-02	1.108E+00	2.924E+02	0.976
α_4	2.94E-05	2.23E-03	1.24E-03	7.78E-03	6.509E-01	2.915E+02	0.981
α_5	1.72E-08	8.68E-04	1.56E-04	4.18E-03	2.536E-01	2.921E+02	0.980
α_6	6.88E-17	4.24E-04	1.93E-06	2.47E-03	9.572E-02	2.255E+02	1.270

CCCG = 7, Gamma = 0.202

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9771285	0.9873385	0.9881218	0.9948736	4.051E+02	5.195E+00	--
α_2	9.77E-04	5.15E-03	4.37E-03	1.20E-02	2.105E+00	4.069E+02	1.019
α_3	2.98E-04	3.18E-03	2.42E-03	8.63E-03	1.320E+00	4.143E+02	1.003
α_4	1.24E-04	2.43E-03	1.68E-03	7.27E-03	9.967E-01	4.097E+02	1.015
α_5	6.50E-06	1.28E-03	6.11E-04	4.85E-03	5.249E-01	4.080E+02	1.020
α_6	3.52E-10	4.74E-04	4.63E-05	2.46E-03	1.956E-01	4.128E+02	1.009
α_7	4.38E-28	1.54E-04	3.48E-09	8.33E-04	5.291E-02	3.445E+02	1.210

CCCG = 8, Gamma = 0.202

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9785253	0.9877810	0.9884558	0.9947324	4.715E+02	5.832E+00	--
α_2	9.56E-04	4.71E-03	4.03E-03	1.08E-02	2.229E+00	4.709E+02	1.032
α_3	2.22E-04	2.59E-03	1.95E-03	7.14E-03	1.260E+00	4.860E+02	1.002
α_4	1.22E-04	2.15E-03	1.51E-03	6.33E-03	1.042E+00	4.847E+02	1.005
α_5	3.74E-05	1.59E-03	9.75E-04	5.25E-03	7.626E-01	4.780E+02	1.020
α_6	1.57E-07	6.85E-04	1.91E-04	3.04E-03	3.271E-01	4.774E+02	1.022
α_7	2.65E-13	2.74E-04	7.34E-06	1.54E-03	1.344E-01	4.906E+02	0.995
α_8	2.03E-20	2.25E-04	2.12E-07	1.31E-03	7.682E-02	3.406E+02	1.433

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.87E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01	9.88E-01
α_2	9.35E-03	9.50E-03	9.46E-03	7.40E-03	5.81E-03	5.15E-03	4.71E-03
α_3		3.32E-03	3.12E-03	4.19E-03	3.78E-03	3.18E-03	2.59E-03
α_4			1.57E-03	1.69E-03	2.23E-03	2.43E-03	2.15E-03
α_5				4.74E-04	8.68E-04	1.28E-03	1.59E-03
α_6					4.24E-04	4.74E-04	6.85E-04
α_7						1.54E-04	2.74E-04
α_8							2.25E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.87E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01	9.88E-01
Beta	9.35E-03	1.28E-02	1.41E-02	1.38E-02	1.31E-02	1.27E-02	1.22E-02
Gamma		2.59E-01	3.31E-01	4.62E-01	5.57E-01	5.94E-01	6.14E-01
Delta			3.34E-01	3.41E-01	4.83E-01	5.77E-01	6.56E-01
Epsilon				2.19E-01	3.67E-01	4.41E-01	5.64E-01
Mu					3.28E-01	3.28E-01	4.26E-01
Omega						2.45E-01	4.22E-01
Sigma							4.52E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.50	6.50	6.50	6.50	6.50	6.50	6.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 4.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.128

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9896253	0.9973094	0.9987866	0.9999901	1.828E+02	4.932E-01	--
α_2	9.88E-06	2.69E-03	1.21E-03	1.04E-02	4.932E-01	1.828E+02	0.617

CCCG = 3, Gamma = 0.128

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9901518	0.9966393	0.9976134	0.9998011	3.142E+02	1.059E+00	--
α_2	4.27E-05	2.29E-03	1.35E-03	7.72E-03	7.137E-01	3.115E+02	0.807
α_3	3.86E-07	1.07E-03	3.25E-04	4.69E-03	3.458E-01	3.215E+02	0.783

CCCG = 4, Gamma = 0.128

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9911705	0.9962055	0.9967802	0.9992764	5.552E+02	2.115E+00	--
α_2	3.42E-04	2.76E-03	2.20E-03	7.11E-03	1.549E+00	5.588E+02	0.872
α_3	1.48E-08	4.75E-04	9.28E-05	2.26E-03	2.646E-01	5.573E+02	0.877
α_4	6.14E-08	5.56E-04	1.36E-04	2.54E-03	3.010E-01	5.414E+02	0.903

CCCG = 5, Gamma = 0.128

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9934491	0.9963620	0.9965855	0.9985118	1.458E+03	5.325E+00	--
α_2	7.88E-04	2.47E-03	2.25E-03	4.91E-03	3.632E+00	1.466E+03	0.958
α_3	9.16E-05	9.32E-04	7.16E-04	2.51E-03	1.354E+00	1.451E+03	0.969
α_4	1.93E-08	2.03E-04	4.85E-05	9.33E-04	2.961E-01	1.457E+03	0.966
α_5	9.39E-35	3.15E-05	3.47E-11	1.56E-04	4.243E-02	1.345E+03	1.046

CCCG = 6, Gamma = 0.128

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9930127	0.9961909	0.9964430	0.9985082	1.291E+03	4.936E+00	--
α_2	5.91E-04	2.22E-03	1.98E-03	4.70E-03	2.915E+00	1.308E+03	0.970
α_3	8.23E-05	9.64E-04	7.24E-04	2.67E-03	1.257E+00	1.302E+03	0.976
α_4	1.58E-06	3.88E-04	1.77E-04	1.49E-03	5.031E-01	1.297E+03	0.981
α_5	2.58E-15	8.90E-05	1.17E-06	5.10E-04	1.155E-01	1.298E+03	0.980
α_6	6.77E-13	1.45E-04	5.30E-06	8.02E-04	1.451E-01	1.002E+03	1.270

CCCG = 7, Gamma = 0.128

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9943474	0.9964226	0.9965445	0.9980818	2.689E+03	9.654E+00	--
α_2	7.00E-04	1.81E-03	1.68E-03	3.33E-03	4.851E+00	2.681E+03	1.019
α_3	2.63E-04	1.03E-03	9.07E-04	2.20E-03	2.800E+00	2.726E+03	1.003
α_4	5.24E-05	5.13E-04	3.96E-04	1.37E-03	1.384E+00	2.695E+03	1.015
α_5	6.47E-07	1.83E-04	8.17E-05	7.07E-04	4.902E-01	2.681E+03	1.020
α_6	1.01E-15	4.23E-05	5.36E-07	2.43E-04	1.146E-01	2.711E+03	1.009
α_7	3.40E-93	6.47E-06	6.89E-25	7.69E-06	1.464E-02	2.262E+03	1.210

CCCG = 8, Gamma = 0.128

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940007	0.9964339	0.9965976	0.9983083	1.997E+03	7.148E+00	--
α_2	4.02E-04	1.48E-03	1.32E-03	3.12E-03	2.980E+00	2.005E+03	1.032
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	1.002
α_4	4.14E-05	5.66E-04	4.15E-04	1.60E-03	1.166E+00	2.061E+03	1.005
α_5	1.50E-06	2.65E-04	1.28E-04	9.90E-04	5.375E-01	2.031E+03	1.020
α_6	1.97E-11	8.90E-05	6.91E-06	4.71E-04	1.805E-01	2.027E+03	1.022
α_7	1.03E-35	1.99E-05	1.49E-11	9.72E-05	4.139E-02	2.083E+03	0.995
α_8	1.19E-08	1.96E-04	4.31E-05	9.11E-04	2.827E-01	1.446E+03	1.433

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	2.69E-03	2.29E-03	2.76E-03	2.47E-03	2.22E-03	1.81E-03	1.48E-03
α_3		1.07E-03	4.75E-04	9.32E-04	9.64E-04	1.03E-03	9.48E-04
α_4			5.56E-04	2.03E-04	3.88E-04	5.13E-04	5.66E-04
α_5				3.15E-05	8.90E-05	1.83E-04	2.65E-04
α_6					1.45E-04	4.23E-05	8.90E-05
α_7						6.47E-06	1.99E-05
α_8							1.96E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	2.69E-03	3.36E-03	3.79E-03	3.64E-03	3.81E-03	3.58E-03	3.57E-03
Gamma		3.20E-01	2.72E-01	3.21E-01	4.16E-01	4.95E-01	5.84E-01
Delta			5.39E-01	2.01E-01	3.92E-01	4.21E-01	5.45E-01
Epsilon				1.34E-01	3.76E-01	3.11E-01	5.01E-01
Mu					6.19E-01	2.11E-01	5.35E-01
Omega						1.33E-01	7.08E-01
Sigma							9.08E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.10	4.10	4.10	4.10	4.10	4.10	4.10
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.2 Containment Spray Motor-Operated Valves

2.3.2.1 CSS-MOV-FTOC: CSS Motor-Operated Valves Fail to Open/Close

Generic CCF Parameters

System Group: Clean Water
System: Containment Spray Recirculation
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Close, Fail to Open, Fail to Open or Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 24.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9612834	0.9901115	0.9957085	0.9999699	1.0000000	4.691E+01	4.685E-01
α_2	2.77E-05	9.89E-03	4.29E-03	3.87E-02	0.00E+00	4.685E-01	4.691E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9615139	0.9865078	0.9901416	0.9990683	1.0000000	8.248E+01	1.128E+00
α_2	3.41E-04	1.02E-02	6.63E-03	3.21E-02	0.00E+00	8.512E-01	8.276E+01
α_3	1.65E-07	3.31E-03	7.08E-04	1.55E-02	0.00E+00	2.768E-01	8.333E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9612453	0.9838248	0.9864918	0.9972942	1.0000000	1.152E+02	1.894E+00
α_2	9.30E-04	1.08E-02	8.13E-03	2.96E-02	0.00E+00	1.260E+00	1.158E+02
α_3	3.73E-06	3.44E-03	1.26E-03	1.42E-02	0.00E+00	4.024E-01	1.167E+02
α_4	1.37E-08	1.98E-03	2.95E-04	9.79E-03	0.00E+00	2.315E-01	1.168E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9684864	0.9843116	0.9857662	0.9951812	1.0000000	2.153E+02	3.432E+00
α_2	1.50E-03	8.80E-03	7.35E-03	2.10E-02	0.00E+00	1.924E+00	2.168E+02
α_3	2.78E-04	4.79E-03	3.40E-03	1.41E-02	0.00E+00	1.049E+00	2.177E+02
α_4	1.33E-06	1.75E-03	6.02E-04	7.37E-03	0.00E+00	3.822E-01	2.184E+02
α_5	3.05E-20	3.51E-04	3.27E-07	2.04E-03	0.00E+00	7.674E-02	2.187E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9705104	0.9848753	0.9861298	0.9949523	1.0000000	2.497E+02	3.835E+00
α_2	9.62E-04	6.71E-03	5.46E-03	1.67E-02	0.00E+00	1.701E+00	2.519E+02

α_3	3.76E-04	4.76E-03	3.54E-03	1.33E-02	0.00E+00	1.207E+00	2.523E+02
α_4	2.15E-05	2.35E-03	1.23E-03	8.47E-03	0.00E+00	5.960E-01	2.530E+02
α_5	3.41E-09	8.72E-04	1.17E-04	4.37E-03	0.00E+00	2.211E-01	2.533E+02
α_6	3.41E-15	4.33E-04	4.38E-06	2.50E-03	0.00E+00	1.098E-01	2.534E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9748039	0.9857048	0.9865005	0.9938815	1.0000000	3.963E+02	5.747E+00
α_2	1.14E-03	5.58E-03	4.78E-03	1.27E-02	0.00E+00	2.243E+00	3.998E+02
α_3	5.44E-04	4.05E-03	3.27E-03	1.03E-02	0.00E+00	1.630E+00	4.004E+02
α_4	1.68E-04	2.69E-03	1.93E-03	7.84E-03	0.00E+00	1.083E+00	4.010E+02
α_5	1.02E-05	1.41E-03	7.09E-04	5.17E-03	0.00E+00	5.654E-01	4.015E+02
α_6	2.62E-10	4.77E-04	4.40E-05	2.48E-03	0.00E+00	1.916E-01	4.019E+02
α_7	5.93E-41	8.66E-05	3.22E-12	3.80E-04	0.00E+00	3.480E-02	4.020E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9759647	0.9863757	0.9871381	0.9941818	1.0000000	4.145E+02	5.726E+00
α_2	8.66E-04	4.80E-03	4.04E-03	1.13E-02	0.00E+00	2.018E+00	4.182E+02
α_3	3.42E-04	3.31E-03	2.56E-03	8.83E-03	0.00E+00	1.391E+00	4.189E+02
α_4	1.50E-04	2.53E-03	1.80E-03	7.40E-03	0.00E+00	1.062E+00	4.192E+02
α_5	2.95E-05	1.67E-03	9.77E-04	5.68E-03	0.00E+00	7.026E-01	4.195E+02
α_6	3.27E-07	8.32E-04	2.55E-04	3.62E-03	0.00E+00	3.497E-01	4.199E+02
α_7	1.25E-15	2.57E-04	2.35E-06	1.48E-03	0.00E+00	1.078E-01	4.201E+02
α_8	2.62E-17	2.25E-04	9.54E-07	1.31E-03	0.00E+00	9.469E-02	4.202E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.87E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
α_2	9.89E-03	1.02E-02	1.08E-02	8.80E-03	6.71E-03	5.58E-03	4.80E-03
α_3		3.31E-03	3.44E-03	4.79E-03	4.76E-03	4.05E-03	3.31E-03
α_4			1.98E-03	1.75E-03	2.35E-03	2.69E-03	2.53E-03
α_5				3.51E-04	8.72E-04	1.41E-03	1.67E-03
α_6					4.33E-04	4.77E-04	8.32E-04
α_7						8.66E-05	2.57E-04
α_8							2.25E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.87E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
Beta	9.89E-03	1.35E-02	1.62E-02	1.57E-02	1.51E-02	1.43E-02	1.36E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	24.50	24.50	24.50	24.50	24.50	24.50	24.50
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 9.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.367

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9704767	0.9923819	0.9966046	0.9999747	6.297E+01	4.834E-01	--
α_2	2.53E-05	7.62E-03	3.40E-03	2.95E-02	4.834E-01	6.297E+01	0.840

CCCG = 3, Gamma = 0.367

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738091	0.9905694	0.9929390	0.9992294	1.287E+02	1.226E+00	--
α_2	3.60E-04	7.39E-03	5.10E-03	2.22E-02	9.769E-01	1.312E+02	1.058
α_3	3.27E-08	2.04E-03	3.55E-04	9.90E-03	2.487E-01	1.216E+02	1.149

CCCG = 4, Gamma = 0.367

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9710574	0.9876227	0.9895187	0.9977042	1.641E+02	2.057E+00	--
α_2	9.30E-04	8.42E-03	6.60E-03	2.21E-02	1.442E+00	1.699E+02	1.126
α_3	3.28E-06	2.62E-03	9.83E-04	1.08E-02	4.114E-01	1.569E+02	1.227
α_4	1.77E-09	1.35E-03	1.47E-04	6.91E-03	2.036E-01	1.510E+02	1.276

CCCG = 5, Gamma = 0.367

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9753811	0.9875219	0.9886057	0.9959599	2.915E+02	3.683E+00	--
α_2	1.50E-03	7.32E-03	6.28E-03	1.67E-02	2.243E+00	3.041E+02	1.186
α_3	1.78E-04	3.53E-03	2.45E-03	1.06E-02	9.912E-01	2.795E+02	1.295
α_4	9.35E-07	1.37E-03	4.63E-04	5.81E-03	3.765E-01	2.742E+02	1.323
α_5	2.17E-21	2.51E-04	1.43E-07	1.45E-03	7.237E-02	2.887E+02	1.258

CCCG = 6, Gamma = 0.367

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9766051	0.9877708	0.9887182	0.9957000	3.343E+02	4.139E+00	--
α_2	1.11E-03	5.77E-03	4.91E-03	1.34E-02	2.128E+00	3.666E+02	1.121
α_3	2.50E-04	3.61E-03	2.63E-03	1.03E-02	1.134E+00	3.127E+02	1.318
α_4	1.15E-05	1.77E-03	8.76E-04	6.53E-03	5.533E-01	3.129E+02	1.319
α_5	2.70E-09	6.94E-04	9.27E-05	3.48E-03	2.210E-01	3.180E+02	1.299
α_6	4.91E-16	3.85E-04	2.68E-06	2.23E-03	1.027E-01	2.667E+02	1.549

CCCG = 7, Gamma = 0.367

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9803434	0.9885628	0.9891369	0.9948219	5.559E+02	6.432E+00	--
α_2	1.19E-03	4.57E-03	4.05E-03	9.72E-03	2.840E+00	6.191E+02	1.120
α_3	4.92E-04	3.31E-03	2.71E-03	8.19E-03	1.746E+00	5.255E+02	1.321
α_4	1.29E-04	2.07E-03	1.48E-03	6.01E-03	1.084E+00	5.232E+02	1.329
α_5	5.94E-06	1.04E-03	5.06E-04	3.91E-03	5.376E-01	5.141E+02	1.353
α_6	3.46E-10	3.93E-04	3.97E-05	2.03E-03	1.979E-01	5.031E+02	1.384
α_7	1.20E-52	5.34E-05	5.35E-15	1.82E-04	2.656E-02	4.974E+02	1.400

CCCG = 8, Gamma = 0.367

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9812189	0.9892009	0.9897718	0.9952337	5.599E+02	6.112E+00	--
α_2	8.08E-04	3.73E-03	3.23E-03	8.39E-03	2.364E+00	6.310E+02	1.099
α_3	3.29E-04	2.76E-03	2.19E-03	7.17E-03	1.512E+00	5.455E+02	1.273
α_4	1.19E-04	2.04E-03	1.44E-03	5.97E-03	1.056E+00	5.178E+02	1.342
α_5	1.93E-05	1.27E-03	7.25E-04	4.39E-03	6.745E-01	5.296E+02	1.313
α_6	8.11E-08	6.04E-04	1.53E-04	2.74E-03	3.076E-01	5.093E+02	1.366
α_7	1.61E-15	2.30E-04	2.28E-06	1.33E-03	1.093E-01	4.743E+02	1.468
α_8	2.49E-18	1.61E-04	4.48E-07	9.40E-04	8.885E-02	5.509E+02	1.264

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.91E-01	9.88E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01
α_2	7.62E-03	7.39E-03	8.42E-03	7.32E-03	5.77E-03	4.57E-03	3.73E-03
α_3		2.04E-03	2.62E-03	3.53E-03	3.61E-03	3.31E-03	2.76E-03
α_4			1.35E-03	1.37E-03	1.77E-03	2.07E-03	2.04E-03
α_5				2.51E-04	6.94E-04	1.04E-03	1.27E-03
α_6					3.85E-04	3.93E-04	6.04E-04
α_7						5.34E-05	2.30E-04
α_8							1.61E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.91E-01	9.88E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01
Beta	7.62E-03	9.43E-03	1.24E-02	1.25E-02	1.22E-02	1.14E-02	1.08E-02
Gamma		2.16E-01	3.20E-01	4.13E-01	5.28E-01	6.01E-01	6.54E-01
Delta			3.40E-01	3.15E-01	4.40E-01	5.18E-01	6.09E-01
Epsilon				1.55E-01	3.79E-01	4.19E-01	5.27E-01
Mu					3.57E-01	2.99E-01	4.39E-01
Omega						1.20E-01	3.94E-01
Sigma							4.12E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	9.00	9.00	9.00	9.00	9.00	9.00	9.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.163

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9174805	0.9791281	0.9911490	0.9999530	2.110E+01	4.498E-01	--
α_2	4.70E-05	2.09E-02	8.85E-03	8.25E-02	4.498E-01	2.110E+01	0.840

CCCG = 3, Gamma = 0.163

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9111706	0.9680815	0.9760983	0.9975454	3.574E+01	1.178E+00	--
α_2	1.12E-03	2.50E-02	1.72E-02	7.56E-02	9.387E-01	3.662E+01	1.058
α_3	7.33E-08	6.92E-03	1.13E-03	3.40E-02	2.396E-01	3.437E+01	1.149

CCCG = 4, Gamma = 0.163

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9068134	0.9606614	0.9668587	0.9932843	4.636E+01	1.898E+00	--
α_2	2.34E-03	2.58E-02	1.97E-02	6.98E-02	1.285E+00	4.861E+01	1.126
α_3	7.96E-06	8.57E-03	3.09E-03	3.57E-02	3.927E-01	4.541E+01	1.227
α_4	1.94E-08	5.01E-03	6.75E-04	2.52E-02	2.207E-01	4.382E+01	1.276

CCCG = 5, Gamma = 0.163

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9241730	0.9617143	0.9650335	0.9879045	8.806E+01	3.506E+00	--
α_2	3.74E-03	2.09E-02	1.76E-02	4.92E-02	1.992E+00	9.337E+01	1.186
α_3	7.67E-04	1.23E-02	8.87E-03	3.58E-02	1.078E+00	8.626E+01	1.295
α_4	2.24E-06	4.25E-03	1.38E-03	1.82E-02	3.632E-01	8.513E+01	1.323
α_5	7.46E-21	8.06E-04	4.68E-07	4.67E-03	7.248E-02	8.984E+01	1.258

CCCG = 6, Gamma = 0.163

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9304165	0.9631784	0.9658577	0.9867811	1.098E+02	4.199E+00	--
α_2	2.68E-03	1.55E-02	1.30E-02	3.69E-02	1.941E+00	1.232E+02	1.121
α_3	1.20E-03	1.25E-02	9.61E-03	3.37E-02	1.332E+00	1.052E+02	1.318
α_4	6.25E-05	5.81E-03	3.14E-03	2.06E-02	6.181E-01	1.057E+02	1.319
α_5	1.47E-08	2.14E-03	3.19E-04	1.06E-02	2.313E-01	1.078E+02	1.299
α_6	7.76E-20	8.49E-04	8.01E-07	4.94E-03	7.684E-02	9.047E+01	1.549

CCCG = 7, Gamma = 0.163

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9392953	0.9646980	0.9664434	0.9841381	1.700E+02	6.223E+00	--
α_2	3.33E-03	1.36E-02	1.20E-02	2.94E-02	2.654E+00	1.928E+02	1.120
α_3	1.36E-03	9.93E-03	8.04E-03	2.50E-02	1.645E+00	1.641E+02	1.321
α_4	4.51E-04	6.77E-03	4.90E-03	1.94E-02	1.115E+00	1.637E+02	1.329
α_5	3.61E-05	3.73E-03	1.98E-03	1.34E-02	6.034E-01	1.612E+02	1.353
α_6	2.00E-10	1.13E-03	8.40E-05	5.97E-03	1.780E-01	1.580E+02	1.384
α_7	9.53E-51	1.75E-04	3.59E-14	6.18E-04	2.734E-02	1.563E+02	1.400

CCCG = 8, Gamma = 0.163

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9418054	0.9661439	0.9678167	0.9847682	1.782E+02	6.246E+00	--
α_2	2.81E-03	1.22E-02	1.06E-02	2.68E-02	2.504E+00	2.035E+02	1.099
α_3	8.57E-04	7.98E-03	6.22E-03	2.11E-02	1.419E+00	1.765E+02	1.273
α_4	3.35E-04	6.09E-03	4.28E-03	1.80E-02	1.027E+00	1.677E+02	1.342
α_5	8.78E-05	4.25E-03	2.55E-03	1.42E-02	7.337E-01	1.717E+02	1.313
α_6	2.39E-06	2.40E-03	8.67E-04	9.98E-03	3.975E-01	1.653E+02	1.366
α_7	5.00E-20	4.99E-04	4.80E-07	2.90E-03	7.703E-02	1.542E+02	1.468
α_8	4.54E-18	4.88E-04	1.22E-06	2.85E-03	8.749E-02	1.791E+02	1.264

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.79E-01	9.68E-01	9.61E-01	9.62E-01	9.63E-01	9.65E-01	9.66E-01
α_2	2.09E-02	2.50E-02	2.58E-02	2.09E-02	1.55E-02	1.36E-02	1.22E-02
α_3		6.92E-03	8.57E-03	1.23E-02	1.25E-02	9.93E-03	7.98E-03
α_4			5.01E-03	4.25E-03	5.81E-03	6.77E-03	6.09E-03
α_5				8.06E-04	2.14E-03	3.73E-03	4.25E-03
α_6					8.49E-04	1.13E-03	2.40E-03
α_7						1.75E-04	4.99E-04
α_8							4.88E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.79E-01	9.68E-01	9.61E-01	9.62E-01	9.63E-01	9.65E-01	9.66E-01
Beta	2.09E-02	3.19E-02	3.93E-02	3.83E-02	3.68E-02	3.53E-02	3.39E-02
Gamma		2.17E-01	3.45E-01	4.54E-01	5.79E-01	6.15E-01	6.41E-01
Delta			3.69E-01	2.91E-01	4.13E-01	5.43E-01	6.32E-01
Epsilon				1.59E-01	3.40E-01	4.26E-01	5.57E-01
Mu					2.84E-01	2.58E-01	4.43E-01
Omega						1.35E-01	2.92E-01
Sigma							4.94E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 5.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.204

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9477851	0.9866219	0.9941382	0.9999614	3.471E+01	4.706E-01	--
α_2	3.86E-05	1.34E-02	5.86E-03	5.22E-02	4.706E-01	3.471E+01	0.840

CCCG = 3, Gamma = 0.204

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9491811	0.9822866	0.9871285	0.9988358	6.114E+01	1.103E+00	--
α_2	3.68E-04	1.27E-02	8.11E-03	4.08E-02	8.104E-01	6.284E+01	1.058
α_3	4.20E-07	4.98E-03	1.17E-03	2.30E-02	2.921E-01	5.835E+01	1.149

CCCG = 4, Gamma = 0.204

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9549297	0.9809823	0.9840091	0.9966801	1.007E+02	1.953E+00	--
α_2	1.16E-03	1.24E-02	9.46E-03	3.35E-02	1.312E+00	1.049E+02	1.126
α_3	7.44E-06	4.42E-03	1.75E-03	1.79E-02	4.307E-01	9.703E+01	1.227
α_4	4.47E-09	2.24E-03	2.65E-04	1.14E-02	2.099E-01	9.349E+01	1.276

CCCG = 5, Gamma = 0.204

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9632983	0.9822154	0.9840221	0.9949563	1.716E+02	3.107E+00	--
α_2	1.31E-03	9.23E-03	7.51E-03	2.31E-02	1.684E+00	1.807E+02	1.186
α_3	2.50E-04	5.64E-03	3.83E-03	1.72E-02	9.426E-01	1.661E+02	1.295
α_4	1.76E-06	2.33E-03	8.03E-04	9.85E-03	3.816E-01	1.631E+02	1.323
α_5	2.29E-16	5.74E-04	3.15E-06	3.34E-03	9.865E-02	1.719E+02	1.258

CCCG = 6, Gamma = 0.204

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9677006	0.9834415	0.9848173	0.9944810	2.270E+02	3.822E+00	--
α_2	9.77E-04	6.74E-03	5.50E-03	1.68E-02	1.714E+00	2.524E+02	1.121
α_3	3.37E-04	5.12E-03	3.70E-03	1.48E-02	1.108E+00	2.151E+02	1.318
α_4	3.99E-05	3.01E-03	1.68E-03	1.05E-02	6.509E-01	2.153E+02	1.319
α_5	2.29E-08	1.16E-03	2.08E-04	5.57E-03	2.536E-01	2.191E+02	1.299
α_6	8.45E-17	5.21E-04	2.37E-06	3.03E-03	9.572E-02	1.838E+02	1.549

CCCG = 7, Gamma = 0.204

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9718296	0.9843907	0.9853508	0.9936726	3.276E+02	5.195E+00	--
α_2	1.08E-03	5.68E-03	4.82E-03	1.32E-02	2.105E+00	3.686E+02	1.120
α_3	3.95E-04	4.20E-03	3.21E-03	1.14E-02	1.320E+00	3.129E+02	1.321
α_4	1.63E-04	3.19E-03	2.21E-03	9.55E-03	9.967E-01	3.115E+02	1.329
α_5	8.66E-06	1.71E-03	8.13E-04	6.45E-03	5.249E-01	3.063E+02	1.353
α_6	4.85E-10	6.52E-04	6.38E-05	3.38E-03	1.956E-01	2.998E+02	1.384
α_7	5.09E-28	1.78E-04	4.05E-09	9.68E-04	5.291E-02	2.965E+02	1.400

CCCG = 8, Gamma = 0.204

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740421	0.9852188	0.9860310	0.9936218	3.887E+02	5.832E+00	--
α_2	1.02E-03	5.03E-03	4.31E-03	1.15E-02	2.229E+00	4.405E+02	1.099
α_3	2.83E-04	3.29E-03	2.48E-03	9.09E-03	1.260E+00	3.812E+02	1.273
α_4	1.63E-04	2.87E-03	2.03E-03	8.47E-03	1.042E+00	3.617E+02	1.342
α_5	4.83E-05	2.06E-03	1.26E-03	6.78E-03	7.626E-01	3.700E+02	1.313
α_6	2.10E-07	9.18E-04	2.56E-04	4.08E-03	3.271E-01	3.559E+02	1.366
α_7	3.93E-13	4.05E-04	1.09E-05	2.28E-03	1.344E-01	3.315E+02	1.468
α_8	1.80E-20	1.99E-04	1.87E-07	1.16E-03	7.682E-02	3.851E+02	1.264

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.82E-01	9.81E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01
α_2	1.34E-02	1.27E-02	1.24E-02	9.23E-03	6.74E-03	5.68E-03	5.03E-03
α_3		4.98E-03	4.42E-03	5.64E-03	5.12E-03	4.20E-03	3.29E-03
α_4			2.24E-03	2.33E-03	3.01E-03	3.19E-03	2.87E-03
α_5				5.74E-04	1.16E-03	1.71E-03	2.06E-03
α_6					5.21E-04	6.52E-04	9.18E-04
α_7						1.78E-04	4.05E-04
α_8							1.99E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.82E-01	9.81E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01
Beta	1.34E-02	1.77E-02	1.90E-02	1.78E-02	1.66E-02	1.56E-02	1.48E-02
Gamma		2.81E-01	3.50E-01	4.81E-01	5.93E-01	6.36E-01	6.59E-01
Delta			3.36E-01	3.40E-01	4.78E-01	5.77E-01	6.62E-01
Epsilon				1.97E-01	3.58E-01	4.43E-01	5.55E-01
Mu					3.10E-01	3.27E-01	4.25E-01
Omega						2.15E-01	3.97E-01
Sigma							3.30E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.00	5.00	5.00	5.00	5.00	5.00	5.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 6.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.265

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9861682	0.9964114	0.9983798	0.9999868	1.369E+02	4.932E-01	--
α_2	1.32E-05	3.59E-03	1.62E-03	1.38E-02	4.932E-01	1.369E+02	0.840

CCCG = 3, Gamma = 0.265

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9867346	0.9954706	0.9967810	0.9997316	2.329E+02	1.059E+00	--
α_2	5.55E-05	2.97E-03	1.75E-03	1.00E-02	7.137E-01	2.397E+02	1.058
α_3	5.62E-07	1.56E-03	4.72E-04	6.81E-03	3.458E-01	2.212E+02	1.149

CCCG = 4, Gamma = 0.265

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9883883	0.9950073	0.9957618	0.9990471	4.214E+02	2.115E+00	--
α_2	4.40E-04	3.55E-03	2.83E-03	9.13E-03	1.549E+00	4.347E+02	1.126
α_3	2.06E-08	6.61E-04	1.29E-04	3.14E-03	2.646E-01	4.003E+02	1.227
α_4	8.64E-08	7.82E-04	1.92E-04	3.57E-03	3.010E-01	3.848E+02	1.276

CCCG = 5, Gamma = 0.265

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9916924	0.9953850	0.9956680	0.9981114	1.148E+03	5.325E+00	--
α_2	9.75E-04	3.06E-03	2.78E-03	6.07E-03	3.632E+00	1.185E+03	1.186
α_3	1.22E-04	1.24E-03	9.55E-04	3.35E-03	1.354E+00	1.087E+03	1.295
α_4	2.64E-08	2.78E-04	6.63E-05	1.28E-03	2.961E-01	1.065E+03	1.323
α_5	1.13E-34	3.79E-05	4.17E-11	1.88E-04	4.243E-02	1.121E+03	1.258

CCCG = 6, Gamma = 0.265

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9914197	0.9953212	0.9956303	0.9981669	1.050E+03	4.936E+00	--
α_2	6.82E-04	2.56E-03	2.28E-03	5.42E-03	2.915E+00	1.134E+03	1.121
α_3	1.11E-04	1.30E-03	9.76E-04	3.59E-03	1.257E+00	9.660E+02	1.318
α_4	2.12E-06	5.21E-04	2.38E-04	2.00E-03	5.031E-01	9.656E+02	1.319
α_5	3.41E-15	1.18E-04	1.55E-06	6.75E-04	1.155E-01	9.809E+02	1.299
α_6	8.25E-13	1.76E-04	6.46E-06	9.77E-04	1.451E-01	8.224E+02	1.549

CCCG = 7, Gamma = 0.265

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9931840	0.9956855	0.9958323	0.9976861	2.228E+03	9.654E+00	--
α_2	7.69E-04	1.98E-03	1.85E-03	3.66E-03	4.851E+00	2.440E+03	1.120
α_3	3.46E-04	1.35E-03	1.19E-03	2.89E-03	2.800E+00	2.070E+03	1.321
α_4	6.86E-05	6.72E-04	5.19E-04	1.80E-03	1.384E+00	2.059E+03	1.329
α_5	8.58E-07	2.42E-04	1.08E-04	9.37E-04	4.902E-01	2.023E+03	1.353
α_6	1.38E-15	5.79E-05	7.34E-07	3.32E-04	1.146E-01	1.979E+03	1.384
α_7	3.94E-93	7.49E-06	7.96E-25	8.89E-06	1.464E-02	1.956E+03	1.400

CCCG = 8, Gamma = 0.265

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9929422	0.9958040	0.9959964	0.9980091	1.696E+03	7.148E+00	--
α_2	4.28E-04	1.58E-03	1.41E-03	3.32E-03	2.980E+00	1.884E+03	1.099
α_3	2.08E-04	1.20E-03	1.01E-03	2.87E-03	1.960E+00	1.628E+03	1.273
α_4	5.51E-05	7.54E-04	5.53E-04	2.14E-03	1.166E+00	1.545E+03	1.342
α_5	1.93E-06	3.40E-04	1.65E-04	1.27E-03	5.375E-01	1.580E+03	1.313
α_6	2.63E-11	1.19E-04	9.22E-06	6.28E-04	1.805E-01	1.518E+03	1.366
α_7	1.51E-35	2.93E-05	2.19E-11	1.43E-04	4.139E-02	1.414E+03	1.468
α_8	1.05E-08	1.72E-04	3.80E-05	8.03E-04	2.827E-01	1.642E+03	1.264

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
α_2	3.59E-03	2.97E-03	3.55E-03	3.06E-03	2.56E-03	1.98E-03	1.58E-03
α_3		1.56E-03	6.61E-04	1.24E-03	1.30E-03	1.35E-03	1.20E-03
α_4			7.82E-04	2.78E-04	5.21E-04	6.72E-04	7.54E-04
α_5				3.79E-05	1.18E-04	2.42E-04	3.40E-04
α_6					1.76E-04	5.79E-05	1.19E-04
α_7						7.49E-06	2.93E-05
α_8							1.72E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
Beta	3.59E-03	4.53E-03	4.99E-03	4.61E-03	4.68E-03	4.31E-03	4.20E-03
Gamma		3.45E-01	2.89E-01	3.38E-01	4.52E-01	5.40E-01	6.24E-01
Delta			5.42E-01	2.02E-01	3.85E-01	4.20E-01	5.41E-01
Epsilon				1.20E-01	3.61E-01	3.14E-01	4.67E-01
Mu					6.00E-01	2.13E-01	4.85E-01
Omega						1.14E-01	6.29E-01
Sigma							8.55E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.50	6.50	6.50	6.50	6.50	6.50	6.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.2.2 CSS-MOV-CC: CSS Motor-Operated Valves Fail to Open

Generic CCF Parameters

System Group: Clean Water
System: Containment Spray Recirculation
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 14.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9509830	0.9874663	0.9945389	0.9999620	1.0000000	3.691E+01	4.685E-01
α_2	3.52E-05	1.25E-02	5.46E-03	4.90E-02	0.00E+00	4.685E-01	3.691E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9563263	0.9846748	0.9887899	0.9989407	1.0000000	7.248E+01	1.128E+00
α_2	3.88E-04	1.16E-02	7.54E-03	3.65E-02	0.00E+00	8.512E-01	7.276E+01
α_3	1.88E-07	3.76E-03	8.05E-04	1.76E-02	0.00E+00	2.768E-01	7.333E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9576496	0.9823141	0.9852225	0.9970385	1.0000000	1.052E+02	1.894E+00
α_2	1.02E-03	1.18E-02	8.89E-03	3.23E-02	0.00E+00	1.260E+00	1.058E+02
α_3	4.09E-06	3.76E-03	1.38E-03	1.56E-02	0.00E+00	4.024E-01	1.067E+02
α_4	1.50E-08	2.16E-03	3.22E-04	1.07E-02	0.00E+00	2.315E-01	1.068E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9669859	0.9835602	0.9850771	0.9949484	1.0000000	2.053E+02	3.432E+00
α_2	1.57E-03	9.22E-03	7.70E-03	2.20E-02	0.00E+00	1.924E+00	2.068E+02
α_3	2.91E-04	5.02E-03	3.56E-03	1.48E-02	0.00E+00	1.049E+00	2.077E+02
α_4	1.39E-06	1.83E-03	6.31E-04	7.72E-03	0.00E+00	3.822E-01	2.084E+02
α_5	3.19E-20	3.68E-04	3.43E-07	2.14E-03	0.00E+00	7.674E-02	2.087E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9693065	0.9842544	0.9855587	0.9947433	1.0000000	2.397E+02	3.835E+00
α_2	1.00E-03	6.98E-03	5.69E-03	1.74E-02	0.00E+00	1.701E+00	2.419E+02
α_3	3.91E-04	4.96E-03	3.68E-03	1.39E-02	0.00E+00	1.207E+00	2.423E+02
α_4	2.24E-05	2.45E-03	1.28E-03	8.82E-03	0.00E+00	5.960E-01	2.430E+02

α_5	3.55E-09	9.08E-04	1.21E-04	4.55E-03	0.00E+00	2.211E-01	2.433E+02
α_6	3.55E-15	4.51E-04	4.56E-06	2.60E-03	0.00E+00	1.098E-01	2.434E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9741677	0.9853401	0.9861556	0.9937256	1.0000000	3.863E+02	5.747E+00
α_2	1.17E-03	5.72E-03	4.91E-03	1.31E-02	0.00E+00	2.243E+00	3.898E+02
α_3	5.58E-04	4.16E-03	3.35E-03	1.05E-02	0.00E+00	1.630E+00	3.904E+02
α_4	1.72E-04	2.76E-03	1.98E-03	8.03E-03	0.00E+00	1.083E+00	3.910E+02
α_5	1.04E-05	1.44E-03	7.27E-04	5.30E-03	0.00E+00	5.654E-01	3.915E+02
α_6	2.68E-10	4.89E-04	4.51E-05	2.55E-03	0.00E+00	1.916E-01	3.919E+02
α_7	6.08E-41	8.88E-05	3.30E-12	3.89E-04	0.00E+00	3.480E-02	3.920E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9753763	0.9860436	0.9868240	0.9940338	1.0000000	4.045E+02	5.726E+00
α_2	8.87E-04	4.92E-03	4.14E-03	1.16E-02	0.00E+00	2.018E+00	4.082E+02
α_3	3.50E-04	3.39E-03	2.62E-03	9.04E-03	0.00E+00	1.391E+00	4.089E+02
α_4	1.54E-04	2.59E-03	1.84E-03	7.58E-03	0.00E+00	1.062E+00	4.092E+02
α_5	3.02E-05	1.71E-03	1.00E-03	5.82E-03	0.00E+00	7.026E-01	4.095E+02
α_6	3.35E-07	8.53E-04	2.62E-04	3.71E-03	0.00E+00	3.497E-01	4.099E+02
α_7	1.29E-15	2.63E-04	2.41E-06	1.52E-03	0.00E+00	1.078E-01	4.101E+02
α_8	2.69E-17	2.31E-04	9.78E-07	1.34E-03	0.00E+00	9.469E-02	4.102E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.85E-01	9.82E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.25E-02	1.16E-02	1.18E-02	9.22E-03	6.98E-03	5.72E-03	4.92E-03
α_3		3.76E-03	3.76E-03	5.02E-03	4.96E-03	4.16E-03	3.39E-03
α_4			2.16E-03	1.83E-03	2.45E-03	2.76E-03	2.59E-03
α_5				3.68E-04	9.08E-04	1.44E-03	1.71E-03
α_6					4.51E-04	4.89E-04	8.53E-04
α_7						8.88E-05	2.63E-04
α_8							2.31E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.85E-01	9.82E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.25E-02	1.53E-02	1.77E-02	1.64E-02	1.57E-02	1.47E-02	1.40E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	14.50	14.50	14.50	14.50	14.50	14.50	14.50
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 6.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.414

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9644989	0.9908332	0.9959059	0.9999695	5.225E+01	4.834E-01	--
α_2	3.05E-05	9.17E-03	4.09E-03	3.55E-02	4.834E-01	5.225E+01	0.954

CCCG = 3, Gamma = 0.414

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9714796	0.9897262	0.9923043	0.9991599	1.181E+02	1.226E+00	--
α_2	3.93E-04	8.06E-03	5.56E-03	2.42E-02	9.769E-01	1.203E+02	1.129
α_3	3.55E-08	2.22E-03	3.85E-04	1.08E-02	2.487E-01	1.119E+02	1.221

CCCG = 4, Gamma = 0.414

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9694033	0.9869112	0.9889136	0.9975711	1.551E+02	2.057E+00	--
α_2	9.86E-04	8.92E-03	6.99E-03	2.34E-02	1.442E+00	1.602E+02	1.175
α_3	3.41E-06	2.72E-03	1.02E-03	1.12E-02	4.114E-01	1.508E+02	1.256
α_4	1.90E-09	1.45E-03	1.58E-04	7.43E-03	2.036E-01	1.404E+02	1.351

CCCG = 5, Gamma = 0.414

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9749660	0.9873106	0.9884122	0.9958911	2.866E+02	3.683E+00	--
α_2	1.54E-03	7.50E-03	6.43E-03	1.71E-02	2.243E+00	2.969E+02	1.204
α_3	1.81E-04	3.59E-03	2.49E-03	1.08E-02	9.912E-01	2.751E+02	1.305
α_4	9.26E-07	1.36E-03	4.59E-04	5.76E-03	3.765E-01	2.768E+02	1.300
α_5	2.10E-21	2.42E-04	1.38E-07	1.40E-03	7.237E-02	2.986E+02	1.206

CCCG = 6, Gamma = 0.414

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9762703	0.9875950	0.9885557	0.9956378	3.295E+02	4.139E+00	--
α_2	1.13E-03	5.90E-03	5.01E-03	1.37E-02	2.128E+00	3.588E+02	1.137
α_3	2.54E-04	3.68E-03	2.68E-03	1.05E-02	1.134E+00	3.069E+02	1.333
α_4	1.15E-05	1.76E-03	8.73E-04	6.51E-03	5.533E-01	3.139E+02	1.305
α_5	2.66E-09	6.83E-04	9.12E-05	3.43E-03	2.210E-01	3.233E+02	1.269
α_6	4.91E-16	3.85E-04	2.68E-06	2.23E-03	1.027E-01	2.666E+02	1.539

CCCG = 7, Gamma = 0.414

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9803406	0.9885612	0.9891354	0.9948212	5.559E+02	6.432E+00	--
α_2	1.20E-03	4.60E-03	4.08E-03	9.80E-03	2.840E+00	6.141E+02	1.124
α_3	4.94E-04	3.33E-03	2.72E-03	8.23E-03	1.746E+00	5.228E+02	1.322
α_4	1.28E-04	2.05E-03	1.47E-03	5.96E-03	1.084E+00	5.279E+02	1.311
α_5	5.86E-06	1.03E-03	4.99E-04	3.86E-03	5.376E-01	5.212E+02	1.329
α_6	3.32E-10	3.78E-04	3.82E-05	1.95E-03	1.979E-01	5.231E+02	1.325
α_7	1.10E-52	4.90E-05	4.91E-15	1.67E-04	2.656E-02	5.421E+02	1.279

CCCG = 8, Gamma = 0.414

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9812083	0.9891948	0.9897660	0.9952310	5.596E+02	6.112E+00	--
α_2	8.13E-04	3.76E-03	3.25E-03	8.45E-03	2.364E+00	6.267E+02	1.102
α_3	3.32E-04	2.79E-03	2.20E-03	7.23E-03	1.512E+00	5.412E+02	1.277
α_4	1.19E-04	2.02E-03	1.43E-03	5.94E-03	1.056E+00	5.212E+02	1.327
α_5	1.90E-05	1.25E-03	7.13E-04	4.32E-03	6.745E-01	5.382E+02	1.286
α_6	8.09E-08	6.02E-04	1.53E-04	2.73E-03	3.076E-01	5.109E+02	1.356
α_7	1.51E-15	2.15E-04	2.13E-06	1.24E-03	1.093E-01	5.072E+02	1.367
α_8	2.63E-18	1.70E-04	4.72E-07	9.91E-04	8.885E-02	5.224E+02	1.327

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.90E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01	9.89E-01
α_2	9.17E-03	8.06E-03	8.92E-03	7.50E-03	5.90E-03	4.60E-03	3.76E-03
α_3		2.22E-03	2.72E-03	3.59E-03	3.68E-03	3.33E-03	2.79E-03
α_4			1.45E-03	1.36E-03	1.76E-03	2.05E-03	2.02E-03
α_5				2.42E-04	6.83E-04	1.03E-03	1.25E-03
α_6					3.85E-04	3.78E-04	6.02E-04
α_7						4.90E-05	2.15E-04
α_8							1.70E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.90E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01	9.89E-01
Beta	9.17E-03	1.03E-02	1.31E-02	1.27E-02	1.24E-02	1.14E-02	1.08E-02
Gamma		2.16E-01	3.19E-01	4.09E-01	5.25E-01	5.98E-01	6.52E-01
Delta			3.47E-01	3.08E-01	4.34E-01	5.13E-01	6.05E-01
Epsilon				1.51E-01	3.78E-01	4.16E-01	5.25E-01
Mu					3.61E-01	2.93E-01	4.41E-01
Omega						1.15E-01	3.91E-01
Sigma							4.41E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.00	6.00	6.00	6.00	6.00	6.00	6.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.138

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8949391	0.9733555	0.9886065	0.9999394	1.643E+01	4.498E-01	--
α_2	6.06E-05	2.66E-02	1.14E-02	1.05E-01	4.498E-01	1.643E+01	0.954

CCCG = 3, Gamma = 0.138

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9004917	0.9641707	0.9731104	0.9972348	3.171E+01	1.178E+00	--
α_2	1.26E-03	2.81E-02	1.93E-02	8.48E-02	9.387E-01	3.249E+01	1.129
α_3	8.22E-08	7.75E-03	1.26E-03	3.80E-02	2.396E-01	3.067E+01	1.221

CCCG = 4, Gamma = 0.138

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8995402	0.9575287	0.9641801	0.9927336	4.280E+01	1.898E+00	--
α_2	2.54E-03	2.79E-02	2.14E-02	7.54E-02	1.285E+00	4.483E+01	1.175
α_3	8.46E-06	9.11E-03	3.28E-03	3.80E-02	3.927E-01	4.274E+01	1.256
α_4	2.13E-08	5.50E-03	7.42E-04	2.76E-02	2.207E-01	3.989E+01	1.351

CCCG = 5, Gamma = 0.138

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9222093	0.9607080	0.9641075	0.9875803	8.572E+01	3.506E+00	--
α_2	3.87E-03	2.16E-02	1.82E-02	5.08E-02	1.992E+00	9.025E+01	1.204
α_3	7.87E-04	1.27E-02	9.10E-03	3.67E-02	1.078E+00	8.406E+01	1.305
α_4	2.24E-06	4.25E-03	1.38E-03	1.82E-02	3.632E-01	8.511E+01	1.300
α_5	7.29E-21	7.87E-04	4.56E-07	4.56E-03	7.248E-02	9.202E+01	1.206

CCCG = 6, Gamma = 0.138

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9289583	0.9623965	0.9651283	0.9864956	1.075E+02	4.199E+00	--
α_2	2.76E-03	1.60E-02	1.34E-02	3.79E-02	1.941E+00	1.197E+02	1.137
α_3	1.24E-03	1.28E-02	9.87E-03	3.46E-02	1.332E+00	1.024E+02	1.333
α_4	6.27E-05	5.83E-03	3.15E-03	2.07E-02	6.181E-01	1.054E+02	1.305
α_5	1.46E-08	2.12E-03	3.16E-04	1.05E-02	2.313E-01	1.088E+02	1.269
α_6	7.82E-20	8.55E-04	8.08E-07	4.98E-03	7.684E-02	8.978E+01	1.539

CCCG = 7, Gamma = 0.138

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9390171	0.9645345	0.9662874	0.9840637	1.692E+02	6.223E+00	--
α_2	3.37E-03	1.38E-02	1.21E-02	2.97E-02	2.654E+00	1.903E+02	1.124
α_3	1.37E-03	1.00E-02	8.12E-03	2.52E-02	1.645E+00	1.624E+02	1.322
α_4	4.50E-04	6.74E-03	4.88E-03	1.94E-02	1.115E+00	1.643E+02	1.311
α_5	3.58E-05	3.70E-03	1.96E-03	1.33E-02	6.034E-01	1.626E+02	1.329
α_6	1.93E-10	1.09E-03	8.11E-05	5.77E-03	1.780E-01	1.635E+02	1.325
α_7	8.79E-51	1.61E-04	3.31E-14	5.70E-04	2.734E-02	1.696E+02	1.279

CCCG = 8, Gamma = 0.138

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9414978	0.9659632	0.9676442	0.9846859	1.773E+02	6.246E+00	--
α_2	2.84E-03	1.23E-02	1.07E-02	2.71E-02	2.504E+00	2.012E+02	1.102
α_3	8.68E-04	8.08E-03	6.30E-03	2.14E-02	1.419E+00	1.743E+02	1.277
α_4	3.35E-04	6.07E-03	4.27E-03	1.80E-02	1.027E+00	1.681E+02	1.327
α_5	8.68E-05	4.21E-03	2.52E-03	1.40E-02	7.337E-01	1.737E+02	1.286
α_6	2.40E-06	2.40E-03	8.68E-04	9.99E-03	3.975E-01	1.651E+02	1.356
α_7	4.70E-20	4.69E-04	4.51E-07	2.73E-03	7.703E-02	1.642E+02	1.367
α_8	4.81E-18	5.17E-04	1.29E-06	3.02E-03	8.749E-02	1.691E+02	1.327

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.73E-01	9.64E-01	9.58E-01	9.61E-01	9.62E-01	9.65E-01	9.66E-01
α_2	2.66E-02	2.81E-02	2.79E-02	2.16E-02	1.60E-02	1.38E-02	1.23E-02
α_3		7.75E-03	9.11E-03	1.27E-02	1.28E-02	1.00E-02	8.08E-03
α_4			5.50E-03	4.25E-03	5.83E-03	6.74E-03	6.07E-03
α_5				7.87E-04	2.12E-03	3.70E-03	4.21E-03
α_6					8.55E-04	1.09E-03	2.40E-03
α_7						1.61E-04	4.69E-04
α_8							5.17E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.73E-01	9.64E-01	9.58E-01	9.61E-01	9.62E-01	9.65E-01	9.66E-01
Beta	2.66E-02	3.58E-02	4.25E-02	3.93E-02	3.76E-02	3.55E-02	3.40E-02
Gamma		2.16E-01	3.44E-01	4.50E-01	5.76E-01	6.12E-01	6.39E-01
Delta			3.77E-01	2.85E-01	4.07E-01	5.38E-01	6.29E-01
Epsilon				1.56E-01	3.38E-01	4.23E-01	5.56E-01
Mu					2.87E-01	2.52E-01	4.46E-01
Omega						1.29E-01	2.91E-01
Sigma							5.24E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.276

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9386933	0.9842760	0.9930881	0.9999545	2.946E+01	4.706E-01	--
α_2	4.55E-05	1.57E-02	6.91E-03	6.13E-02	4.706E-01	2.946E+01	0.954

CCCG = 3, Gamma = 0.276

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9450613	0.9808363	0.9860626	0.9987388	5.643E+01	1.103E+00	--
α_2	3.99E-04	1.38E-02	8.79E-03	4.42E-02	8.104E-01	5.797E+01	1.129
α_3	4.54E-07	5.38E-03	1.27E-03	2.48E-02	2.921E-01	5.405E+01	1.221

CCCG = 4, Gamma = 0.276

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9527162	0.9800399	0.9832113	0.9965133	9.587E+01	1.953E+00	--
α_2	1.22E-03	1.30E-02	9.95E-03	3.52E-02	1.312E+00	9.958E+01	1.175
α_3	7.69E-06	4.56E-03	1.81E-03	1.85E-02	4.307E-01	9.393E+01	1.256
α_4	4.78E-09	2.39E-03	2.83E-04	1.22E-02	2.099E-01	8.754E+01	1.351

CCCG = 5, Gamma = 0.276

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9628772	0.9820099	0.9838368	0.9948974	1.696E+02	3.107E+00	--
α_2	1.33E-03	9.42E-03	7.66E-03	2.35E-02	1.684E+00	1.771E+02	1.204
α_3	2.53E-04	5.71E-03	3.88E-03	1.74E-02	9.426E-01	1.641E+02	1.305
α_4	1.73E-06	2.30E-03	7.93E-04	9.72E-03	3.816E-01	1.653E+02	1.300
α_5	2.21E-16	5.53E-04	3.03E-06	3.22E-03	9.865E-02	1.784E+02	1.206

CCCG = 6, Gamma = 0.276

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9674088	0.9832910	0.9846790	0.9944304	2.249E+02	3.822E+00	--
α_2	9.95E-04	6.86E-03	5.60E-03	1.71E-02	1.714E+00	2.480E+02	1.137
α_3	3.42E-04	5.20E-03	3.76E-03	1.50E-02	1.108E+00	2.120E+02	1.333
α_4	3.96E-05	2.99E-03	1.67E-03	1.04E-02	6.509E-01	2.169E+02	1.305
α_5	2.25E-08	1.13E-03	2.04E-04	5.46E-03	2.536E-01	2.236E+02	1.269
α_6	8.42E-17	5.19E-04	2.36E-06	3.02E-03	9.572E-02	1.844E+02	1.539

CCCG = 7, Gamma = 0.276

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9719263	0.9844445	0.9854014	0.9936946	3.288E+02	5.195E+00	--
α_2	1.08E-03	5.71E-03	4.85E-03	1.33E-02	2.105E+00	3.664E+02	1.124
α_3	3.96E-04	4.21E-03	3.22E-03	1.14E-02	1.320E+00	3.119E+02	1.322
α_4	1.61E-04	3.15E-03	2.19E-03	9.45E-03	9.967E-01	3.149E+02	1.311
α_5	8.52E-06	1.68E-03	8.01E-04	6.35E-03	5.249E-01	3.111E+02	1.329
α_6	4.65E-10	6.26E-04	6.13E-05	3.24E-03	1.956E-01	3.123E+02	1.325
α_7	4.66E-28	1.63E-04	3.70E-09	8.87E-04	5.291E-02	3.237E+02	1.279

CCCG = 8, Gamma = 0.276

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9741162	0.9852611	0.9860711	0.9936402	3.899E+02	5.832E+00	--
α_2	1.03E-03	5.06E-03	4.33E-03	1.16E-02	2.229E+00	4.385E+02	1.102
α_3	2.85E-04	3.31E-03	2.49E-03	9.14E-03	1.260E+00	3.790E+02	1.277
α_4	1.62E-04	2.85E-03	2.01E-03	8.40E-03	1.042E+00	3.649E+02	1.327
α_5	4.74E-05	2.02E-03	1.24E-03	6.66E-03	7.626E-01	3.768E+02	1.286
α_6	2.09E-07	9.13E-04	2.55E-04	4.06E-03	3.271E-01	3.579E+02	1.356
α_7	3.67E-13	3.78E-04	1.01E-05	2.12E-03	1.344E-01	3.553E+02	1.367
α_8	1.89E-20	2.10E-04	1.97E-07	1.22E-03	7.682E-02	3.660E+02	1.327

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01
α_2	1.57E-02	1.38E-02	1.30E-02	9.42E-03	6.86E-03	5.71E-03	5.06E-03
α_3		5.38E-03	4.56E-03	5.71E-03	5.20E-03	4.21E-03	3.31E-03
α_4			2.39E-03	2.30E-03	2.99E-03	3.15E-03	2.85E-03
α_5				5.53E-04	1.13E-03	1.68E-03	2.02E-03
α_6					5.19E-04	6.26E-04	9.13E-04
α_7						1.63E-04	3.78E-04
α_8							2.10E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01
Beta	1.57E-02	1.92E-02	2.00E-02	1.80E-02	1.67E-02	1.56E-02	1.47E-02
Gamma		2.81E-01	3.49E-01	4.76E-01	5.89E-01	6.33E-01	6.57E-01
Delta			3.44E-01	3.33E-01	4.72E-01	5.72E-01	6.58E-01
Epsilon				1.94E-01	3.56E-01	4.39E-01	5.53E-01
Mu					3.14E-01	3.19E-01	4.26E-01
Omega						2.07E-01	3.92E-01
Sigma							3.57E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 2.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.172

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9837336	0.9957786	0.9980925	0.9999845	1.163E+02	4.932E-01	--
α_2	1.55E-05	4.22E-03	1.91E-03	1.63E-02	4.932E-01	1.163E+02	0.954

CCCG = 3, Gamma = 0.172

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9856415	0.9950964	0.9965143	0.9997094	2.150E+02	1.059E+00	--
α_2	6.02E-05	3.22E-03	1.90E-03	1.09E-02	7.137E-01	2.211E+02	1.129
α_3	6.07E-07	1.69E-03	5.10E-04	7.36E-03	3.458E-01	2.047E+02	1.221

CCCG = 4, Gamma = 0.172

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9877875	0.9947484	0.9955417	0.9989975	4.005E+02	2.115E+00	--
α_2	4.63E-04	3.73E-03	2.97E-03	9.61E-03	1.549E+00	4.132E+02	1.175
α_3	2.13E-08	6.82E-04	1.33E-04	3.25E-03	2.646E-01	3.876E+02	1.256
α_4	9.23E-08	8.35E-04	2.05E-04	3.81E-03	3.010E-01	3.604E+02	1.351

CCCG = 5, Gamma = 0.172

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9915776	0.9953212	0.9956081	0.9980852	1.133E+03	5.325E+00	--
α_2	9.93E-04	3.11E-03	2.83E-03	6.18E-03	3.632E+00	1.164E+03	1.204
α_3	1.23E-04	1.26E-03	9.65E-04	3.39E-03	1.354E+00	1.076E+03	1.305
α_4	2.60E-08	2.74E-04	6.54E-05	1.26E-03	2.961E-01	1.081E+03	1.300
α_5	1.08E-34	3.64E-05	4.01E-11	1.80E-04	4.243E-02	1.165E+03	1.206

CCCG = 6, Gamma = 0.172

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9913158	0.9952644	0.9955773	0.9981447	1.037E+03	4.936E+00	--
α_2	6.94E-04	2.61E-03	2.32E-03	5.52E-03	2.915E+00	1.114E+03	1.137
α_3	1.13E-04	1.32E-03	9.91E-04	3.64E-03	1.257E+00	9.521E+02	1.333
α_4	2.10E-06	5.17E-04	2.37E-04	1.98E-03	5.031E-01	9.730E+02	1.305
α_5	3.34E-15	1.15E-04	1.52E-06	6.61E-04	1.155E-01	1.001E+03	1.269
α_6	8.22E-13	1.76E-04	6.44E-06	9.74E-04	1.451E-01	8.253E+02	1.539

CCCG = 7, Gamma = 0.172

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9931865	0.9956871	0.9958338	0.9976869	2.229E+03	9.654E+00	--
α_2	7.73E-04	1.99E-03	1.86E-03	3.68E-03	4.851E+00	2.427E+03	1.124
α_3	3.47E-04	1.35E-03	1.20E-03	2.90E-03	2.800E+00	2.065E+03	1.322
α_4	6.78E-05	6.64E-04	5.13E-04	1.78E-03	1.384E+00	2.084E+03	1.311
α_5	8.43E-07	2.38E-04	1.07E-04	9.22E-04	4.902E-01	2.057E+03	1.329
α_6	1.32E-15	5.55E-05	7.04E-07	3.19E-04	1.146E-01	2.063E+03	1.325
α_7	3.60E-93	6.85E-06	7.29E-25	8.14E-06	1.464E-02	2.137E+03	1.279

CCCG = 8, Gamma = 0.172

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9929302	0.9957969	0.9959896	0.9980056	1.694E+03	7.148E+00	--
α_2	4.30E-04	1.59E-03	1.41E-03	3.33E-03	2.980E+00	1.876E+03	1.102
α_3	2.10E-04	1.21E-03	1.01E-03	2.88E-03	1.960E+00	1.619E+03	1.277
α_4	5.47E-05	7.47E-04	5.48E-04	2.12E-03	1.166E+00	1.559E+03	1.327
α_5	1.90E-06	3.34E-04	1.62E-04	1.25E-03	5.375E-01	1.609E+03	1.286
α_6	2.61E-11	1.18E-04	9.17E-06	6.25E-04	1.805E-01	1.527E+03	1.356
α_7	1.41E-35	2.73E-05	2.04E-11	1.34E-04	4.139E-02	1.515E+03	1.367
α_8	1.10E-08	1.81E-04	3.99E-05	8.44E-04	2.827E-01	1.560E+03	1.327

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
α_2	4.22E-03	3.22E-03	3.73E-03	3.11E-03	2.61E-03	1.99E-03	1.59E-03
α_3		1.69E-03	6.82E-04	1.26E-03	1.32E-03	1.35E-03	1.21E-03
α_4			8.35E-04	2.74E-04	5.17E-04	6.64E-04	7.47E-04
α_5				3.64E-05	1.15E-04	2.38E-04	3.34E-04
α_6					1.76E-04	5.55E-05	1.18E-04
α_7						6.85E-06	2.73E-05
α_8							1.81E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
Beta	4.22E-03	4.90E-03	5.25E-03	4.68E-03	4.74E-03	4.31E-03	4.20E-03
Gamma		3.44E-01	2.89E-01	3.35E-01	4.49E-01	5.38E-01	6.23E-01
Delta			5.50E-01	1.98E-01	3.80E-01	4.16E-01	5.38E-01
Epsilon				1.17E-01	3.60E-01	3.12E-01	4.69E-01
Mu					6.04E-01	2.07E-01	4.95E-01
Omega						1.10E-01	6.38E-01
Sigma							8.69E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.50	2.50	2.50	2.50	2.50	2.50	2.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.2.3 CSS-MOV-OO: CSS Motor-Operated Valves Fail to Close

Generic CCF Parameters

System Group: Clean Water
System: Containment Spray Recirculation
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 10.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9443172	0.9857510	0.9937772	0.9999568	1.0000000	3.241E+01	4.685E-01
α_2	4.02E-05	1.42E-02	6.23E-03	5.57E-02	0.00E+00	4.685E-01	3.241E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9535058	0.9836769	0.9880528	0.9988760	1.0000000	6.798E+01	1.128E+00
α_2	4.13E-04	1.23E-02	8.04E-03	3.88E-02	0.00E+00	8.512E-01	6.826E+01
α_3	2.00E-07	4.01E-03	8.58E-04	1.88E-02	0.00E+00	2.768E-01	6.883E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9558071	0.9815382	0.9845699	0.9969069	1.0000000	1.007E+02	1.894E+00
α_2	1.06E-03	1.23E-02	9.29E-03	3.37E-02	0.00E+00	1.260E+00	1.013E+02
α_3	4.27E-06	3.92E-03	1.44E-03	1.62E-02	0.00E+00	4.024E-01	1.022E+02
α_4	1.57E-08	2.26E-03	3.37E-04	1.12E-02	0.00E+00	2.315E-01	1.023E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9662631	0.9831980	0.9847473	0.9948360	1.0000000	2.008E+02	3.432E+00
α_2	1.60E-03	9.42E-03	7.87E-03	2.25E-02	0.00E+00	1.924E+00	2.023E+02
α_3	2.97E-04	5.14E-03	3.64E-03	1.51E-02	0.00E+00	1.049E+00	2.032E+02
α_4	1.42E-06	1.87E-03	6.45E-04	7.89E-03	0.00E+00	3.822E-01	2.039E+02
α_5	3.26E-20	3.76E-04	3.50E-07	2.18E-03	0.00E+00	7.674E-02	2.042E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9687319	0.9839580	0.9852861	0.9946434	1.0000000	2.352E+02	3.835E+00
α_2	1.02E-03	7.12E-03	5.80E-03	1.77E-02	0.00E+00	1.701E+00	2.374E+02
α_3	3.98E-04	5.05E-03	3.75E-03	1.41E-02	0.00E+00	1.207E+00	2.378E+02
α_4	2.29E-05	2.49E-03	1.31E-03	8.98E-03	0.00E+00	5.960E-01	2.385E+02

α_5	3.62E-09	9.25E-04	1.24E-04	4.64E-03	0.00E+00	2.211E-01	2.388E+02
α_6	3.61E-15	4.59E-04	4.65E-06	2.65E-03	0.00E+00	1.098E-01	2.389E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9738649	0.9851699	0.9859945	0.9936476	1.0000000	3.818E+02	5.747E+00
α_2	1.18E-03	5.79E-03	4.96E-03	1.32E-02	0.00E+00	2.243E+00	3.853E+02
α_3	5.64E-04	4.20E-03	3.39E-03	1.06E-02	0.00E+00	1.630E+00	3.859E+02
α_4	1.74E-04	2.79E-03	2.00E-03	8.13E-03	0.00E+00	1.083E+00	3.865E+02
α_5	1.05E-05	1.46E-03	7.36E-04	5.36E-03	0.00E+00	5.654E-01	3.870E+02
α_6	2.71E-10	4.94E-04	4.57E-05	2.58E-03	0.00E+00	1.916E-01	3.874E+02
α_7	6.15E-41	8.98E-05	3.34E-12	3.94E-04	0.00E+00	3.480E-02	3.875E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9751044	0.9858888	0.9866776	0.9939688	1.0000000	4.000E+02	5.726E+00
α_2	8.97E-04	4.97E-03	4.19E-03	1.17E-02	0.00E+00	2.018E+00	4.037E+02
α_3	3.54E-04	3.43E-03	2.65E-03	9.14E-03	0.00E+00	1.391E+00	4.044E+02
α_4	1.56E-04	2.62E-03	1.86E-03	7.67E-03	0.00E+00	1.062E+00	4.047E+02
α_5	3.06E-05	1.73E-03	1.01E-03	5.88E-03	0.00E+00	7.026E-01	4.050E+02
α_6	3.38E-07	8.62E-04	2.65E-04	3.75E-03	0.00E+00	3.497E-01	4.054E+02
α_7	1.30E-15	2.66E-04	2.44E-06	1.54E-03	0.00E+00	1.078E-01	4.056E+02
α_8	2.72E-17	2.33E-04	9.89E-07	1.36E-03	0.00E+00	9.469E-02	4.057E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.84E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.42E-02	1.23E-02	1.23E-02	9.42E-03	7.12E-03	5.79E-03	4.97E-03
α_3		4.01E-03	3.92E-03	5.14E-03	5.05E-03	4.20E-03	3.43E-03
α_4			2.26E-03	1.87E-03	2.49E-03	2.79E-03	2.62E-03
α_5				3.76E-04	9.25E-04	1.46E-03	1.73E-03
α_6					4.59E-04	4.94E-04	8.62E-04
α_7						8.98E-05	2.66E-04
α_8							2.33E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.84E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.42E-02	1.63E-02	1.85E-02	1.68E-02	1.60E-02	1.48E-02	1.41E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	10.00	10.00	10.00	10.00	10.00	10.00	10.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9539859	0.9881044	0.9946679	0.9999603	4.015E+01	4.834E-01	--
α_2	3.97E-05	1.19E-02	5.33E-03	4.60E-02	4.834E-01	4.015E+01	1.165

CCCG = 3, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9666964	0.9879929	0.9909975	0.9990167	1.008E+02	1.226E+00	--
α_2	4.58E-04	9.38E-03	6.48E-03	2.82E-02	9.769E-01	1.031E+02	1.287
α_3	4.20E-08	2.62E-03	4.56E-04	1.27E-02	2.487E-01	9.459E+01	1.412

CCCG = 4, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9654777	0.9852208	0.9874751	0.9972543	1.371E+02	2.057E+00	--
α_2	1.11E-03	1.00E-02	7.85E-03	2.63E-02	1.442E+00	1.426E+02	1.298
α_3	4.02E-06	3.20E-03	1.20E-03	1.31E-02	4.114E-01	1.282E+02	1.454
α_4	2.06E-09	1.57E-03	1.71E-04	8.04E-03	2.036E-01	1.298E+02	1.438

CCCG = 5, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9724614	0.9860346	0.9872441	0.9954751	2.600E+02	3.683E+00	--
α_2	1.66E-03	8.11E-03	6.96E-03	1.85E-02	2.243E+00	2.744E+02	1.291
α_3	1.99E-04	3.96E-03	2.74E-03	1.19E-02	9.912E-01	2.496E+02	1.426
α_4	1.09E-06	1.60E-03	5.40E-04	6.78E-03	3.765E-01	2.352E+02	1.517
α_5	2.64E-21	3.05E-04	1.74E-07	1.76E-03	7.237E-02	2.375E+02	1.504

CCCG = 6, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9741921	0.9865036	0.9875466	0.9952517	3.025E+02	4.139E+00	--
α_2	1.21E-03	6.30E-03	5.35E-03	1.46E-02	2.128E+00	3.357E+02	1.206
α_3	2.73E-04	3.96E-03	2.88E-03	1.13E-02	1.134E+00	2.854E+02	1.422
α_4	1.31E-05	2.00E-03	9.93E-04	7.41E-03	5.533E-01	2.758E+02	1.474
α_5	3.13E-09	8.04E-04	1.07E-04	4.03E-03	2.210E-01	2.746E+02	1.483
α_6	5.54E-16	4.34E-04	3.03E-06	2.52E-03	1.027E-01	2.363E+02	1.724

CCCG = 7, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9788390	0.9876844	0.9883015	0.9944225	5.158E+02	6.432E+00	--
α_2	1.26E-03	4.86E-03	4.30E-03	1.03E-02	2.840E+00	5.820E+02	1.181
α_3	5.25E-04	3.54E-03	2.89E-03	8.75E-03	1.746E+00	4.919E+02	1.399
α_4	1.41E-04	2.26E-03	1.61E-03	6.56E-03	1.084E+00	4.793E+02	1.438
α_5	6.53E-06	1.15E-03	5.56E-04	4.30E-03	5.376E-01	4.677E+02	1.475
α_6	3.96E-10	4.51E-04	4.55E-05	2.33E-03	1.979E-01	4.390E+02	1.572
α_7	1.50E-52	6.67E-05	6.69E-15	2.28E-04	2.656E-02	3.980E+02	1.735

CCCG = 8, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9798453	0.9884084	0.9890202	0.9948824	5.212E+02	6.112E+00	--
α_2	8.58E-04	3.97E-03	3.43E-03	8.92E-03	2.364E+00	5.938E+02	1.158
α_3	3.49E-04	2.93E-03	2.32E-03	7.61E-03	1.512E+00	5.143E+02	1.338
α_4	1.29E-04	2.21E-03	1.56E-03	6.48E-03	1.056E+00	4.775E+02	1.442
α_5	2.12E-05	1.40E-03	7.98E-04	4.83E-03	6.745E-01	4.811E+02	1.433
α_6	8.75E-08	6.51E-04	1.65E-04	2.95E-03	3.076E-01	4.725E+02	1.460
α_7	1.94E-15	2.77E-04	2.74E-06	1.60E-03	1.093E-01	3.946E+02	1.749
α_8	2.48E-18	1.61E-04	4.46E-07	9.36E-04	8.885E-02	5.532E+02	1.248

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.88E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01	9.88E-01
α_2	1.19E-02	9.38E-03	1.00E-02	8.11E-03	6.30E-03	4.86E-03	3.97E-03
α_3		2.62E-03	3.20E-03	3.96E-03	3.96E-03	3.54E-03	2.93E-03
α_4			1.57E-03	1.60E-03	2.00E-03	2.26E-03	2.21E-03
α_5				3.05E-04	8.04E-04	1.15E-03	1.40E-03
α_6					4.34E-04	4.51E-04	6.51E-04
α_7						6.67E-05	2.77E-04
α_8							1.61E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.88E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01	9.88E-01
Beta	1.19E-02	1.20E-02	1.48E-02	1.40E-02	1.35E-02	1.23E-02	1.16E-02
Gamma		2.18E-01	3.22E-01	4.20E-01	5.33E-01	6.06E-01	6.58E-01
Delta			3.29E-01	3.25E-01	4.50E-01	5.26E-01	6.16E-01
Epsilon				1.60E-01	3.82E-01	4.25E-01	5.30E-01
Mu					3.51E-01	3.11E-01	4.37E-01
Omega						1.29E-01	4.02E-01
Sigma							3.67E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8721545	0.9674848	0.9859770	0.9999254	1.338E+01	4.498E-01	--
α_2	7.46E-05	3.25E-02	1.40E-02	1.28E-01	4.498E-01	1.338E+01	1.165

CCCG = 3, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8865594	0.9590428	0.9691725	0.9968241	2.759E+01	1.178E+00	--
α_2	1.44E-03	3.20E-02	2.21E-02	9.64E-02	9.387E-01	2.840E+01	1.287
α_3	9.54E-08	8.96E-03	1.47E-03	4.40E-02	2.396E-01	2.649E+01	1.412

CCCG = 4, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8886482	0.9528194	0.9601422	0.9919010	3.834E+01	1.898E+00	--
α_2	2.81E-03	3.08E-02	2.36E-02	8.32E-02	1.285E+00	4.045E+01	1.298
α_3	9.82E-06	1.05E-02	3.80E-03	4.39E-02	3.927E-01	3.688E+01	1.454
α_4	2.27E-08	5.86E-03	7.91E-04	2.94E-02	2.207E-01	3.746E+01	1.438

CCCG = 5, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9151324	0.9570748	0.9607615	0.9864072	7.816E+01	3.506E+00	--
α_2	4.16E-03	2.32E-02	1.96E-02	5.44E-02	1.992E+00	8.405E+01	1.291
α_3	8.61E-04	1.38E-02	9.95E-03	4.01E-02	1.078E+00	7.684E+01	1.426
α_4	2.62E-06	4.96E-03	1.61E-03	2.13E-02	3.632E-01	7.290E+01	1.517
α_5	9.10E-21	9.81E-04	5.70E-07	5.69E-03	7.248E-02	7.379E+01	1.504

CCCG = 6, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9232932	0.9593547	0.9622893	0.9853831	9.911E+01	4.199E+00	--
α_2	2.93E-03	1.69E-02	1.42E-02	4.02E-02	1.941E+00	1.127E+02	1.206
α_3	1.32E-03	1.37E-02	1.05E-02	3.69E-02	1.332E+00	9.593E+01	1.422
α_4	7.09E-05	6.59E-03	3.56E-03	2.34E-02	6.181E-01	9.320E+01	1.474
α_5	1.71E-08	2.48E-03	3.69E-04	1.23E-02	2.313E-01	9.305E+01	1.483
α_6	8.76E-20	9.58E-04	9.05E-07	5.58E-03	7.684E-02	8.017E+01	1.724

CCCG = 7, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9346140	0.9619446	0.9638154	0.9828836	1.573E+02	6.223E+00	--
α_2	3.54E-03	1.44E-02	1.27E-02	3.12E-02	2.654E+00	1.811E+02	1.181
α_3	1.45E-03	1.06E-02	8.59E-03	2.67E-02	1.645E+00	1.534E+02	1.399
α_4	4.93E-04	7.39E-03	5.36E-03	2.12E-02	1.115E+00	1.498E+02	1.438
α_5	3.98E-05	4.10E-03	2.18E-03	1.47E-02	6.034E-01	1.465E+02	1.475
α_6	2.30E-10	1.29E-03	9.63E-05	6.85E-03	1.780E-01	1.378E+02	1.572
α_7	1.19E-50	2.19E-04	4.50E-14	7.74E-04	2.734E-02	1.250E+02	1.735

CCCG = 8, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9375966	0.9636688	0.9654547	0.9836398	1.657E+02	6.246E+00	--
α_2	2.99E-03	1.29E-02	1.13E-02	2.84E-02	2.504E+00	1.913E+02	1.158
α_3	9.09E-04	8.46E-03	6.60E-03	2.24E-02	1.419E+00	1.663E+02	1.338
α_4	3.64E-04	6.60E-03	4.64E-03	1.95E-02	1.027E+00	1.546E+02	1.442
α_5	9.67E-05	4.68E-03	2.81E-03	1.56E-02	7.337E-01	1.559E+02	1.433
α_6	2.58E-06	2.59E-03	9.35E-04	1.08E-02	3.975E-01	1.534E+02	1.460
α_7	6.02E-20	6.00E-04	5.77E-07	3.49E-03	7.703E-02	1.283E+02	1.749
α_8	4.52E-18	4.86E-04	1.22E-06	2.84E-03	8.749E-02	1.798E+02	1.248

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.67E-01	9.59E-01	9.53E-01	9.57E-01	9.59E-01	9.62E-01	9.64E-01
α_2	3.25E-02	3.20E-02	3.08E-02	2.32E-02	1.69E-02	1.44E-02	1.29E-02
α_3		8.96E-03	1.05E-02	1.38E-02	1.37E-02	1.06E-02	8.46E-03
α_4			5.86E-03	4.96E-03	6.59E-03	7.39E-03	6.60E-03
α_5				9.81E-04	2.48E-03	4.10E-03	4.68E-03
α_6					9.58E-04	1.29E-03	2.59E-03
α_7						2.19E-04	6.00E-04
α_8							4.86E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.67E-01	9.59E-01	9.53E-01	9.57E-01	9.59E-01	9.62E-01	9.64E-01
Beta	3.25E-02	4.10E-02	4.72E-02	4.29E-02	4.06E-02	3.81E-02	3.63E-02
Gamma		2.19E-01	3.47E-01	4.61E-01	5.84E-01	6.20E-01	6.44E-01
Delta			3.57E-01	3.00E-01	4.23E-01	5.51E-01	6.39E-01
Epsilon				1.65E-01	3.43E-01	4.32E-01	5.59E-01
Mu					2.79E-01	2.69E-01	4.39E-01
Omega						1.45E-01	2.96E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9166237	0.9785593	0.9905009	0.9999373	2.148E+01	4.706E-01	--
α_2	6.27E-05	2.14E-02	9.50E-03	8.34E-02	4.706E-01	2.148E+01	1.165

CCCG = 3, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9342925	0.9770348	0.9832596	0.9984832	4.690E+01	1.103E+00	--
α_2	4.78E-04	1.65E-02	1.05E-02	5.27E-02	8.104E-01	4.844E+01	1.287
α_3	5.51E-07	6.51E-03	1.54E-03	3.00E-02	2.921E-01	4.458E+01	1.412

CCCG = 4, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9461228	0.9772276	0.9808275	0.9960145	8.379E+01	1.953E+00	--
α_2	1.38E-03	1.47E-02	1.13E-02	3.99E-02	1.312E+00	8.769E+01	1.298
α_3	9.14E-06	5.42E-03	2.15E-03	2.19E-02	4.307E-01	7.905E+01	1.454
α_4	5.22E-09	2.61E-03	3.09E-04	1.33E-02	2.099E-01	8.014E+01	1.438

CCCG = 5, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9587658	0.9800020	0.9820251	0.9943219	1.523E+02	3.107E+00	--
α_2	1.45E-03	1.02E-02	8.34E-03	2.56E-02	1.684E+00	1.627E+02	1.291
α_3	2.81E-04	6.33E-03	4.30E-03	1.93E-02	9.426E-01	1.480E+02	1.426
α_4	2.05E-06	2.73E-03	9.39E-04	1.15E-02	3.816E-01	1.396E+02	1.517
α_5	2.80E-16	6.99E-04	3.83E-06	4.07E-03	9.865E-02	1.410E+02	1.504

CCCG = 6, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9643116	0.9816927	0.9832088	0.9938931	2.050E+02	3.822E+00	--
α_2	1.07E-03	7.36E-03	6.00E-03	1.83E-02	1.714E+00	2.312E+02	1.206
α_3	3.69E-04	5.61E-03	4.05E-03	1.62E-02	1.108E+00	1.965E+02	1.422
α_4	4.52E-05	3.42E-03	1.91E-03	1.19E-02	6.509E-01	1.899E+02	1.474
α_5	2.65E-08	1.34E-03	2.41E-04	6.45E-03	2.536E-01	1.892E+02	1.483
α_6	9.53E-17	5.87E-04	2.67E-06	3.42E-03	9.572E-02	1.629E+02	1.724

CCCG = 7, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9695598	0.9831263	0.9841615	0.9931567	3.027E+02	5.195E+00	--
α_2	1.15E-03	6.04E-03	5.13E-03	1.41E-02	2.105E+00	3.461E+02	1.181
α_3	4.22E-04	4.49E-03	3.43E-03	1.22E-02	1.320E+00	2.926E+02	1.399
α_4	1.78E-04	3.48E-03	2.42E-03	1.04E-02	9.967E-01	2.850E+02	1.438
α_5	9.53E-06	1.88E-03	8.95E-04	7.10E-03	5.249E-01	2.783E+02	1.475
α_6	5.56E-10	7.48E-04	7.32E-05	3.88E-03	1.956E-01	2.613E+02	1.572
α_7	6.38E-28	2.23E-04	5.06E-09	1.21E-03	5.291E-02	2.369E+02	1.735

CCCG = 8, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9721046	0.9841102	0.9849814	0.9931406	3.612E+02	5.832E+00	--
α_2	1.09E-03	5.35E-03	4.58E-03	1.22E-02	2.229E+00	4.147E+02	1.158
α_3	3.00E-04	3.49E-03	2.63E-03	9.64E-03	1.260E+00	3.595E+02	1.338
α_4	1.77E-04	3.11E-03	2.20E-03	9.18E-03	1.042E+00	3.337E+02	1.442
α_5	5.32E-05	2.26E-03	1.39E-03	7.46E-03	7.626E-01	3.362E+02	1.433
α_6	2.26E-07	9.89E-04	2.76E-04	4.40E-03	3.271E-01	3.304E+02	1.460
α_7	4.72E-13	4.87E-04	1.31E-05	2.73E-03	1.344E-01	2.759E+02	1.749
α_8	1.79E-20	1.99E-04	1.86E-07	1.15E-03	7.682E-02	3.869E+02	1.248

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.79E-01	9.77E-01	9.77E-01	9.80E-01	9.82E-01	9.83E-01	9.84E-01
α_2	2.14E-02	1.65E-02	1.47E-02	1.02E-02	7.36E-03	6.04E-03	5.35E-03
α_3		6.51E-03	5.42E-03	6.33E-03	5.61E-03	4.49E-03	3.49E-03
α_4			2.61E-03	2.73E-03	3.42E-03	3.48E-03	3.11E-03
α_5				6.99E-04	1.34E-03	1.88E-03	2.26E-03
α_6					5.87E-04	7.48E-04	9.89E-04
α_7						2.23E-04	4.87E-04
α_8							1.99E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.79E-01	9.77E-01	9.77E-01	9.80E-01	9.82E-01	9.83E-01	9.84E-01
Beta	2.14E-02	2.30E-02	2.28E-02	2.00E-02	1.83E-02	1.69E-02	1.59E-02
Gamma		2.83E-01	3.53E-01	4.88E-01	5.98E-01	6.42E-01	6.64E-01
Delta			3.25E-01	3.51E-01	4.88E-01	5.85E-01	6.69E-01
Epsilon				2.04E-01	3.61E-01	4.50E-01	5.58E-01
Mu					3.05E-01	3.40E-01	4.25E-01
Omega						2.30E-01	4.09E-01
Sigma							2.90E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804203	0.9949169	0.9977006	0.9999813	9.653E+01	4.932E-01	--
α_2	1.87E-05	5.08E-03	2.30E-03	1.96E-02	4.932E-01	9.653E+01	1.165

CCCG = 3, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9836592	0.9944175	0.9960300	0.9996689	1.887E+02	1.059E+00	--
α_2	6.82E-05	3.64E-03	2.15E-03	1.23E-02	7.137E-01	1.951E+02	1.287
α_3	6.98E-07	1.94E-03	5.87E-04	8.46E-03	3.458E-01	1.781E+02	1.412

CCCG = 4, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9865462	0.9942133	0.9950866	0.9988950	3.633E+02	2.115E+00	--
α_2	5.10E-04	4.11E-03	3.28E-03	1.06E-02	1.549E+00	3.750E+02	1.298
α_3	2.46E-08	7.87E-04	1.54E-04	3.74E-03	2.646E-01	3.360E+02	1.454
α_4	9.79E-08	8.86E-04	2.17E-04	4.05E-03	3.010E-01	3.396E+02	1.438

CCCG = 5, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9908766	0.9949311	0.9952417	0.9979253	1.045E+03	5.325E+00	--
α_2	1.06E-03	3.33E-03	3.03E-03	6.62E-03	3.632E+00	1.086E+03	1.291
α_3	1.35E-04	1.37E-03	1.05E-03	3.70E-03	1.354E+00	9.857E+02	1.426
α_4	3.03E-08	3.19E-04	7.62E-05	1.47E-03	2.961E-01	9.276E+02	1.517
α_5	1.35E-34	4.54E-05	5.00E-11	2.25E-04	4.243E-02	9.356E+02	1.504

CCCG = 6, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9906791	0.9949167	0.9952523	0.9980082	9.660E+02	4.936E+00	--
α_2	7.35E-04	2.76E-03	2.46E-03	5.84E-03	2.915E+00	1.052E+03	1.206
α_3	1.20E-04	1.41E-03	1.06E-03	3.88E-03	1.257E+00	8.933E+02	1.422
α_4	2.37E-06	5.83E-04	2.67E-04	2.23E-03	5.031E-01	8.623E+02	1.474
α_5	3.90E-15	1.35E-04	1.78E-06	7.72E-04	1.155E-01	8.578E+02	1.483
α_6	9.20E-13	1.97E-04	7.20E-06	1.09E-03	1.451E-01	7.378E+02	1.724

CCCG = 7, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9927455	0.9954077	0.9955638	0.9975369	2.093E+03	9.654E+00	--
α_2	8.11E-04	2.09E-03	1.95E-03	3.86E-03	4.851E+00	2.312E+03	1.181
α_3	3.67E-04	1.43E-03	1.27E-03	3.06E-03	2.800E+00	1.953E+03	1.399
α_4	7.43E-05	7.27E-04	5.62E-04	1.95E-03	1.384E+00	1.902E+03	1.438
α_5	9.35E-07	2.64E-04	1.18E-04	1.02E-03	4.902E-01	1.855E+03	1.475
α_6	1.57E-15	6.59E-05	8.35E-07	3.78E-04	1.146E-01	1.740E+03	1.572
α_7	4.88E-93	9.29E-06	9.88E-25	1.10E-05	1.464E-02	1.577E+03	1.735

CCCG = 8, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9925217	0.9955537	0.9957575	0.9978901	1.601E+03	7.148E+00	--
α_2	4.52E-04	1.67E-03	1.48E-03	3.50E-03	2.980E+00	1.787E+03	1.158
α_3	2.19E-04	1.27E-03	1.06E-03	3.02E-03	1.960E+00	1.547E+03	1.338
α_4	5.94E-05	8.12E-04	5.95E-04	2.30E-03	1.166E+00	1.436E+03	1.442
α_5	2.11E-06	3.72E-04	1.80E-04	1.39E-03	5.375E-01	1.446E+03	1.433
α_6	2.81E-11	1.27E-04	9.87E-06	6.72E-04	1.805E-01	1.419E+03	1.460
α_7	1.81E-35	3.49E-05	2.61E-11	1.71E-04	4.139E-02	1.185E+03	1.749
α_8	1.04E-08	1.70E-04	3.75E-05	7.93E-04	2.827E-01	1.661E+03	1.248

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.94E-01	9.94E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01
α_2	5.08E-03	3.64E-03	4.11E-03	3.33E-03	2.76E-03	2.09E-03	1.67E-03
α_3		1.94E-03	7.87E-04	1.37E-03	1.41E-03	1.43E-03	1.27E-03
α_4			8.86E-04	3.19E-04	5.83E-04	7.27E-04	8.12E-04
α_5				4.54E-05	1.35E-04	2.64E-04	3.72E-04
α_6					1.97E-04	6.59E-05	1.27E-04
α_7						9.29E-06	3.49E-05
α_8							1.70E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.94E-01	9.94E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01
Beta	5.08E-03	5.58E-03	5.79E-03	5.07E-03	5.08E-03	4.59E-03	4.45E-03
Gamma		3.47E-01	2.89E-01	3.43E-01	4.56E-01	5.44E-01	6.26E-01
Delta			5.29E-01	2.10E-01	3.94E-01	4.27E-01	5.45E-01
Epsilon				1.24E-01	3.62E-01	3.18E-01	4.64E-01
Mu					5.94E-01	2.21E-01	4.72E-01
Omega						1.24E-01	6.17E-01
Sigma							8.30E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.3 BWR Residual Heat Removal Motor-Operated Valves

2.3.3.1 BWR-RHR-MOV-FTOC: BWR RHR Motor-Operated Valves Fail to Open/Close

Generic CCF Parameters

Plant Type: BWR
System Group: Clean Water
System: Residual Heat Removal (LCI in BWRs; LPI in PWRs)
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Close, Fail to Open, Fail to Open or Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 86.6

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9696188	0.9917753	0.9958946	0.9999493	0.9981153	6.655E+01	5.519E-01
α_2	5.36E-05	8.22E-03	4.10E-03	3.04E-02	1.88E-03	5.519E-01	6.655E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9706811	0.9890027	0.9914758	0.9988782	0.9962236	1.239E+02	1.378E+00
α_2	5.71E-04	8.79E-03	6.35E-03	2.53E-02	3.78E-03	1.101E+00	1.242E+02
α_3	1.10E-07	2.21E-03	4.71E-04	1.04E-02	0.00E+00	2.768E-01	1.250E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9704435	0.9867514	0.9884984	0.9970792	0.9943246	1.783E+02	2.394E+00
α_2	1.47E-03	9.74E-03	8.00E-03	2.40E-02	5.68E-03	1.760E+00	1.789E+02
α_3	2.41E-06	2.23E-03	8.16E-04	9.23E-03	0.00E+00	4.024E-01	1.803E+02
α_4	8.87E-09	1.28E-03	1.91E-04	6.34E-03	0.00E+00	2.315E-01	1.804E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9741690	0.9865272	0.9875811	0.9952887	0.9939371	3.001E+02	4.099E+00
α_2	1.90E-03	8.24E-03	7.19E-03	1.82E-02	5.31E-03	2.508E+00	3.017E+02
α_3	2.56E-04	3.72E-03	2.71E-03	1.07E-02	7.58E-04	1.132E+00	3.031E+02
α_4	9.54E-07	1.26E-03	4.33E-04	5.30E-03	0.00E+00	3.822E-01	3.038E+02
α_5	2.19E-20	2.52E-04	2.35E-07	1.46E-03	0.00E+00	7.674E-02	3.042E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9759826	0.9870434	0.9879349	0.9950685	0.9936237	3.562E+02	4.675E+00

α_2	1.42E-03	6.54E-03	5.66E-03	1.47E-02	5.01E-03	2.361E+00	3.585E+02
α_3	3.85E-04	3.81E-03	2.94E-03	1.02E-02	1.26E-03	1.374E+00	3.595E+02
α_4	1.71E-05	1.69E-03	9.01E-04	6.04E-03	1.05E-04	6.098E-01	3.602E+02
α_5	2.40E-09	6.13E-04	8.19E-05	3.07E-03	0.00E+00	2.211E-01	3.606E+02
α_6	2.39E-15	3.04E-04	3.08E-06	1.75E-03	0.00E+00	1.098E-01	3.607E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9783755	0.9872699	0.9878795	0.9940929	0.9933982	5.244E+02	6.761E+00
α_2	1.51E-03	5.59E-03	4.98E-03	1.17E-02	4.71E-03	2.967E+00	5.282E+02
α_3	5.81E-04	3.54E-03	2.94E-03	8.54E-03	1.62E-03	1.878E+00	5.292E+02
α_4	1.42E-04	2.11E-03	1.53E-03	6.07E-03	2.56E-04	1.122E+00	5.300E+02
α_5	7.87E-06	1.07E-03	5.40E-04	3.92E-03	1.51E-05	5.677E-01	5.306E+02
α_6	1.98E-10	3.61E-04	3.33E-05	1.88E-03	0.00E+00	1.916E-01	5.309E+02
α_7	4.49E-41	6.55E-05	2.44E-12	2.87E-04	0.00E+00	3.480E-02	5.311E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9795457	0.9879035	0.9884707	0.9943322	0.9932552	5.642E+02	6.908E+00
α_2	1.25E-03	4.88E-03	4.32E-03	1.04E-02	4.40E-03	2.790E+00	5.683E+02
α_3	4.37E-04	3.01E-03	2.45E-03	7.48E-03	1.87E-03	1.718E+00	5.694E+02
α_4	1.38E-04	1.99E-03	1.45E-03	5.69E-03	4.24E-04	1.136E+00	5.700E+02
α_5	2.29E-05	1.25E-03	7.32E-04	4.21E-03	4.84E-05	7.111E-01	5.704E+02
α_6	2.43E-07	6.13E-04	1.88E-04	2.67E-03	2.20E-06	3.501E-01	5.707E+02
α_7	9.23E-16	1.89E-04	1.73E-06	1.09E-03	0.00E+00	1.078E-01	5.710E+02
α_8	1.93E-17	1.66E-04	7.02E-07	9.65E-04	0.00E+00	9.469E-02	5.710E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.89E-01	9.87E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01
α_2	8.22E-03	8.79E-03	9.74E-03	8.24E-03	6.54E-03	5.59E-03	4.88E-03
α_3		2.21E-03	2.23E-03	3.72E-03	3.81E-03	3.54E-03	3.01E-03
α_4			1.28E-03	1.26E-03	1.69E-03	2.11E-03	1.99E-03
α_5				2.52E-04	6.13E-04	1.07E-03	1.25E-03
α_6					3.04E-04	3.61E-04	6.13E-04
α_7						6.55E-05	1.89E-04
α_8							1.66E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.89E-01	9.87E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01
Beta	8.22E-03	1.10E-02	1.32E-02	1.35E-02	1.30E-02	1.27E-02	1.21E-02
Gamma		2.01E-01	2.65E-01	3.88E-01	4.95E-01	5.61E-01	5.96E-01
Delta			3.65E-01	2.88E-01	4.06E-01	5.05E-01	5.83E-01
Epsilon				1.67E-01	3.52E-01	4.14E-01	5.27E-01
Mu					3.32E-01	2.85E-01	4.37E-01
Omega						1.54E-01	3.66E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	43.30	64.95	86.60	108.25	129.90	151.55	173.20
N₁	0.8333	1.0000	1.0000	1.0417	1.0417	1.0127	0.9645
N₂	0.0833	0.2500	0.5000	0.5833	0.6597	0.7234	0.7716
N₃		0.0000	0.0000	0.0833	0.1667	0.2488	0.3279
N₄			0.0000	0.0000	0.0139	0.0394	0.0743
N₅				0.0000	0.0000	0.0023	0.0085
N₆					0.0000	0.0000	0.0004
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 32.6

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.389

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9788011	0.9942130	0.9970617	0.9999574	9.737E+01	5.667E-01	--
α_2	4.26E-05	5.79E-03	2.94E-03	2.12E-02	5.667E-01	9.737E+01	0.628

CCCG = 3, Gamma = 0.388

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9808732	0.9926722	0.9942260	0.9991589	1.999E+02	1.476E+00	--
α_2	5.14E-04	6.29E-03	4.71E-03	1.75E-02	1.227E+00	1.937E+02	0.803
α_3	1.65E-08	1.03E-03	1.79E-04	5.01E-03	2.487E-01	2.403E+02	0.651

CCCG = 4, Gamma = 0.387

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9784619	0.9901671	0.9913930	0.9976818	2.575E+02	2.557E+00	--
α_2	1.35E-03	7.84E-03	6.56E-03	1.87E-02	1.942E+00	2.457E+02	0.881
α_3	1.63E-06	1.30E-03	4.89E-04	5.35E-03	4.114E-01	3.156E+02	0.690
α_4	9.02E-10	6.88E-04	7.49E-05	3.53E-03	2.036E-01	2.959E+02	0.736

CCCG = 5, Gamma = 0.386

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9809626	0.9899272	0.9906734	0.9963431	4.275E+02	4.350E+00	--
α_2	1.78E-03	6.88E-03	6.10E-03	1.46E-02	2.826E+00	4.081E+02	0.965
α_3	1.41E-04	2.31E-03	1.65E-03	6.73E-03	1.075E+00	4.645E+02	0.852
α_4	5.09E-07	7.46E-04	2.52E-04	3.17E-03	3.765E-01	5.041E+02	0.787
α_5	1.22E-21	1.40E-04	8.00E-08	8.11E-04	7.237E-02	5.151E+02	0.770

CCCG = 6, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9814994	0.9898722	0.9905287	0.9960027	4.867E+02	4.979E+00	--
α_2	1.54E-03	6.01E-03	5.31E-03	1.28E-02	2.788E+00	4.613E+02	0.981
α_3	2.31E-04	2.53E-03	1.92E-03	6.92E-03	1.301E+00	5.122E+02	0.887
α_4	7.26E-06	9.90E-04	5.00E-04	3.63E-03	5.672E-01	5.722E+02	0.795
α_5	1.45E-09	3.73E-04	4.97E-05	1.87E-03	2.210E-01	5.929E+02	0.768
α_6	2.87E-16	2.26E-04	1.57E-06	1.31E-03	1.027E-01	4.550E+02	1.000

CCCG = 7, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839343	0.9903491	0.9907696	0.9953284	7.641E+02	7.446E+00	--
α_2	1.53E-03	4.87E-03	4.43E-03	9.73E-03	3.563E+00	7.274E+02	1.021
α_3	4.59E-04	2.59E-03	2.17E-03	6.13E-03	1.995E+00	7.692E+02	0.968
α_4	8.90E-05	1.32E-03	9.56E-04	3.79E-03	1.123E+00	8.504E+02	0.877
α_5	3.59E-06	6.19E-04	3.01E-04	2.31E-03	5.399E-01	8.716E+02	0.856
α_6	1.94E-10	2.21E-04	2.23E-05	1.14E-03	1.979E-01	8.943E+02	0.835
α_7	6.65E-53	2.97E-05	2.98E-15	1.01E-04	2.656E-02	8.942E+02	0.835

CCCG = 8, Gamma = 0.384

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9844526	0.9907027	0.9911164	0.9955406	7.773E+02	7.295E+00	--
α_2	1.20E-03	4.23E-03	3.79E-03	8.75E-03	3.136E+00	7.384E+02	1.018
α_3	3.84E-04	2.40E-03	1.99E-03	5.85E-03	1.840E+00	7.634E+02	0.986
α_4	9.04E-05	1.32E-03	9.60E-04	3.79E-03	1.130E+00	8.539E+02	0.882
α_5	1.19E-05	7.51E-04	4.31E-04	2.58E-03	6.830E-01	9.093E+02	0.829
α_6	4.71E-08	3.46E-04	8.82E-05	1.57E-03	3.080E-01	8.887E+02	0.849
α_7	8.12E-16	1.16E-04	1.15E-06	6.69E-04	1.093E-01	9.416E+02	0.801
α_8	2.00E-18	1.29E-04	3.59E-07	7.55E-04	8.885E-02	6.862E+02	1.099

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.93E-01	9.90E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
α_2	5.79E-03	6.29E-03	7.84E-03	6.88E-03	6.01E-03	4.87E-03	4.23E-03
α_3		1.03E-03	1.30E-03	2.31E-03	2.53E-03	2.59E-03	2.40E-03
α_4			6.88E-04	7.46E-04	9.90E-04	1.32E-03	1.32E-03
α_5				1.40E-04	3.73E-04	6.19E-04	7.51E-04
α_6					2.26E-04	2.21E-04	3.46E-04
α_7						2.97E-05	1.16E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.93E-01	9.90E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
Beta	5.79E-03	7.33E-03	9.83E-03	1.01E-02	1.01E-02	9.65E-03	9.30E-03
Gamma		1.41E-01	2.02E-01	3.17E-01	4.07E-01	4.95E-01	5.45E-01
Delta			3.46E-01	2.78E-01	3.85E-01	4.58E-01	5.26E-01
Epsilon				1.58E-01	3.77E-01	3.97E-01	5.04E-01
Mu					3.77E-01	2.88E-01	4.41E-01
Omega						1.18E-01	4.15E-01
Sigma							5.27E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	16.30	24.45	32.60	40.75	48.90	57.05	65.20
N_1	0.8333	1.0000	1.0000	1.0417	1.0417	1.0127	0.9645
N_2	0.0833	0.2500	0.5000	0.5833	0.6597	0.7234	0.7716
N_3		0.0000	0.0000	0.0833	0.1667	0.2488	0.3279

N₄			0.0000	0.0000	0.0139	0.0394	0.0743
N₅				0.0000	0.0000	0.0023	0.0085
N₆					0.0000	0.0000	0.0004
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 9.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.102

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9397996	0.9848116	0.9936115	0.9999661	2.916E+01	4.498E-01	--
α_2	3.39E-05	1.52E-02	6.39E-03	6.02E-02	4.498E-01	2.916E+01	0.628

CCCG = 3, Gamma = 0.102

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9400680	0.9785819	0.9840559	0.9983686	5.384E+01	1.178E+00	--
α_2	7.87E-04	1.77E-02	1.21E-02	5.39E-02	9.387E-01	5.196E+01	0.803
α_3	3.85E-08	3.67E-03	5.92E-04	1.80E-02	2.396E-01	6.502E+01	0.651

CCCG = 4, Gamma = 0.102

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9390174	0.9744198	0.9785535	0.9956748	7.232E+01	1.898E+00	--
α_2	1.67E-03	1.85E-02	1.41E-02	5.03E-02	1.285E+00	6.819E+01	0.881
α_3	4.08E-06	4.43E-03	1.58E-03	1.85E-02	3.927E-01	8.827E+01	0.690
α_4	1.02E-08	2.66E-03	3.55E-04	1.33E-02	2.207E-01	8.286E+01	0.736

CCCG = 5, Gamma = 0.102

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9473834	0.9735505	0.9758979	0.9916930	1.290E+02	3.506E+00	--
α_2	2.86E-03	1.60E-02	1.35E-02	3.77E-02	1.992E+00	1.227E+02	0.965
α_3	4.72E-04	7.63E-03	5.47E-03	2.22E-02	1.078E+00	1.402E+02	0.852
α_4	1.25E-06	2.37E-03	7.68E-04	1.02E-02	3.632E-01	1.527E+02	0.787
α_5	4.28E-21	4.64E-04	2.68E-07	2.68E-03	7.248E-02	1.562E+02	0.770

CCCG = 6, Gamma = 0.102

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9514918	0.9744310	0.9763338	0.9908673	1.600E+02	4.199E+00	--
α_2	2.19E-03	1.27E-02	1.07E-02	3.03E-02	1.941E+00	1.508E+02	0.981
α_3	7.56E-04	7.88E-03	6.04E-03	2.13E-02	1.332E+00	1.676E+02	0.887
α_4	3.52E-05	3.28E-03	1.77E-03	1.17E-02	6.181E-01	1.879E+02	0.795
α_5	8.13E-09	1.19E-03	1.76E-04	5.87E-03	2.313E-01	1.949E+02	0.768
α_6	4.68E-20	5.13E-04	4.83E-07	2.98E-03	7.684E-02	1.497E+02	1.000

CCCG = 7, Gamma = 0.103

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9553796	0.9741237	0.9754279	0.9884132	2.343E+02	6.223E+00	--
α_2	2.88E-03	1.18E-02	1.03E-02	2.54E-02	2.654E+00	2.232E+02	1.021
α_3	9.42E-04	6.90E-03	5.58E-03	1.74E-02	1.645E+00	2.366E+02	0.968
α_4	2.82E-04	4.24E-03	3.07E-03	1.22E-02	1.115E+00	2.620E+02	0.877
α_5	2.17E-05	2.24E-03	1.19E-03	8.03E-03	6.034E-01	2.689E+02	0.856
α_6	1.14E-10	6.44E-04	4.80E-05	3.42E-03	1.780E-01	2.762E+02	0.835
α_7	5.39E-51	9.90E-05	2.03E-14	3.49E-04	2.734E-02	2.762E+02	0.835

CCCG = 8, Gamma = 0.103

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9573000	0.9752246	0.9764715	0.9888904	2.458E+02	6.246E+00	--
α_2	2.45E-03	1.06E-02	9.25E-03	2.33E-02	2.504E+00	2.338E+02	1.018
α_3	6.24E-04	5.82E-03	4.54E-03	1.54E-02	1.419E+00	2.424E+02	0.986
α_4	2.07E-04	3.77E-03	2.65E-03	1.12E-02	1.027E+00	2.714E+02	0.882
α_5	5.21E-05	2.53E-03	1.52E-03	8.46E-03	7.337E-01	2.893E+02	0.829
α_6	1.40E-06	1.40E-03	5.06E-04	5.84E-03	3.975E-01	2.829E+02	0.849
α_7	2.57E-20	2.57E-04	2.46E-07	1.49E-03	7.703E-02	3.000E+02	0.801
α_8	3.71E-18	4.00E-04	1.00E-06	2.33E-03	8.749E-02	2.186E+02	1.099

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.79E-01	9.74E-01	9.74E-01	9.74E-01	9.74E-01	9.75E-01
α_2	1.52E-02	1.77E-02	1.85E-02	1.60E-02	1.27E-02	1.18E-02	1.06E-02
α_3		3.67E-03	4.43E-03	7.63E-03	7.88E-03	6.90E-03	5.82E-03
α_4			2.66E-03	2.37E-03	3.28E-03	4.24E-03	3.77E-03
α_5				4.64E-04	1.19E-03	2.24E-03	2.53E-03
α_6					5.13E-04	6.44E-04	1.40E-03
α_7						9.90E-05	2.57E-04
α_8							4.00E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.79E-01	9.74E-01	9.74E-01	9.74E-01	9.74E-01	9.75E-01
Beta	1.52E-02	2.14E-02	2.56E-02	2.64E-02	2.56E-02	2.59E-02	2.48E-02
Gamma		1.71E-01	2.77E-01	3.96E-01	5.03E-01	5.46E-01	5.72E-01
Delta			3.75E-01	2.71E-01	3.87E-01	5.11E-01	5.90E-01
Epsilon				1.63E-01	3.41E-01	4.13E-01	5.49E-01
Mu					3.02E-01	2.49E-01	4.49E-01
Omega						1.33E-01	3.19E-01
Sigma							6.09E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.50	6.75	9.00	11.25	13.50	15.75	18.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.045

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8655495	0.9678272	0.9884103	0.9999751	1.143E+01	3.801E-01	--
α_2	2.49E-05	3.22E-02	1.16E-02	1.34E-01	3.801E-01	1.143E+01	0.628

CCCG = 3, Gamma = 0.045

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8696724	0.9561140	0.9691630	0.9978785	2.091E+01	9.600E-01	--
α_2	4.90E-04	3.24E-02	1.89E-02	1.10E-01	6.673E-01	1.994E+01	0.803
α_3	1.01E-06	1.15E-02	2.76E-03	5.30E-02	2.927E-01	2.514E+01	0.651

CCCG = 4, Gamma = 0.045

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8748998	0.9490226	0.9579174	0.9926561	3.107E+01	1.669E+00	--
α_2	2.00E-03	3.43E-02	2.46E-02	9.95E-02	1.039E+00	2.928E+01	0.881
α_3	8.72E-06	1.00E-02	3.58E-03	4.20E-02	3.887E-01	3.830E+01	0.690
α_4	7.68E-08	6.66E-03	1.10E-03	3.26E-02	2.414E-01	3.601E+01	0.736

CCCG = 5, Gamma = 0.045

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9017110	0.9502292	0.9544667	0.9842497	6.657E+01	3.487E+00	--
α_2	4.29E-03	2.74E-02	2.27E-02	6.65E-02	1.791E+00	6.358E+01	0.965
α_3	1.30E-03	1.63E-02	1.22E-02	4.53E-02	1.207E+00	7.286E+01	0.852
α_4	9.57E-06	5.41E-03	2.16E-03	2.18E-02	4.340E-01	7.981E+01	0.787
α_5	1.49E-26	6.70E-04	2.38E-08	3.69E-03	5.493E-02	8.191E+01	0.770

CCCG = 6, Gamma = 0.046

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9144539	0.9554522	0.9588808	0.9847254	8.374E+01	3.905E+00	--
α_2	1.62E-03	1.67E-02	1.28E-02	4.48E-02	1.335E+00	7.878E+01	0.981
α_3	2.12E-03	1.73E-02	1.38E-02	4.43E-02	1.531E+00	8.710E+01	0.887
α_4	1.40E-04	7.27E-03	4.33E-03	2.44E-02	7.191E-01	9.814E+01	0.795
α_5	3.52E-08	2.41E-03	4.12E-04	1.17E-02	2.467E-01	1.021E+02	0.768
α_6	1.02E-20	9.27E-04	5.58E-07	5.38E-03	7.279E-02	7.848E+01	1.000

CCCG = 7, Gamma = 0.046

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9259049	0.9575574	0.9597859	0.9815950	1.302E+02	5.770E+00	--
α_2	1.54E-03	1.23E-02	9.86E-03	3.16E-02	1.549E+00	1.239E+02	1.021
α_3	2.68E-03	1.50E-02	1.27E-02	3.55E-02	1.989E+00	1.304E+02	0.968
α_4	7.92E-04	8.80E-03	6.69E-03	2.41E-02	1.287E+00	1.449E+02	0.877
α_5	7.71E-05	4.62E-03	2.68E-03	1.58E-02	6.913E-01	1.490E+02	0.856
α_6	1.12E-08	1.52E-03	2.28E-04	7.49E-03	2.327E-01	1.533E+02	0.835
α_7	9.34E-65	1.38E-04	2.08E-17	3.46E-04	2.112E-02	1.535E+02	0.835

CCCG = 8, Gamma = 0.046

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9357831	0.9616146	0.9632884	0.9817284	1.758E+02	7.016E+00	--
α_2	1.22E-03	9.47E-03	7.60E-03	2.41E-02	1.583E+00	1.655E+02	1.018
α_3	2.04E-03	1.15E-02	9.69E-03	2.72E-02	1.986E+00	1.704E+02	0.986
α_4	1.21E-03	8.68E-03	7.05E-03	2.17E-02	1.672E+00	1.910E+02	0.882
α_5	2.61E-04	4.93E-03	3.44E-03	1.47E-02	1.011E+00	2.040E+02	0.829
α_6	2.16E-05	2.85E-03	1.45E-03	1.04E-02	5.709E-01	1.997E+02	0.849
α_7	1.96E-10	8.53E-04	6.67E-05	4.51E-03	1.809E-01	2.120E+02	0.801
α_8	1.16E-107	8.05E-05	2.44E-27	6.03E-05	1.245E-02	1.546E+02	1.099

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.56E-01	9.49E-01	9.50E-01	9.55E-01	9.58E-01	9.62E-01
α_2	3.22E-02	3.24E-02	3.43E-02	2.74E-02	1.67E-02	1.23E-02	9.47E-03
α_3		1.15E-02	1.00E-02	1.63E-02	1.73E-02	1.50E-02	1.15E-02
α_4			6.66E-03	5.41E-03	7.27E-03	8.80E-03	8.68E-03
α_5				6.70E-04	2.41E-03	4.62E-03	4.93E-03
α_6					9.27E-04	1.52E-03	2.85E-03
α_7						1.38E-04	8.53E-04
α_8							8.05E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.56E-01	9.49E-01	9.50E-01	9.55E-01	9.58E-01	9.62E-01
Beta	3.22E-02	4.39E-02	5.10E-02	4.98E-02	4.45E-02	4.24E-02	3.84E-02
Gamma		2.62E-01	3.28E-01	4.50E-01	6.26E-01	7.09E-01	7.53E-01
Delta			3.99E-01	2.72E-01	3.81E-01	5.01E-01	6.02E-01
Epsilon				1.10E-01	3.14E-01	4.16E-01	5.01E-01
Mu					2.78E-01	2.64E-01	4.34E-01
Omega						8.32E-02	2.47E-01
Sigma							8.63E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	3.00	4.00	5.00	6.00	7.00	8.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 35.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.396

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9724831	0.9929691	0.9969458	0.9999799	6.646E+01	4.706E-01	--
α_2	2.01E-05	7.03E-03	3.05E-03	2.75E-02	4.706E-01	6.646E+01	0.628

CCCG = 3, Gamma = 0.397

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9726463	0.9905054	0.9931346	0.9993808	1.150E+02	1.103E+00	--
α_2	2.11E-04	7.35E-03	4.66E-03	2.36E-02	8.104E-01	1.095E+02	0.803
α_3	1.80E-07	2.15E-03	5.03E-04	9.90E-03	2.921E-01	1.358E+02	0.651

CCCG = 4, Gamma = 0.397

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9744356	0.9892529	0.9909887	0.9981344	1.797E+02	1.953E+00	--
α_2	7.20E-04	7.73E-03	5.90E-03	2.10E-02	1.312E+00	1.685E+02	0.881
α_3	3.33E-06	1.99E-03	7.85E-04	8.04E-03	4.307E-01	2.163E+02	0.690
α_4	2.06E-09	1.03E-03	1.22E-04	5.26E-03	2.099E-01	2.029E+02	0.736

CCCG = 5, Gamma = 0.398

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9772437	0.9890016	0.9901333	0.9968919	2.794E+02	3.107E+00	--
α_2	9.00E-04	6.37E-03	5.18E-03	1.59E-02	1.684E+00	2.625E+02	0.965
α_3	1.39E-04	3.15E-03	2.14E-03	9.62E-03	9.426E-01	2.984E+02	0.852
α_4	8.83E-07	1.18E-03	4.04E-04	4.97E-03	3.816E-01	3.239E+02	0.787
α_5	1.19E-16	2.98E-04	1.63E-06	1.73E-03	9.865E-02	3.311E+02	0.770

CCCG = 6, Gamma = 0.398

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9795878	0.9895583	0.9904360	0.9965297	3.622E+02	3.822E+00	--
α_2	7.32E-04	5.06E-03	4.12E-03	1.26E-02	1.714E+00	3.372E+02	0.981
α_3	1.94E-04	2.95E-03	2.13E-03	8.53E-03	1.108E+00	3.739E+02	0.887
α_4	2.05E-05	1.56E-03	8.67E-04	5.43E-03	6.509E-01	4.176E+02	0.795
α_5	1.16E-08	5.86E-04	1.05E-04	2.82E-03	2.536E-01	4.329E+02	0.768
α_6	4.67E-17	2.88E-04	1.31E-06	1.68E-03	9.572E-02	3.322E+02	1.000

CCCG = 7, Gamma = 0.399

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9809875	0.9894819	0.9901353	0.9957451	4.887E+02	5.195E+00	--
α_2	8.65E-04	4.56E-03	3.87E-03	1.06E-02	2.105E+00	4.595E+02	1.021
α_3	2.54E-04	2.71E-03	2.07E-03	7.36E-03	1.320E+00	4.856E+02	0.968
α_4	9.45E-05	1.85E-03	1.28E-03	5.55E-03	9.967E-01	5.367E+02	0.877
α_5	4.82E-06	9.53E-04	4.53E-04	3.60E-03	5.249E-01	5.502E+02	0.856
α_6	2.57E-10	3.46E-04	3.39E-05	1.79E-03	1.956E-01	5.646E+02	0.835
α_7	2.67E-28	9.37E-05	2.12E-09	5.08E-04	5.291E-02	5.646E+02	0.835

CCCG = 8, Gamma = 0.399

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9823662	0.9899730	0.9905291	0.9956810	5.758E+02	5.832E+00	--
α_2	8.34E-04	4.11E-03	3.52E-03	9.41E-03	2.229E+00	5.400E+02	1.018
α_3	1.93E-04	2.25E-03	1.69E-03	6.22E-03	1.260E+00	5.583E+02	0.986
α_4	9.47E-05	1.67E-03	1.18E-03	4.92E-03	1.042E+00	6.242E+02	0.882
α_5	2.69E-05	1.15E-03	7.01E-04	3.78E-03	7.626E-01	6.646E+02	0.829
α_6	1.15E-07	5.03E-04	1.40E-04	2.24E-03	3.271E-01	6.497E+02	0.849
α_7	1.89E-13	1.95E-04	5.23E-06	1.10E-03	1.344E-01	6.885E+02	0.801
α_8	1.38E-20	1.53E-04	1.44E-07	8.89E-04	7.682E-02	5.017E+02	1.099

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.91E-01	9.89E-01	9.89E-01	9.90E-01	9.89E-01	9.90E-01
α_2	7.03E-03	7.35E-03	7.73E-03	6.37E-03	5.06E-03	4.56E-03	4.11E-03
α_3		2.15E-03	1.99E-03	3.15E-03	2.95E-03	2.71E-03	2.25E-03
α_4			1.03E-03	1.18E-03	1.56E-03	1.85E-03	1.67E-03
α_5				2.98E-04	5.86E-04	9.53E-04	1.15E-03
α_6					2.88E-04	3.46E-04	5.03E-04
α_7						9.37E-05	1.95E-04
α_8							1.53E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.91E-01	9.89E-01	9.89E-01	9.90E-01	9.89E-01	9.90E-01
Beta	7.03E-03	9.49E-03	1.07E-02	1.10E-02	1.04E-02	1.05E-02	1.00E-02
Gamma		2.26E-01	2.81E-01	4.20E-01	5.16E-01	5.66E-01	5.90E-01
Delta			3.42E-01	3.19E-01	4.51E-01	5.45E-01	6.19E-01
Epsilon				2.02E-01	3.60E-01	4.29E-01	5.45E-01
Mu					3.30E-01	3.16E-01	4.26E-01
Omega						2.13E-01	4.09E-01
Sigma							4.40E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	17.50	26.25	35.00	43.75	52.50	61.25	70.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 6.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.068

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9893298	0.9972326	0.9987519	0.9999898	1.777E+02	4.932E-01	--
α_2	1.02E-05	2.77E-03	1.25E-03	1.07E-02	4.932E-01	1.777E+02	0.628

CCCG = 3, Gamma = 0.068

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9907292	0.9968367	0.9977538	0.9998128	3.339E+02	1.059E+00	--
α_2	4.24E-05	2.27E-03	1.34E-03	7.67E-03	7.137E-01	3.135E+02	0.803
α_3	3.20E-07	8.92E-04	2.70E-04	3.89E-03	3.458E-01	3.873E+02	0.651

CCCG = 4, Gamma = 0.068

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9916152	0.9963969	0.9969428	0.9993129	5.848E+02	2.115E+00	--
α_2	3.44E-04	2.78E-03	2.21E-03	7.15E-03	1.549E+00	5.558E+02	0.881
α_3	1.16E-08	3.72E-04	7.27E-05	1.77E-03	2.646E-01	7.109E+02	0.690
α_4	4.99E-08	4.52E-04	1.11E-04	2.06E-03	3.010E-01	6.662E+02	0.736

CCCG = 5, Gamma = 0.068

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9937125	0.9965084	0.9967230	0.9985718	1.520E+03	5.325E+00	--
α_2	7.93E-04	2.49E-03	2.26E-03	4.94E-03	3.632E+00	1.458E+03	0.965
α_3	8.03E-05	8.18E-04	6.28E-04	2.20E-03	1.354E+00	1.654E+03	0.852
α_4	1.57E-08	1.65E-04	3.94E-05	7.58E-04	2.961E-01	1.793E+03	0.787
α_5	6.89E-35	2.32E-05	2.55E-11	1.15E-04	4.243E-02	1.832E+03	0.770

CCCG = 6, Gamma = 0.068

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9933814	0.9963921	0.9966310	0.9985871	1.363E+03	4.936E+00	--
α_2	5.96E-04	2.24E-03	1.99E-03	4.73E-03	2.915E+00	1.299E+03	0.981
α_3	7.44E-05	8.73E-04	6.56E-04	2.41E-03	1.257E+00	1.439E+03	0.887
α_4	1.27E-06	3.13E-04	1.43E-04	1.20E-03	5.031E-01	1.606E+03	0.795
α_5	2.01E-15	6.94E-05	9.16E-07	3.98E-04	1.155E-01	1.664E+03	0.768
α_6	5.32E-13	1.14E-04	4.16E-06	6.30E-04	1.451E-01	1.276E+03	1.000

CCCG = 7, Gamma = 0.068

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9945796	0.9965696	0.9966865	0.9981607	2.805E+03	9.654E+00	--
α_2	7.00E-04	1.81E-03	1.68E-03	3.33E-03	4.851E+00	2.680E+03	1.021
α_3	2.53E-04	9.89E-04	8.74E-04	2.12E-03	2.800E+00	2.830E+03	0.968
α_4	4.52E-05	4.43E-04	3.42E-04	1.18E-03	1.384E+00	3.126E+03	0.877
α_5	5.42E-07	1.53E-04	6.84E-05	5.92E-04	4.902E-01	3.203E+03	0.856
α_6	8.30E-16	3.49E-05	4.42E-07	2.00E-04	1.146E-01	3.285E+03	0.835
α_7	2.34E-93	4.46E-06	4.74E-25	5.30E-06	1.464E-02	3.284E+03	0.835

CCCG = 8, Gamma = 0.068

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9943895	0.9966652	0.9968184	0.9984181	2.136E+03	7.148E+00	--
α_2	3.95E-04	1.46E-03	1.30E-03	3.06E-03	2.980E+00	2.041E+03	1.018
α_3	1.61E-04	9.29E-04	7.77E-04	2.22E-03	1.960E+00	2.108E+03	0.986
α_4	3.62E-05	4.95E-04	3.63E-04	1.40E-03	1.166E+00	2.356E+03	0.882
α_5	1.22E-06	2.14E-04	1.04E-04	8.02E-04	5.375E-01	2.508E+03	0.829
α_6	1.63E-11	7.37E-05	5.71E-06	3.89E-04	1.805E-01	2.450E+03	0.849
α_7	8.24E-36	1.59E-05	1.19E-11	7.80E-05	4.139E-02	2.596E+03	0.801
α_8	9.11E-09	1.49E-04	3.29E-05	6.97E-04	2.827E-01	1.892E+03	1.099

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01
α_2	2.77E-03	2.27E-03	2.78E-03	2.49E-03	2.24E-03	1.81E-03	1.46E-03
α_3		8.92E-04	3.72E-04	8.18E-04	8.73E-04	9.89E-04	9.29E-04
α_4			4.52E-04	1.65E-04	3.13E-04	4.43E-04	4.95E-04
α_5				2.32E-05	6.94E-05	1.53E-04	2.14E-04
α_6					1.14E-04	3.49E-05	7.37E-05
α_7						4.46E-06	1.59E-05
α_8							1.49E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01
Beta	2.77E-03	3.16E-03	3.60E-03	3.49E-03	3.61E-03	3.43E-03	3.33E-03
Gamma		2.82E-01	2.29E-01	2.88E-01	3.79E-01	4.73E-01	5.63E-01
Delta			5.48E-01	1.87E-01	3.62E-01	3.91E-01	5.05E-01
Epsilon				1.23E-01	3.69E-01	3.03E-01	4.78E-01
Mu					6.21E-01	2.04E-01	5.27E-01
Omega						1.13E-01	6.92E-01
Sigma							9.04E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	4.50	6.00	7.50	9.00	10.50	12.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.3.2 BWR-RHR-MOV-CC: BWR RHR Motor-Operated Valves Fail to Open

Generic CCF Parameters

Plant Type: BWR
System Group: Clean Water
System: Residual Heat Removal (LCI in BWRs; LPI in PWRs)
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 53.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9757865	0.9938255	0.9973353	0.9999811	1.0000000	7.541E+01	4.685E-01
α_2	1.72E-05	6.17E-03	2.67E-03	2.42E-02	0.00E+00	4.685E-01	7.541E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9712525	0.9899378	0.9926611	0.9993063	1.0000000	1.110E+02	1.128E+00
α_2	2.53E-04	7.59E-03	4.94E-03	2.40E-02	0.00E+00	8.512E-01	1.113E+02
α_3	1.23E-07	2.47E-03	5.27E-04	1.16E-02	0.00E+00	2.768E-01	1.118E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9687875	0.9869917	0.9891444	0.9978285	1.0000000	1.437E+02	1.894E+00
α_2	7.46E-04	8.65E-03	6.53E-03	2.38E-02	0.00E+00	1.260E+00	1.443E+02
α_3	3.00E-06	2.76E-03	1.01E-03	1.15E-02	0.00E+00	4.024E-01	1.452E+02
α_4	1.10E-08	1.59E-03	2.37E-04	7.87E-03	0.00E+00	2.315E-01	1.453E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9721001	0.9861198	0.9874109	0.9957402	1.0000000	2.438E+02	3.432E+00
α_2	1.32E-03	7.78E-03	6.50E-03	1.86E-02	0.00E+00	1.924E+00	2.453E+02
α_3	2.45E-04	4.24E-03	3.00E-03	1.25E-02	0.00E+00	1.049E+00	2.462E+02
α_4	1.17E-06	1.55E-03	5.33E-04	6.52E-03	0.00E+00	3.822E-01	2.469E+02
α_5	2.69E-20	3.10E-04	2.89E-07	1.80E-03	0.00E+00	7.674E-02	2.472E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9734772	0.9864036	0.9875387	0.9954610	1.0000000	2.782E+02	3.835E+00
α_2	8.64E-04	6.03E-03	4.91E-03	1.50E-02	0.00E+00	1.701E+00	2.804E+02
α_3	3.37E-04	4.28E-03	3.18E-03	1.20E-02	0.00E+00	1.207E+00	2.808E+02

α_4	1.94E-05	2.11E-03	1.11E-03	7.61E-03	0.00E+00	5.960E-01	2.815E+02
α_5	3.07E-09	7.84E-04	1.05E-04	3.93E-03	0.00E+00	2.211E-01	2.818E+02
α_6	3.06E-15	3.89E-04	3.94E-06	2.24E-03	0.00E+00	1.098E-01	2.819E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9764700	0.9866510	0.9874005	0.9942902	1.0000000	4.248E+02	5.747E+00
α_2	1.07E-03	5.21E-03	4.47E-03	1.19E-02	0.00E+00	2.243E+00	4.283E+02
α_3	5.08E-04	3.78E-03	3.05E-03	9.57E-03	0.00E+00	1.630E+00	4.289E+02
α_4	1.56E-04	2.52E-03	1.80E-03	7.32E-03	0.00E+00	1.083E+00	4.295E+02
α_5	9.49E-06	1.31E-03	6.62E-04	4.82E-03	0.00E+00	5.654E-01	4.300E+02
α_6	2.44E-10	4.45E-04	4.11E-05	2.32E-03	0.00E+00	1.916E-01	4.304E+02
α_7	5.54E-41	8.08E-05	3.01E-12	3.54E-04	0.00E+00	3.480E-02	4.305E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9774856	0.9872410	0.9879605	0.9945491	1.0000000	4.430E+02	5.726E+00
α_2	8.11E-04	4.50E-03	3.79E-03	1.06E-02	0.00E+00	2.018E+00	4.467E+02
α_3	3.20E-04	3.10E-03	2.40E-03	8.27E-03	0.00E+00	1.391E+00	4.474E+02
α_4	1.41E-04	2.37E-03	1.68E-03	6.93E-03	0.00E+00	1.062E+00	4.477E+02
α_5	2.76E-05	1.57E-03	9.15E-04	5.32E-03	0.00E+00	7.026E-01	4.480E+02
α_6	3.06E-07	7.79E-04	2.39E-04	3.39E-03	0.00E+00	3.497E-01	4.484E+02
α_7	1.18E-15	2.40E-04	2.21E-06	1.39E-03	0.00E+00	1.078E-01	4.486E+02
α_8	2.46E-17	2.11E-04	8.94E-07	1.23E-03	0.00E+00	9.469E-02	4.487E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.90E-01	9.87E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01
α_2	6.17E-03	7.59E-03	8.65E-03	7.78E-03	6.03E-03	5.21E-03	4.50E-03
α_3		2.47E-03	2.76E-03	4.24E-03	4.28E-03	3.78E-03	3.10E-03
α_4			1.59E-03	1.55E-03	2.11E-03	2.52E-03	2.37E-03
α_5				3.10E-04	7.84E-04	1.31E-03	1.57E-03
α_6					3.89E-04	4.45E-04	7.79E-04
α_7						8.08E-05	2.40E-04
α_8							2.11E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.90E-01	9.87E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01
Beta	6.17E-03	1.01E-02	1.30E-02	1.39E-02	1.36E-02	1.33E-02	1.28E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	53.00	53.00	53.00	53.00	53.00	53.00	53.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 18.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.349

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9828848	0.9955897	0.9980426	0.9999854	1.091E+02	4.834E-01	--
α_2	1.46E-05	4.41E-03	1.96E-03	1.71E-02	4.834E-01	1.091E+02	0.573

CCCG = 3, Gamma = 0.349

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9822435	0.9936160	0.9952279	0.9994797	1.908E+02	1.226E+00	--
α_2	2.47E-04	5.08E-03	3.50E-03	1.53E-02	9.769E-01	1.913E+02	0.777
α_3	2.08E-08	1.30E-03	2.26E-04	6.32E-03	2.487E-01	1.905E+02	0.783

CCCG = 4, Gamma = 0.349

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9789598	0.9910155	0.9924001	0.9983372	2.269E+02	2.057E+00	--
α_2	6.83E-04	6.20E-03	4.85E-03	1.63E-02	1.442E+00	2.312E+02	0.870
α_3	2.27E-06	1.81E-03	6.80E-04	7.45E-03	4.114E-01	2.267E+02	0.892
α_4	1.28E-09	9.75E-04	1.06E-04	5.00E-03	2.036E-01	2.085E+02	0.970

CCCG = 5, Gamma = 0.349

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9802231	0.9899849	0.9908588	0.9967612	3.641E+02	3.683E+00	--
α_2	1.24E-03	6.05E-03	5.19E-03	1.38E-02	2.243E+00	3.686E+02	1.005
α_3	1.39E-04	2.77E-03	1.92E-03	8.31E-03	9.912E-01	3.571E+02	1.041
α_4	6.95E-07	1.02E-03	3.44E-04	4.32E-03	3.765E-01	3.690E+02	1.009
α_5	1.56E-21	1.80E-04	1.03E-07	1.04E-03	7.237E-02	4.015E+02	0.928

CCCG = 6, Gamma = 0.349

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9807209	0.9899297	0.9907130	0.9964625	4.069E+02	4.139E+00	--
α_2	9.54E-04	4.96E-03	4.22E-03	1.15E-02	2.128E+00	4.267E+02	0.986
α_3	2.01E-04	2.92E-03	2.12E-03	8.36E-03	1.134E+00	3.873E+02	1.089
α_4	8.84E-06	1.35E-03	6.71E-04	5.01E-03	5.533E-01	4.082E+02	1.035
α_5	2.05E-09	5.26E-04	7.02E-05	2.64E-03	2.210E-01	4.202E+02	1.006
α_6	3.94E-16	3.10E-04	2.15E-06	1.79E-03	1.027E-01	3.317E+02	1.275

CCCG = 7, Gamma = 0.349

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9831466	0.9901984	0.9906920	0.9955650	6.498E+02	6.432E+00	--
α_2	1.07E-03	4.11E-03	3.64E-03	8.75E-03	2.840E+00	6.884E+02	1.021
α_3	4.18E-04	2.82E-03	2.30E-03	6.97E-03	1.746E+00	6.180E+02	1.139
α_4	1.06E-04	1.69E-03	1.21E-03	4.93E-03	1.084E+00	6.388E+02	1.103
α_5	4.80E-06	8.44E-04	4.09E-04	3.16E-03	5.376E-01	6.366E+02	1.108
α_6	2.65E-10	3.01E-04	3.04E-05	1.56E-03	1.979E-01	6.568E+02	1.075
α_7	8.23E-53	3.68E-05	3.68E-15	1.26E-04	2.656E-02	7.225E+02	0.977

CCCG = 8, Gamma = 0.349

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9838090	0.9906943	0.9911877	0.9958951	6.507E+02	6.112E+00	--
α_2	7.27E-04	3.36E-03	2.90E-03	7.56E-03	2.364E+00	7.011E+02	1.003
α_3	2.86E-04	2.40E-03	1.90E-03	6.24E-03	1.512E+00	6.274E+02	1.122
α_4	9.84E-05	1.68E-03	1.19E-03	4.93E-03	1.056E+00	6.279E+02	1.122
α_5	1.56E-05	1.03E-03	5.88E-04	3.56E-03	6.745E-01	6.523E+02	1.081
α_6	6.73E-08	5.01E-04	1.27E-04	2.27E-03	3.076E-01	6.140E+02	1.149
α_7	1.15E-15	1.64E-04	1.62E-06	9.47E-04	1.093E-01	6.659E+02	1.060
α_8	2.53E-18	1.64E-04	4.56E-07	9.56E-04	8.885E-02	5.416E+02	1.303

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.94E-01	9.91E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
α_2	4.41E-03	5.08E-03	6.20E-03	6.05E-03	4.96E-03	4.11E-03	3.36E-03
α_3		1.30E-03	1.81E-03	2.77E-03	2.92E-03	2.82E-03	2.40E-03
α_4			9.75E-04	1.02E-03	1.35E-03	1.69E-03	1.68E-03
α_5				1.80E-04	5.26E-04	8.44E-04	1.03E-03
α_6					3.10E-04	3.01E-04	5.01E-04
α_7						3.68E-05	1.64E-04
α_8							1.64E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.94E-01	9.91E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
Beta	4.41E-03	6.38E-03	8.98E-03	1.00E-02	1.01E-02	9.80E-03	9.31E-03
Gamma		2.04E-01	3.10E-01	3.96E-01	5.07E-01	5.81E-01	6.39E-01
Delta			3.50E-01	3.02E-01	4.28E-01	5.05E-01	5.96E-01
Epsilon				1.50E-01	3.82E-01	4.11E-01	5.26E-01
Mu					3.71E-01	2.86E-01	4.45E-01
Omega						1.09E-01	3.96E-01
Sigma							5.00E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	18.50	18.50	18.50	18.50	18.50	18.50	18.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 5.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9464882	0.9865090	0.9943392	0.9999700	3.289E+01	4.498E-01	--
α_2	3.00E-05	1.35E-02	5.66E-03	5.35E-02	4.498E-01	3.289E+01	0.573

CCCG = 3, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9370563	0.9774930	0.9832351	0.9982839	5.117E+01	1.178E+00	--
α_2	7.94E-04	1.79E-02	1.22E-02	5.43E-02	9.387E-01	5.150E+01	0.777
α_3	4.84E-08	4.61E-03	7.45E-04	2.26E-02	2.396E-01	5.178E+01	0.783

CCCG = 4, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9299954	0.9705835	0.9753039	0.9950129	6.264E+01	1.898E+00	--
α_2	1.77E-03	1.96E-02	1.49E-02	5.32E-02	1.285E+00	6.444E+01	0.870
α_3	5.66E-06	6.12E-03	2.19E-03	2.55E-02	3.927E-01	6.375E+01	0.892
α_4	1.44E-08	3.74E-03	5.02E-04	1.88E-02	2.207E-01	5.874E+01	0.970

CCCG = 5, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9380753	0.9688167	0.9715585	0.9901832	1.089E+02	3.506E+00	--
α_2	3.14E-03	1.75E-02	1.48E-02	4.14E-02	1.992E+00	1.115E+02	1.005
α_3	6.10E-04	9.83E-03	7.06E-03	2.86E-02	1.078E+00	1.085E+02	1.041
α_4	1.69E-06	3.21E-03	1.04E-03	1.38E-02	3.632E-01	1.127E+02	1.009
α_5	5.45E-21	5.90E-04	3.41E-07	3.41E-03	7.248E-02	1.229E+02	0.928

CCCG = 6, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9419028	0.9693223	0.9715823	0.9890173	1.327E+02	4.199E+00	--
α_2	2.34E-03	1.35E-02	1.14E-02	3.22E-02	1.941E+00	1.413E+02	0.986
α_3	9.86E-04	1.03E-02	7.88E-03	2.77E-02	1.332E+00	1.284E+02	1.089
α_4	4.86E-05	4.53E-03	2.44E-03	1.61E-02	6.181E-01	1.360E+02	1.035
α_5	1.13E-08	1.65E-03	2.45E-04	8.16E-03	2.313E-01	1.402E+02	1.006
α_6	6.33E-20	6.93E-04	6.54E-07	4.03E-03	7.684E-02	1.108E+02	1.275

CCCG = 7, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9475246	0.9695271	0.9710487	0.9863321	1.980E+02	6.223E+00	--
α_2	3.02E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.127E+02	1.021
α_3	1.16E-03	8.52E-03	6.89E-03	2.14E-02	1.645E+00	1.914E+02	1.139
α_4	3.73E-04	5.59E-03	4.05E-03	1.61E-02	1.115E+00	1.982E+02	1.103
α_5	2.94E-05	3.04E-03	1.61E-03	1.09E-02	6.034E-01	1.978E+02	1.108
α_6	1.55E-10	8.70E-04	6.49E-05	4.62E-03	1.780E-01	2.045E+02	1.075
α_7	6.62E-51	1.21E-04	2.49E-14	4.29E-04	2.734E-02	2.250E+02	0.977

CCCG = 8, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9492854	0.9705338	0.9720028	0.9867644	2.057E+02	6.246E+00	--
α_2	2.55E-03	1.10E-02	9.64E-03	2.43E-02	2.504E+00	2.242E+02	1.003
α_3	7.51E-04	7.00E-03	5.46E-03	1.85E-02	1.419E+00	2.013E+02	1.122
α_4	2.79E-04	5.07E-03	3.56E-03	1.50E-02	1.027E+00	2.017E+02	1.122
α_5	7.19E-05	3.49E-03	2.09E-03	1.16E-02	7.337E-01	2.097E+02	1.081
α_6	2.00E-06	2.01E-03	7.25E-04	8.36E-03	3.975E-01	1.976E+02	1.149
α_7	3.59E-20	3.59E-04	3.45E-07	2.09E-03	7.703E-02	2.146E+02	1.060
α_8	4.66E-18	5.01E-04	1.25E-06	2.93E-03	8.749E-02	1.745E+02	1.303

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.77E-01	9.71E-01	9.69E-01	9.69E-01	9.70E-01	9.71E-01
α_2	1.35E-02	1.79E-02	1.96E-02	1.75E-02	1.35E-02	1.23E-02	1.10E-02
α_3		4.61E-03	6.12E-03	9.83E-03	1.03E-02	8.52E-03	7.00E-03
α_4			3.74E-03	3.21E-03	4.53E-03	5.59E-03	5.07E-03
α_5				5.90E-04	1.65E-03	3.04E-03	3.49E-03
α_6					6.93E-04	8.70E-04	2.01E-03
α_7						1.21E-04	3.59E-04
α_8							5.01E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.77E-01	9.71E-01	9.69E-01	9.69E-01	9.70E-01	9.71E-01
Beta	1.35E-02	2.25E-02	2.94E-02	3.12E-02	3.07E-02	3.05E-02	2.95E-02
Gamma		2.05E-01	3.35E-01	4.37E-01	5.58E-01	5.96E-01	6.25E-01
Delta			3.79E-01	2.79E-01	4.01E-01	5.30E-01	6.20E-01
Epsilon				1.55E-01	3.41E-01	4.19E-01	5.56E-01
Mu					2.96E-01	2.46E-01	4.51E-01
Omega						1.23E-01	3.00E-01
Sigma							5.83E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.00	5.00	5.00	5.00	5.00	5.00	5.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.019

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8583850	0.9660869	0.9877468	0.9999737	1.083E+01	3.801E-01	--
α_2	2.63E-05	3.39E-02	1.23E-02	1.42E-01	3.801E-01	1.083E+01	0.573

CCCG = 3, Gamma = 0.019

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8481159	0.9486390	0.9637218	0.9974977	1.773E+01	9.600E-01	--
α_2	5.41E-04	3.56E-02	2.08E-02	1.21E-01	6.673E-01	1.807E+01	0.777
α_3	1.39E-06	1.57E-02	3.81E-03	7.24E-02	2.927E-01	1.830E+01	0.783

CCCG = 4, Gamma = 0.019

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8471492	0.9373501	0.9480381	0.9908935	2.497E+01	1.669E+00	--
α_2	2.23E-03	3.81E-02	2.75E-02	1.11E-01	1.039E+00	2.620E+01	0.870
α_3	1.28E-05	1.46E-02	5.25E-03	6.11E-02	3.887E-01	2.619E+01	0.892
α_4	1.15E-07	9.88E-03	1.65E-03	4.84E-02	2.414E-01	2.419E+01	0.970

CCCG = 5, Gamma = 0.019

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8820182	0.9400237	0.9450226	0.9809216	5.465E+01	3.487E+00	--
α_2	4.78E-03	3.05E-02	2.53E-02	7.38E-02	1.791E+00	5.702E+01	1.005
α_3	1.70E-03	2.13E-02	1.59E-02	5.90E-02	1.207E+00	5.558E+01	1.041
α_4	1.31E-05	7.41E-03	2.97E-03	2.98E-02	4.340E-01	5.815E+01	1.009
α_5	1.92E-26	8.63E-04	3.07E-08	4.76E-03	5.493E-02	6.363E+01	0.928

CCCG = 6, Gamma = 0.019

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8942229	0.9447012	0.9488632	0.9809420	6.670E+01	3.905E+00	--
α_2	1.74E-03	1.79E-02	1.38E-02	4.81E-02	1.335E+00	7.327E+01	0.986
α_3	2.80E-03	2.27E-02	1.81E-02	5.80E-02	1.531E+00	6.604E+01	1.089
α_4	1.96E-04	1.01E-02	6.03E-03	3.39E-02	7.191E-01	7.039E+01	1.035
α_5	4.94E-08	3.37E-03	5.78E-04	1.64E-02	2.467E-01	7.289E+01	1.006
α_6	1.39E-20	1.26E-03	7.61E-07	7.33E-03	7.279E-02	5.765E+01	1.275

CCCG = 7, Gamma = 0.019

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9101602	0.9483928	0.9510506	0.9775420	1.060E+02	5.770E+00	--
α_2	1.62E-03	1.30E-02	1.04E-02	3.32E-02	1.549E+00	1.181E+02	1.021
α_3	3.31E-03	1.85E-02	1.56E-02	4.37E-02	1.989E+00	1.052E+02	1.139
α_4	1.05E-03	1.16E-02	8.84E-03	3.17E-02	1.287E+00	1.094E+02	1.103
α_5	1.05E-04	6.27E-03	3.64E-03	2.14E-02	6.913E-01	1.096E+02	1.108
α_6	1.51E-08	2.05E-03	3.09E-04	1.01E-02	2.327E-01	1.134E+02	1.075
α_7	1.15E-64	1.69E-04	2.56E-17	4.26E-04	2.112E-02	1.250E+02	0.977

CCCG = 8, Gamma = 0.019

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9216893	0.9530768	0.9550865	0.9775985	1.425E+02	7.016E+00	--
α_2	1.26E-03	9.74E-03	7.82E-03	2.48E-02	1.583E+00	1.609E+02	1.003
α_3	2.43E-03	1.37E-02	1.15E-02	3.23E-02	1.986E+00	1.433E+02	1.122
α_4	1.61E-03	1.15E-02	9.36E-03	2.88E-02	1.672E+00	1.436E+02	1.122
α_5	3.56E-04	6.70E-03	4.69E-03	1.99E-02	1.011E+00	1.498E+02	1.081
α_6	3.05E-05	4.02E-03	2.05E-03	1.47E-02	5.709E-01	1.413E+02	1.149
α_7	2.70E-10	1.18E-03	9.22E-05	6.22E-03	1.809E-01	1.537E+02	1.060
α_8	1.44E-107	9.95E-05	3.01E-27	7.46E-05	1.245E-02	1.251E+02	1.303

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.66E-01	9.49E-01	9.37E-01	9.40E-01	9.45E-01	9.48E-01	9.53E-01
α_2	3.39E-02	3.56E-02	3.81E-02	3.05E-02	1.79E-02	1.30E-02	9.74E-03
α_3		1.57E-02	1.46E-02	2.13E-02	2.27E-02	1.85E-02	1.37E-02
α_4			9.88E-03	7.41E-03	1.01E-02	1.16E-02	1.15E-02
α_5				8.63E-04	3.37E-03	6.27E-03	6.70E-03
α_6					1.26E-03	2.05E-03	4.02E-03
α_7						1.69E-04	1.18E-03
α_8							9.95E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.66E-01	9.49E-01	9.37E-01	9.40E-01	9.45E-01	9.48E-01	9.53E-01
Beta	3.39E-02	5.14E-02	6.26E-02	6.00E-02	5.53E-02	5.16E-02	4.69E-02
Gamma		3.07E-01	3.91E-01	4.92E-01	6.76E-01	7.49E-01	7.92E-01
Delta			4.03E-01	2.80E-01	3.94E-01	5.20E-01	6.32E-01
Epsilon				1.04E-01	3.14E-01	4.22E-01	5.10E-01
Mu					2.72E-01	2.61E-01	4.42E-01
Omega						7.62E-02	2.41E-01
Sigma							7.80E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 23.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.443

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9780218	0.9943877	0.9975667	0.9999840	8.338E+01	4.706E-01	--
α_2	1.60E-05	5.61E-03	2.43E-03	2.20E-02	4.706E-01	8.338E+01	0.573

CCCG = 3, Gamma = 0.443

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9712002	0.9900009	0.9927676	0.9993475	1.092E+02	1.103E+00	--
α_2	2.11E-04	7.33E-03	4.65E-03	2.36E-02	8.104E-01	1.097E+02	0.777
α_3	2.24E-07	2.66E-03	6.25E-04	1.23E-02	2.921E-01	1.093E+02	0.783

CCCG = 4, Gamma = 0.443

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9702290	0.9874745	0.9894912	0.9978230	1.539E+02	1.953E+00	--
α_2	7.71E-04	8.27E-03	6.31E-03	2.24E-02	1.312E+00	1.573E+02	0.870
α_3	4.67E-06	2.78E-03	1.10E-03	1.13E-02	4.307E-01	1.544E+02	0.892
α_4	2.94E-09	1.47E-03	1.74E-04	7.51E-03	2.099E-01	1.421E+02	0.970

CCCG = 5, Gamma = 0.443

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9722641	0.9865825	0.9879568	0.9962035	2.284E+02	3.107E+00	--
α_2	1.02E-03	7.21E-03	5.86E-03	1.80E-02	1.684E+00	2.319E+02	1.005
α_3	1.85E-04	4.18E-03	2.84E-03	1.28E-02	9.426E-01	2.246E+02	1.041
α_4	1.23E-06	1.64E-03	5.64E-04	6.92E-03	3.816E-01	2.323E+02	1.009
α_5	1.56E-16	3.90E-04	2.14E-06	2.27E-03	9.865E-02	2.529E+02	0.928

CCCG = 6, Gamma = 0.443

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9745912	0.9869904	0.9880788	0.9956711	2.900E+02	3.822E+00	--
α_2	8.07E-04	5.57E-03	4.54E-03	1.39E-02	1.714E+00	3.059E+02	0.986
α_3	2.61E-04	3.98E-03	2.87E-03	1.15E-02	1.108E+00	2.776E+02	1.089
α_4	2.93E-05	2.22E-03	1.24E-03	7.75E-03	6.509E-01	2.926E+02	1.035
α_5	1.67E-08	8.41E-04	1.51E-04	4.05E-03	2.536E-01	3.014E+02	1.006
α_6	6.52E-17	4.02E-04	1.83E-06	2.34E-03	9.572E-02	2.380E+02	1.275

CCCG = 7, Gamma = 0.443

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9766893	0.9870945	0.9878924	0.9947743	3.974E+02	5.195E+00	--
α_2	9.41E-04	4.96E-03	4.20E-03	1.15E-02	2.105E+00	4.225E+02	1.021
α_3	3.26E-04	3.47E-03	2.65E-03	9.42E-03	1.320E+00	3.794E+02	1.139
α_4	1.29E-04	2.54E-03	1.76E-03	7.60E-03	9.967E-01	3.921E+02	1.103
α_5	6.78E-06	1.34E-03	6.37E-04	5.06E-03	5.249E-01	3.908E+02	1.108
α_6	3.60E-10	4.85E-04	4.74E-05	2.51E-03	1.956E-01	4.034E+02	1.075
α_7	3.40E-28	1.19E-04	2.70E-09	6.47E-04	5.291E-02	4.438E+02	0.977

CCCG = 8, Gamma = 0.443

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9782192	0.9876062	0.9882904	0.9946567	4.647E+02	5.832E+00	--
α_2	8.98E-04	4.43E-03	3.79E-03	1.01E-02	2.229E+00	5.014E+02	1.003
α_3	2.40E-04	2.80E-03	2.11E-03	7.72E-03	1.260E+00	4.490E+02	1.122
α_4	1.32E-04	2.31E-03	1.63E-03	6.82E-03	1.042E+00	4.492E+02	1.122
α_5	3.83E-05	1.63E-03	9.98E-04	5.38E-03	7.626E-01	4.667E+02	1.081
α_6	1.70E-07	7.44E-04	2.08E-04	3.31E-03	3.271E-01	4.394E+02	1.149
α_7	2.73E-13	2.82E-04	7.55E-06	1.58E-03	1.344E-01	4.767E+02	1.060
α_8	1.79E-20	1.98E-04	1.86E-07	1.15E-03	7.682E-02	3.877E+02	1.303

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.90E-01	9.87E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01
α_2	5.61E-03	7.33E-03	8.27E-03	7.21E-03	5.57E-03	4.96E-03	4.43E-03
α_3		2.66E-03	2.78E-03	4.18E-03	3.98E-03	3.47E-03	2.80E-03
α_4			1.47E-03	1.64E-03	2.22E-03	2.54E-03	2.31E-03
α_5				3.90E-04	8.41E-04	1.34E-03	1.63E-03
α_6					4.02E-04	4.85E-04	7.44E-04
α_7						1.19E-04	2.82E-04
α_8							1.98E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.90E-01	9.87E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01
Beta	5.61E-03	1.00E-02	1.25E-02	1.34E-02	1.30E-02	1.29E-02	1.24E-02
Gamma		2.66E-01	3.40E-01	4.63E-01	5.72E-01	6.16E-01	6.43E-01
Delta			3.46E-01	3.27E-01	4.65E-01	5.64E-01	6.49E-01
Epsilon				1.92E-01	3.59E-01	4.34E-01	5.52E-01
Mu					3.24E-01	3.10E-01	4.29E-01
Omega						1.97E-01	3.92E-01
Sigma							4.13E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	23.50	23.50	23.50	23.50	23.50	23.50	23.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 5.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9904372	0.9975201	0.9988820	0.9999909	1.984E+02	4.932E-01	--
α_2	9.10E-06	2.48E-03	1.12E-03	9.56E-03	4.932E-01	1.984E+02	0.573

CCCG = 3, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9904369	0.9967368	0.9976827	0.9998069	3.236E+02	1.059E+00	--
α_2	4.10E-05	2.19E-03	1.29E-03	7.40E-03	7.137E-01	3.248E+02	0.777
α_3	3.85E-07	1.07E-03	3.24E-04	4.67E-03	3.458E-01	3.226E+02	0.783

CCCG = 4, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9910895	0.9961706	0.9967505	0.9992697	5.501E+02	2.115E+00	--
α_2	3.41E-04	2.75E-03	2.19E-03	7.08E-03	1.549E+00	5.614E+02	0.870
α_3	1.50E-08	4.82E-04	9.42E-05	2.29E-03	2.646E-01	5.491E+02	0.892
α_4	6.59E-08	5.96E-04	1.46E-04	2.72E-03	3.010E-01	5.047E+02	0.970

CCCG = 5, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9930981	0.9961669	0.9964023	0.9984318	1.384E+03	5.325E+00	--
α_2	8.27E-04	2.59E-03	2.36E-03	5.15E-03	3.632E+00	1.398E+03	1.005
α_3	9.83E-05	1.00E-03	7.68E-04	2.70E-03	1.354E+00	1.352E+03	1.041
α_4	2.01E-08	2.12E-04	5.06E-05	9.75E-04	2.961E-01	1.395E+03	1.009
α_5	8.32E-35	2.80E-05	3.08E-11	1.39E-04	4.243E-02	1.517E+03	0.928

CCCG = 6, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9927012	0.9960209	0.9962841	0.9984415	1.235E+03	4.936E+00	--
α_2	6.01E-04	2.26E-03	2.01E-03	4.77E-03	2.915E+00	1.288E+03	0.986
α_3	9.17E-05	1.08E-03	8.08E-04	2.97E-03	1.257E+00	1.168E+03	1.089
α_4	1.66E-06	4.09E-04	1.87E-04	1.57E-03	5.031E-01	1.230E+03	1.035
α_5	2.64E-15	9.13E-05	1.20E-06	5.23E-04	1.155E-01	1.265E+03	1.006
α_6	6.80E-13	1.45E-04	5.32E-06	8.05E-04	1.451E-01	9.985E+02	1.275

CCCG = 7, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9940232	0.9962172	0.9963460	0.9979715	2.543E+03	9.654E+00	--
α_2	7.01E-04	1.81E-03	1.69E-03	3.34E-03	4.851E+00	2.675E+03	1.021
α_3	2.99E-04	1.17E-03	1.03E-03	2.49E-03	2.800E+00	2.399E+03	1.139
α_4	5.70E-05	5.58E-04	4.31E-04	1.49E-03	1.384E+00	2.479E+03	1.103
α_5	7.03E-07	1.99E-04	8.87E-05	7.68E-04	4.902E-01	2.469E+03	1.108
α_6	1.07E-15	4.50E-05	5.70E-07	2.58E-04	1.146E-01	2.546E+03	1.075
α_7	2.75E-93	5.23E-06	5.56E-25	6.21E-06	1.464E-02	2.801E+03	0.977

CCCG = 8, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9937536	0.9962869	0.9964573	0.9982385	1.918E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.064E+03	1.003
α_3	1.84E-04	1.06E-03	8.87E-04	2.53E-03	1.960E+00	1.845E+03	1.122
α_4	4.61E-05	6.31E-04	4.63E-04	1.79E-03	1.166E+00	1.846E+03	1.122
α_5	1.59E-06	2.80E-04	1.36E-04	1.05E-03	5.375E-01	1.918E+03	1.081
α_6	2.21E-11	1.00E-04	7.76E-06	5.29E-04	1.805E-01	1.804E+03	1.149
α_7	1.09E-35	2.12E-05	1.58E-11	1.03E-04	4.139E-02	1.956E+03	1.060
α_8	1.08E-08	1.78E-04	3.92E-05	8.28E-04	2.827E-01	1.591E+03	1.303

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	2.48E-03	2.19E-03	2.75E-03	2.59E-03	2.26E-03	1.81E-03	1.44E-03
α_3		1.07E-03	4.82E-04	1.00E-03	1.08E-03	1.17E-03	1.06E-03
α_4			5.96E-04	2.12E-04	4.09E-04	5.58E-04	6.31E-04
α_5				2.80E-05	9.13E-05	1.99E-04	2.80E-04
α_6					1.45E-04	4.50E-05	1.00E-04
α_7						5.23E-06	2.12E-05
α_8							1.78E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	2.48E-03	3.26E-03	3.83E-03	3.83E-03	3.98E-03	3.78E-03	3.71E-03
Gamma		3.28E-01	2.81E-01	3.24E-01	4.32E-01	5.21E-01	6.12E-01
Delta			5.53E-01	1.94E-01	3.75E-01	4.09E-01	5.33E-01
Epsilon				1.16E-01	3.66E-01	3.08E-01	4.79E-01
Mu					6.14E-01	2.02E-01	5.16E-01
Omega						1.04E-01	6.65E-01
Sigma							8.94E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.00	5.00	5.00	5.00	5.00	5.00	5.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.3.3 BWR-RHR-MOV-OO: BWR RHR Motor-Operated Valves Fail to Close

Generic CCF Parameters

Plant Type: BWR
System Group: Clean Water
System: Residual Heat Removal (LCI in BWRs; LPI in PWRs)
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 30.6

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9480003	0.9858852	0.9929129	0.9999141	0.9948613	3.855E+01	5.519E-01
α_2	9.28E-05	1.41E-02	7.09E-03	5.20E-02	5.14E-03	5.519E-01	3.855E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9560183	0.9834583	0.9871433	0.9983042	0.9896694	8.193E+01	1.378E+00
α_2	8.63E-04	1.32E-02	9.58E-03	3.80E-02	1.03E-02	1.101E+00	8.221E+01
α_3	1.66E-07	3.32E-03	7.11E-04	1.56E-02	0.00E+00	2.768E-01	8.303E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9572698	0.9808003	0.9833121	0.9957518	0.9844237	1.223E+02	2.394E+00
α_2	2.14E-03	1.41E-02	1.16E-02	3.47E-02	1.56E-02	1.760E+00	1.229E+02
α_3	3.51E-06	3.23E-03	1.18E-03	1.34E-02	0.00E+00	4.024E-01	1.243E+02
α_4	1.29E-08	1.86E-03	2.77E-04	9.19E-03	0.00E+00	2.315E-01	1.244E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9664961	0.9825008	0.9838538	0.9938747	0.9833160	2.301E+02	4.099E+00
α_2	2.48E-03	1.07E-02	9.35E-03	2.36E-02	1.46E-02	2.508E+00	2.317E+02
α_3	3.33E-04	4.83E-03	3.52E-03	1.38E-02	2.09E-03	1.132E+00	2.331E+02
α_4	1.24E-06	1.63E-03	5.62E-04	6.88E-03	0.00E+00	3.822E-01	2.338E+02
α_5	2.84E-20	3.28E-04	3.05E-07	1.90E-03	0.00E+00	7.674E-02	2.342E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9687292	0.9831120	0.9842598	0.9935619	0.9824143	2.722E+02	4.675E+00
α_2	1.85E-03	8.53E-03	7.38E-03	1.91E-02	1.38E-02	2.361E+00	2.745E+02
α_3	5.02E-04	4.96E-03	3.83E-03	1.33E-02	3.49E-03	1.374E+00	2.755E+02

α_4	2.23E-05	2.20E-03	1.18E-03	7.87E-03	2.91E-04	6.098E-01	2.762E+02
α_5	3.13E-09	7.99E-04	1.07E-04	4.01E-03	0.00E+00	2.211E-01	2.766E+02
α_6	3.12E-15	3.97E-04	4.01E-06	2.29E-03	0.00E+00	1.098E-01	2.767E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9734995	0.9843896	0.9851269	0.9927501	0.9817569	4.264E+02	6.761E+00
α_2	1.86E-03	6.85E-03	6.11E-03	1.44E-02	1.30E-02	2.967E+00	4.302E+02
α_3	7.13E-04	4.34E-03	3.60E-03	1.05E-02	4.48E-03	1.878E+00	4.312E+02
α_4	1.75E-04	2.59E-03	1.88E-03	7.44E-03	7.08E-04	1.122E+00	4.320E+02
α_5	9.65E-06	1.31E-03	6.63E-04	4.81E-03	4.17E-05	5.677E-01	4.326E+02
α_6	2.43E-10	4.42E-04	4.09E-05	2.30E-03	0.00E+00	1.916E-01	4.329E+02
α_7	5.50E-41	8.03E-05	2.99E-12	3.52E-04	0.00E+00	3.480E-02	4.331E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9745774	0.9849524	0.9856489	0.9929416	0.9813302	4.522E+02	6.908E+00
α_2	1.56E-03	6.08E-03	5.38E-03	1.30E-02	1.22E-02	2.790E+00	4.563E+02
α_3	5.43E-04	3.74E-03	3.05E-03	9.31E-03	5.18E-03	1.718E+00	4.574E+02
α_4	1.72E-04	2.48E-03	1.80E-03	7.08E-03	1.17E-03	1.136E+00	4.580E+02
α_5	2.85E-05	1.55E-03	9.11E-04	5.24E-03	1.34E-04	7.111E-01	4.584E+02
α_6	3.02E-07	7.63E-04	2.34E-04	3.32E-03	6.09E-06	3.501E-01	4.587E+02
α_7	1.15E-15	2.35E-04	2.16E-06	1.36E-03	0.00E+00	1.078E-01	4.590E+02
α_8	2.40E-17	2.06E-04	8.74E-07	1.20E-03	0.00E+00	9.469E-02	4.590E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.83E-01	9.81E-01	9.83E-01	9.83E-01	9.84E-01	9.85E-01
α_2	1.41E-02	1.32E-02	1.41E-02	1.07E-02	8.53E-03	6.85E-03	6.08E-03
α_3		3.32E-03	3.23E-03	4.83E-03	4.96E-03	4.34E-03	3.74E-03
α_4			1.86E-03	1.63E-03	2.20E-03	2.59E-03	2.48E-03
α_5				3.28E-04	7.99E-04	1.31E-03	1.55E-03
α_6					3.97E-04	4.42E-04	7.63E-04
α_7						8.03E-05	2.35E-04
α_8							2.06E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.83E-01	9.81E-01	9.83E-01	9.83E-01	9.84E-01	9.85E-01
Beta	1.41E-02	1.65E-02	1.92E-02	1.75E-02	1.69E-02	1.56E-02	1.50E-02
Gamma		2.01E-01	2.65E-01	3.88E-01	4.95E-01	5.61E-01	5.96E-01
Delta			3.65E-01	2.88E-01	4.06E-01	5.05E-01	5.83E-01
Epsilon				1.67E-01	3.52E-01	4.14E-01	5.27E-01
Mu					3.32E-01	2.85E-01	4.37E-01
Omega						1.54E-01	3.66E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	15.30	22.95	30.60	38.25	45.90	53.55	61.20
N₁	0.8333	1.0000	1.0000	1.0417	1.0417	1.0127	0.9645
N₂	0.0833	0.2500	0.5000	0.5833	0.6597	0.7234	0.7716
N₃		0.0000	0.0000	0.0833	0.1667	0.2488	0.3279
N₄			0.0000	0.0000	0.0139	0.0394	0.0743
N₅				0.0000	0.0000	0.0023	0.0085
N₆					0.0000	0.0000	0.0004
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 11.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.399

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9690451	0.9915391	0.9956909	0.9999376	6.642E+01	5.667E-01	--
α_2	6.24E-05	8.46E-03	4.31E-03	3.10E-02	5.667E-01	6.642E+01	0.758

CCCG = 3, Gamma = 0.396

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9760316	0.9908092	0.9927520	0.9989435	1.591E+02	1.476E+00	--
α_2	6.49E-04	7.94E-03	5.94E-03	2.21E-02	1.227E+00	1.533E+02	0.909
α_3	2.00E-08	1.25E-03	2.17E-04	6.07E-03	2.487E-01	1.984E+02	0.707

CCCG = 4, Gamma = 0.393

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9735473	0.9879123	0.9894131	0.9971464	2.090E+02	2.557E+00	--
α_2	1.68E-03	9.73E-03	8.15E-03	2.32E-02	1.942E+00	1.977E+02	0.985
α_3	1.95E-06	1.55E-03	5.83E-04	6.39E-03	4.114E-01	2.643E+02	0.743
α_4	1.06E-09	8.05E-04	8.77E-05	4.13E-03	2.036E-01	2.528E+02	0.777

CCCG = 5, Gamma = 0.390

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9789884	0.9888788	0.9897009	0.9959606	3.868E+02	4.350E+00	--
α_2	1.99E-03	7.68E-03	6.81E-03	1.64E-02	2.826E+00	3.650E+02	1.006
α_3	1.51E-04	2.47E-03	1.76E-03	7.21E-03	1.075E+00	4.334E+02	0.851
α_4	5.47E-07	8.03E-04	2.71E-04	3.41E-03	3.765E-01	4.684E+02	0.789
α_5	1.40E-21	1.61E-04	9.19E-08	9.32E-04	7.237E-02	4.484E+02	0.825

CCCG = 6, Gamma = 0.388

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9791122	0.9885606	0.9893003	0.9954826	4.303E+02	4.979E+00	--
α_2	1.79E-03	6.98E-03	6.17E-03	1.49E-02	2.788E+00	3.967E+02	1.059
α_3	2.48E-04	2.72E-03	2.06E-03	7.42E-03	1.301E+00	4.774E+02	0.884
α_4	7.88E-06	1.08E-03	5.43E-04	3.95E-03	5.672E-01	5.269E+02	0.802
α_5	1.59E-09	4.09E-04	5.46E-05	2.05E-03	2.210E-01	5.395E+02	0.784
α_6	3.31E-16	2.60E-04	1.81E-06	1.51E-03	1.027E-01	3.954E+02	1.069

CCCG = 7, Gamma = 0.386

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9830209	0.9897989	0.9902429	0.9950612	7.225E+02	7.446E+00	--
α_2	1.68E-03	5.35E-03	4.87E-03	1.07E-02	3.563E+00	6.621E+02	1.065
α_3	4.66E-04	2.62E-03	2.20E-03	6.22E-03	1.995E+00	7.580E+02	0.933
α_4	9.05E-05	1.34E-03	9.72E-04	3.85E-03	1.123E+00	8.364E+02	0.847
α_5	3.62E-06	6.24E-04	3.03E-04	2.33E-03	5.399E-01	8.651E+02	0.819
α_6	1.98E-10	2.25E-04	2.27E-05	1.16E-03	1.979E-01	8.790E+02	0.806
α_7	7.45E-53	3.33E-05	3.33E-15	1.14E-04	2.656E-02	7.981E+02	0.888

CCCG = 8, Gamma = 0.384

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9831478	0.9899203	0.9903681	0.9951641	7.164E+02	7.295E+00	--
α_2	1.36E-03	4.78E-03	4.28E-03	9.88E-03	3.136E+00	6.535E+02	1.084
α_3	4.04E-04	2.53E-03	2.09E-03	6.15E-03	1.840E+00	7.257E+02	0.978
α_4	9.33E-05	1.36E-03	9.90E-04	3.91E-03	1.130E+00	8.277E+02	0.858
α_5	1.24E-05	7.83E-04	4.50E-04	2.69E-03	6.830E-01	8.711E+02	0.816
α_6	4.75E-08	3.50E-04	8.90E-05	1.59E-03	3.080E-01	8.805E+02	0.808
α_7	8.40E-16	1.20E-04	1.18E-06	6.92E-04	1.093E-01	9.103E+02	0.782
α_8	2.45E-18	1.58E-04	4.40E-07	9.24E-04	8.885E-02	5.606E+02	1.269

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.91E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01
α_2	8.46E-03	7.94E-03	9.73E-03	7.68E-03	6.98E-03	5.35E-03	4.78E-03
α_3		1.25E-03	1.55E-03	2.47E-03	2.72E-03	2.62E-03	2.53E-03
α_4			8.05E-04	8.03E-04	1.08E-03	1.34E-03	1.36E-03
α_5				1.61E-04	4.09E-04	6.24E-04	7.83E-04
α_6					2.60E-04	2.25E-04	3.50E-04
α_7						3.33E-05	1.20E-04
α_8							1.58E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.91E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01
Beta	8.46E-03	9.19E-03	1.21E-02	1.11E-02	1.14E-02	1.02E-02	1.01E-02
Gamma		1.36E-01	1.95E-01	3.09E-01	3.90E-01	4.75E-01	5.26E-01
Delta			3.41E-01	2.81E-01	3.91E-01	4.59E-01	5.23E-01
Epsilon				1.67E-01	3.84E-01	3.97E-01	5.09E-01
Mu					3.88E-01	2.93E-01	4.45E-01
Omega						1.29E-01	4.43E-01
Sigma							5.69E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.55	8.33	11.10	13.88	16.65	19.43	22.20
N_1	0.8333	1.0000	1.0000	1.0417	1.0417	1.0127	0.9645
N_2	0.0833	0.2500	0.5000	0.5833	0.6597	0.7234	0.7716
N_3		0.0000	0.0000	0.0833	0.1667	0.2488	0.3279

N₄			0.0000	0.0000	0.0139	0.0394	0.0743
N₅				0.0000	0.0000	0.0023	0.0085
N₆					0.0000	0.0000	0.0004
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.123

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9163082	0.9788287	0.9910182	0.9999523	2.080E+01	4.498E-01	--
α_2	4.77E-05	2.12E-02	8.98E-03	8.37E-02	4.498E-01	2.080E+01	0.758

CCCG = 3, Gamma = 0.124

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9263232	0.9736022	0.9802938	0.9979802	4.346E+01	1.178E+00	--
α_2	9.81E-04	2.20E-02	1.51E-02	6.67E-02	9.387E-01	4.168E+01	0.909
α_3	4.60E-08	4.37E-03	7.07E-04	2.14E-02	2.396E-01	5.454E+01	0.707

CCCG = 4, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9268421	0.9692393	0.9741633	0.9947801	5.982E+01	1.898E+00	--
α_2	2.04E-03	2.25E-02	1.72E-02	6.11E-02	1.285E+00	5.578E+01	0.985
α_3	4.79E-06	5.19E-03	1.86E-03	2.17E-02	3.927E-01	7.527E+01	0.743
α_4	1.18E-08	3.05E-03	4.09E-04	1.53E-02	2.207E-01	7.210E+01	0.777

CCCG = 5, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9430894	0.9713688	0.9738989	0.9909980	1.189E+02	3.506E+00	--
α_2	3.14E-03	1.76E-02	1.48E-02	4.14E-02	1.992E+00	1.115E+02	1.006
α_3	4.98E-04	8.04E-03	5.76E-03	2.34E-02	1.078E+00	1.330E+02	0.851
α_4	1.32E-06	2.51E-03	8.13E-04	1.08E-02	3.632E-01	1.443E+02	0.789
α_5	4.84E-21	5.24E-04	3.03E-07	3.03E-03	7.248E-02	1.383E+02	0.825

CCCG = 6, Gamma = 0.126

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9468373	0.9719535	0.9740305	0.9899712	1.455E+02	4.199E+00	--
α_2	2.49E-03	1.44E-02	1.21E-02	3.44E-02	1.941E+00	1.325E+02	1.059
α_3	7.93E-04	8.27E-03	6.34E-03	2.23E-02	1.332E+00	1.597E+02	0.884
α_4	3.74E-05	3.48E-03	1.88E-03	1.24E-02	6.181E-01	1.769E+02	0.802
α_5	8.74E-09	1.27E-03	1.89E-04	6.31E-03	2.313E-01	1.814E+02	0.784
α_6	5.27E-20	5.78E-04	5.44E-07	3.36E-03	7.684E-02	1.330E+02	1.069

CCCG = 7, Gamma = 0.126

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9536486	0.9731118	0.9744642	0.9879556	2.252E+02	6.223E+00	--
α_2	3.12E-03	1.27E-02	1.12E-02	2.76E-02	2.654E+00	2.057E+02	1.065
α_3	9.43E-04	6.91E-03	5.59E-03	1.74E-02	1.645E+00	2.363E+02	0.933
α_4	2.83E-04	4.25E-03	3.08E-03	1.22E-02	1.115E+00	2.610E+02	0.847
α_5	2.15E-05	2.23E-03	1.18E-03	7.99E-03	6.034E-01	2.704E+02	0.819
α_6	1.15E-10	6.47E-04	4.82E-05	3.43E-03	1.780E-01	2.750E+02	0.806
α_7	5.96E-51	1.09E-04	2.25E-14	3.87E-04	2.734E-02	2.498E+02	0.888

CCCG = 8, Gamma = 0.126

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9545924	0.9736413	0.9749637	0.9881736	2.307E+02	6.246E+00	--
α_2	2.72E-03	1.18E-02	1.03E-02	2.59E-02	2.504E+00	2.101E+02	1.084
α_3	6.46E-04	6.02E-03	4.69E-03	1.59E-02	1.419E+00	2.342E+02	0.978
α_4	2.10E-04	3.83E-03	2.69E-03	1.13E-02	1.027E+00	2.674E+02	0.858
α_5	5.36E-05	2.60E-03	1.56E-03	8.69E-03	7.337E-01	2.816E+02	0.816
α_6	1.39E-06	1.39E-03	5.03E-04	5.80E-03	3.975E-01	2.849E+02	0.808
α_7	2.61E-20	2.61E-04	2.51E-07	1.52E-03	7.703E-02	2.948E+02	0.782
α_8	4.48E-18	4.82E-04	1.20E-06	2.81E-03	8.749E-02	1.815E+02	1.269

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.79E-01	9.74E-01	9.69E-01	9.71E-01	9.72E-01	9.73E-01	9.74E-01
α_2	2.12E-02	2.20E-02	2.25E-02	1.76E-02	1.44E-02	1.27E-02	1.18E-02
α_3		4.37E-03	5.19E-03	8.04E-03	8.27E-03	6.91E-03	6.02E-03
α_4			3.05E-03	2.51E-03	3.48E-03	4.25E-03	3.83E-03
α_5				5.24E-04	1.27E-03	2.23E-03	2.60E-03
α_6					5.78E-04	6.47E-04	1.39E-03
α_7						1.09E-04	2.61E-04
α_8							4.82E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.79E-01	9.74E-01	9.69E-01	9.71E-01	9.72E-01	9.73E-01	9.74E-01
Beta	2.12E-02	2.64E-02	3.08E-02	2.86E-02	2.80E-02	2.69E-02	2.64E-02
Gamma		1.66E-01	2.68E-01	3.87E-01	4.85E-01	5.26E-01	5.53E-01
Delta			3.70E-01	2.74E-01	3.92E-01	5.11E-01	5.87E-01
Epsilon				1.73E-01	3.47E-01	4.12E-01	5.53E-01
Mu					3.12E-01	2.54E-01	4.51E-01
Omega						1.45E-01	3.48E-01
Sigma							6.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	3.00	4.00	5.00	6.00	7.00	8.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.092

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8267998	0.9583751	0.9847587	0.9999672	8.751E+00	3.801E-01	--
α_2	3.28E-05	4.16E-02	1.52E-02	1.73E-01	3.801E-01	8.751E+00	0.758

CCCG = 3, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8478120	0.9485331	0.9636443	0.9974922	1.769E+01	9.600E-01	--
α_2	5.85E-04	3.84E-02	2.25E-02	1.30E-01	6.673E-01	1.672E+01	0.909
α_3	1.15E-06	1.31E-02	3.15E-03	6.03E-02	2.927E-01	2.206E+01	0.707

CCCG = 4, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8573568	0.9416604	0.9516971	0.9915480	2.694E+01	1.669E+00	--
α_2	2.33E-03	3.98E-02	2.87E-02	1.15E-01	1.039E+00	2.506E+01	0.985
α_3	9.77E-06	1.12E-02	4.01E-03	4.70E-02	3.887E-01	3.422E+01	0.743
α_4	8.43E-08	7.30E-03	1.21E-03	3.57E-02	2.414E-01	3.284E+01	0.777

CCCG = 5, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8974275	0.9480163	0.9524221	0.9835310	6.359E+01	3.487E+00	--
α_2	4.56E-03	2.91E-02	2.42E-02	7.06E-02	1.791E+00	5.974E+01	1.006
α_3	1.32E-03	1.66E-02	1.24E-02	4.62E-02	1.207E+00	7.147E+01	0.851
α_4	9.79E-06	5.53E-03	2.21E-03	2.23E-02	4.340E-01	7.799E+01	0.789
α_5	1.63E-26	7.32E-04	2.61E-08	4.03E-03	5.493E-02	7.497E+01	0.825

CCCG = 6, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9100347	0.9531112	0.9567026	0.9839049	7.937E+01	3.905E+00	--
α_2	1.78E-03	1.83E-02	1.41E-02	4.92E-02	1.335E+00	7.146E+01	1.059
α_3	2.16E-03	1.76E-02	1.40E-02	4.50E-02	1.531E+00	8.570E+01	0.884
α_4	1.45E-04	7.48E-03	4.45E-03	2.51E-02	7.191E-01	9.540E+01	0.802
α_5	3.67E-08	2.51E-03	4.29E-04	1.22E-02	2.467E-01	9.811E+01	0.784
α_6	1.11E-20	1.01E-03	6.09E-07	5.86E-03	7.279E-02	7.200E+01	1.069

CCCG = 7, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9258817	0.9575439	0.9597730	0.9815891	1.301E+02	5.770E+00	--
α_2	1.63E-03	1.30E-02	1.04E-02	3.34E-02	1.549E+00	1.171E+02	1.065
α_3	2.62E-03	1.47E-02	1.24E-02	3.46E-02	1.989E+00	1.335E+02	0.933
α_4	7.75E-04	8.62E-03	6.55E-03	2.35E-02	1.287E+00	1.480E+02	0.847
α_5	7.47E-05	4.48E-03	2.60E-03	1.53E-02	6.913E-01	1.537E+02	0.819
α_6	1.10E-08	1.48E-03	2.23E-04	7.34E-03	2.327E-01	1.565E+02	0.806
α_7	1.01E-64	1.48E-04	2.25E-17	3.74E-04	2.112E-02	1.423E+02	0.888

CCCG = 8, Gamma = 0.095

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9349226	0.9610944	0.9627892	0.9814775	1.733E+02	7.016E+00	--
α_2	1.32E-03	1.02E-02	8.19E-03	2.60E-02	1.583E+00	1.535E+02	1.084
α_3	2.05E-03	1.16E-02	9.73E-03	2.73E-02	1.986E+00	1.698E+02	0.978
α_4	1.20E-03	8.54E-03	6.94E-03	2.14E-02	1.672E+00	1.940E+02	0.858
α_5	2.60E-04	4.91E-03	3.43E-03	1.46E-02	1.011E+00	2.048E+02	0.816
α_6	2.08E-05	2.74E-03	1.40E-03	1.00E-02	5.709E-01	2.074E+02	0.808
α_7	1.93E-10	8.42E-04	6.59E-05	4.45E-03	1.809E-01	2.148E+02	0.782
α_8	1.36E-107	9.40E-05	2.85E-27	7.05E-05	1.245E-02	1.324E+02	1.269

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.58E-01	9.49E-01	9.42E-01	9.48E-01	9.53E-01	9.58E-01	9.61E-01
α_2	4.16E-02	3.84E-02	3.98E-02	2.91E-02	1.83E-02	1.30E-02	1.02E-02
α_3		1.31E-02	1.12E-02	1.66E-02	1.76E-02	1.47E-02	1.16E-02
α_4			7.30E-03	5.53E-03	7.48E-03	8.62E-03	8.54E-03
α_5				7.32E-04	2.51E-03	4.48E-03	4.91E-03
α_6					1.01E-03	1.48E-03	2.74E-03
α_7						1.48E-04	8.42E-04
α_8							9.40E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.58E-01	9.49E-01	9.42E-01	9.48E-01	9.53E-01	9.58E-01	9.61E-01
Beta	4.16E-02	5.15E-02	5.83E-02	5.20E-02	4.69E-02	4.25E-02	3.89E-02
Gamma		2.54E-01	3.18E-01	4.40E-01	6.09E-01	6.93E-01	7.38E-01
Delta			3.94E-01	2.74E-01	3.85E-01	5.01E-01	5.97E-01
Epsilon				1.17E-01	3.20E-01	4.15E-01	5.01E-01
Mu					2.87E-01	2.67E-01	4.28E-01
Omega						9.09E-02	2.54E-01
Sigma							1.01E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.50	2.25	3.00	3.75	4.50	5.25	6.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 11.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.355

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9540187	0.9882273	0.9948529	0.9999661	3.950E+01	4.706E-01	--
α_2	3.39E-05	1.18E-02	5.15E-03	4.60E-02	4.706E-01	3.950E+01	0.758

CCCG = 3, Gamma = 0.356

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9617878	0.9867109	0.9903690	0.9991302	8.186E+01	1.103E+00	--
α_2	2.99E-04	1.04E-02	6.60E-03	3.33E-02	8.104E-01	7.727E+01	0.909
α_3	2.45E-07	2.91E-03	6.83E-04	1.34E-02	2.921E-01	1.001E+02	0.707

CCCG = 4, Gamma = 0.358

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9665578	0.9859201	0.9881809	0.9975503	1.367E+02	1.953E+00	--
α_2	9.57E-04	1.02E-02	7.83E-03	2.78E-02	1.312E+00	1.267E+02	0.985
α_3	4.26E-06	2.54E-03	1.00E-03	1.03E-02	4.307E-01	1.693E+02	0.743
α_4	2.57E-09	1.29E-03	1.53E-04	6.58E-03	2.099E-01	1.620E+02	0.777

CCCG = 5, Gamma = 0.360

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9736311	0.9872470	0.9885550	0.9963928	2.405E+02	3.107E+00	--
α_2	1.06E-03	7.50E-03	6.10E-03	1.87E-02	1.684E+00	2.228E+02	1.006
α_3	1.57E-04	3.56E-03	2.41E-03	1.09E-02	9.426E-01	2.642E+02	0.851
α_4	1.00E-06	1.33E-03	4.58E-04	5.63E-03	3.816E-01	2.857E+02	0.789
α_5	1.44E-16	3.60E-04	1.97E-06	2.10E-03	9.865E-02	2.736E+02	0.825

CCCG = 6, Gamma = 0.361

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9762231	0.9878296	0.9888494	0.9959519	3.102E+02	3.822E+00	--
α_2	8.85E-04	6.11E-03	4.98E-03	1.52E-02	1.714E+00	2.790E+02	1.059
α_3	2.16E-04	3.29E-03	2.38E-03	9.50E-03	1.108E+00	3.352E+02	0.884
α_4	2.32E-05	1.76E-03	9.79E-04	6.13E-03	6.509E-01	3.700E+02	0.802
α_5	1.32E-08	6.69E-04	1.20E-04	3.22E-03	2.536E-01	3.790E+02	0.784
α_6	5.58E-17	3.44E-04	1.56E-06	2.01E-03	9.572E-02	2.778E+02	1.069

CCCG = 7, Gamma = 0.362

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9792064	0.9884930	0.9892064	0.9953432	4.463E+02	5.195E+00	--
α_2	9.89E-04	5.21E-03	4.42E-03	1.21E-02	2.105E+00	4.019E+02	1.065
α_3	2.69E-04	2.86E-03	2.18E-03	7.77E-03	1.320E+00	4.600E+02	0.933
α_4	9.99E-05	1.96E-03	1.36E-03	5.88E-03	9.967E-01	5.073E+02	0.847
α_5	5.05E-06	9.99E-04	4.75E-04	3.77E-03	5.249E-01	5.249E+02	0.819
α_6	2.72E-10	3.67E-04	3.58E-05	1.90E-03	1.956E-01	5.335E+02	0.806
α_7	3.12E-28	1.09E-04	2.47E-09	5.93E-04	5.291E-02	4.844E+02	0.888

CCCG = 8, Gamma = 0.363

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9803844	0.9888424	0.9894598	0.9951919	5.169E+02	5.832E+00	--
α_2	9.71E-04	4.79E-03	4.10E-03	1.10E-02	2.229E+00	4.635E+02	1.084
α_3	2.10E-04	2.44E-03	1.84E-03	6.74E-03	1.260E+00	5.148E+02	0.978
α_4	1.01E-04	1.77E-03	1.25E-03	5.23E-03	1.042E+00	5.869E+02	0.858
α_5	2.89E-05	1.23E-03	7.54E-04	4.07E-03	7.626E-01	6.176E+02	0.816
α_6	1.20E-07	5.24E-04	1.46E-04	2.33E-03	3.271E-01	6.245E+02	0.808
α_7	2.02E-13	2.08E-04	5.58E-06	1.17E-03	1.344E-01	6.456E+02	0.782
α_8	1.74E-20	1.93E-04	1.81E-07	1.12E-03	7.682E-02	3.977E+02	1.269

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.87E-01	9.86E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01
α_2	1.18E-02	1.04E-02	1.02E-02	7.50E-03	6.11E-03	5.21E-03	4.79E-03
α_3		2.91E-03	2.54E-03	3.56E-03	3.29E-03	2.86E-03	2.44E-03
α_4			1.29E-03	1.33E-03	1.76E-03	1.96E-03	1.77E-03
α_5				3.60E-04	6.69E-04	9.99E-04	1.23E-03
α_6					3.44E-04	3.67E-04	5.24E-04
α_7						1.09E-04	2.08E-04
α_8							1.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.87E-01	9.86E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01
Beta	1.18E-02	1.33E-02	1.41E-02	1.28E-02	1.22E-02	1.15E-02	1.12E-02
Gamma		2.19E-01	2.72E-01	4.12E-01	4.98E-01	5.47E-01	5.71E-01
Delta			3.38E-01	3.23E-01	4.57E-01	5.46E-01	6.17E-01
Epsilon				2.13E-01	3.66E-01	4.29E-01	5.49E-01
Mu					3.40E-01	3.23E-01	4.29E-01
Omega						2.30E-01	4.34E-01
Sigma							4.81E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.75	8.63	11.50	14.38	17.25	20.13	23.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.031

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9868343	0.9965845	0.9984583	0.9999874	1.439E+02	4.932E-01	--
α_2	1.26E-05	3.42E-03	1.54E-03	1.32E-02	4.932E-01	1.439E+02	0.758

CCCG = 3, Gamma = 0.031

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9894743	0.9964077	0.9974485	0.9997874	2.939E+02	1.059E+00	--
α_2	4.88E-05	2.61E-03	1.54E-03	8.81E-03	7.137E-01	2.729E+02	0.909
α_3	3.53E-07	9.83E-04	2.97E-04	4.29E-03	3.458E-01	3.513E+02	0.707

CCCG = 4, Gamma = 0.031

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9906340	0.9959746	0.9965840	0.9992322	5.232E+02	2.115E+00	--
α_2	3.89E-04	3.14E-03	2.50E-03	8.08E-03	1.549E+00	4.918E+02	0.985
α_3	1.26E-08	4.04E-04	7.91E-05	1.92E-03	2.646E-01	6.540E+02	0.743
α_4	5.32E-08	4.81E-04	1.18E-04	2.20E-03	3.010E-01	6.250E+02	0.777

CCCG = 5, Gamma = 0.031

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9934959	0.9963880	0.9966099	0.9985224	1.469E+03	5.325E+00	--
α_2	8.29E-04	2.60E-03	2.37E-03	5.17E-03	3.632E+00	1.393E+03	1.006
α_3	8.06E-05	8.21E-04	6.30E-04	2.21E-03	1.354E+00	1.649E+03	0.851
α_4	1.58E-08	1.66E-04	3.97E-05	7.64E-04	2.961E-01	1.780E+03	0.789
α_5	7.41E-35	2.49E-05	2.74E-11	1.23E-04	4.243E-02	1.703E+03	0.825

CCCG = 6, Gamma = 0.031

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9929974	0.9961826	0.9964352	0.9985049	1.288E+03	4.936E+00	--
α_2	6.47E-04	2.43E-03	2.16E-03	5.14E-03	2.915E+00	1.196E+03	1.059
α_3	7.46E-05	8.75E-04	6.57E-04	2.42E-03	1.257E+00	1.435E+03	0.884
α_4	1.29E-06	3.18E-04	1.45E-04	1.22E-03	5.031E-01	1.583E+03	0.802
α_5	2.06E-15	7.13E-05	9.40E-07	4.09E-04	1.155E-01	1.620E+03	0.784
α_6	5.72E-13	1.22E-04	4.48E-06	6.77E-04	1.451E-01	1.187E+03	1.069

CCCG = 7, Gamma = 0.031

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9945331	0.9965402	0.9966581	0.9981449	2.781E+03	9.654E+00	--
α_2	7.32E-04	1.89E-03	1.76E-03	3.48E-03	4.851E+00	2.562E+03	1.065
α_3	2.45E-04	9.56E-04	8.45E-04	2.05E-03	2.800E+00	2.927E+03	0.933
α_4	4.38E-05	4.29E-04	3.31E-04	1.15E-03	1.384E+00	3.227E+03	0.847
α_5	5.20E-07	1.47E-04	6.57E-05	5.68E-04	4.902E-01	3.337E+03	0.819
α_6	8.04E-16	3.38E-05	4.28E-07	1.94E-04	1.146E-01	3.390E+03	0.806
α_7	2.50E-93	4.76E-06	5.06E-25	5.65E-06	1.464E-02	3.077E+03	0.888

CCCG = 8, Gamma = 0.032

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9942112	0.9965592	0.9967172	0.9983678	2.070E+03	7.148E+00	--
α_2	4.23E-04	1.56E-03	1.39E-03	3.28E-03	2.980E+00	1.907E+03	1.084
α_3	1.60E-04	9.26E-04	7.74E-04	2.21E-03	1.960E+00	2.115E+03	0.978
α_4	3.54E-05	4.84E-04	3.55E-04	1.37E-03	1.166E+00	2.410E+03	0.858
α_5	1.20E-06	2.12E-04	1.03E-04	7.93E-04	5.375E-01	2.536E+03	0.816
α_6	1.56E-11	7.04E-05	5.46E-06	3.72E-04	1.805E-01	2.562E+03	0.808
α_7	8.08E-36	1.56E-05	1.17E-11	7.64E-05	4.139E-02	2.649E+03	0.782
α_8	1.06E-08	1.73E-04	3.82E-05	8.08E-04	2.827E-01	1.631E+03	1.269

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
α_2	3.42E-03	2.61E-03	3.14E-03	2.60E-03	2.43E-03	1.89E-03	1.56E-03
α_3		9.83E-04	4.04E-04	8.21E-04	8.75E-04	9.56E-04	9.26E-04
α_4			4.81E-04	1.66E-04	3.18E-04	4.29E-04	4.84E-04
α_5				2.49E-05	7.13E-05	1.47E-04	2.12E-04
α_6					1.22E-04	3.38E-05	7.04E-05
α_7						4.76E-06	1.56E-05
α_8							1.73E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
Beta	3.42E-03	3.59E-03	4.03E-03	3.61E-03	3.82E-03	3.46E-03	3.44E-03
Gamma		2.74E-01	2.20E-01	2.80E-01	3.63E-01	4.54E-01	5.47E-01
Delta			5.43E-01	1.89E-01	3.69E-01	3.91E-01	5.08E-01
Epsilon				1.30E-01	3.79E-01	3.02E-01	4.94E-01
Mu					6.32E-01	2.08E-01	5.50E-01
Omega						1.23E-01	7.28E-01
Sigma							9.17E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.50	0.75	1.00	1.25	1.50	1.75	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.4 Pressurizer Power-Operated Relief Valve Motor-Operated Block Valves

2.3.4.1 PWR-RCS-MOV-FTOC: Pressurizer PORV Block Motor-Operated Valves Fail to Open/Close

Generic CCF Parameters

Plant Type: PWR
System Group: Clean Water
System: Reactor Coolant
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Close, Fail to Open, Fail to Open or Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 10.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9443172	0.9857510	0.9937772	0.9999568	1.0000000	3.241E+01	4.685E-01
α_2	4.02E-05	1.42E-02	6.23E-03	5.57E-02	0.00E+00	4.685E-01	3.241E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9535058	0.9836769	0.9880528	0.9988760	1.0000000	6.798E+01	1.128E+00
α_2	4.13E-04	1.23E-02	8.04E-03	3.88E-02	0.00E+00	8.512E-01	6.826E+01
α_3	2.00E-07	4.01E-03	8.58E-04	1.88E-02	0.00E+00	2.768E-01	6.883E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9558071	0.9815382	0.9845699	0.9969069	1.0000000	1.007E+02	1.894E+00
α_2	1.06E-03	1.23E-02	9.29E-03	3.37E-02	0.00E+00	1.260E+00	1.013E+02
α_3	4.27E-06	3.92E-03	1.44E-03	1.62E-02	0.00E+00	4.024E-01	1.022E+02
α_4	1.57E-08	2.26E-03	3.37E-04	1.12E-02	0.00E+00	2.315E-01	1.023E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9662631	0.9831980	0.9847473	0.9948360	1.0000000	2.008E+02	3.432E+00
α_2	1.60E-03	9.42E-03	7.87E-03	2.25E-02	0.00E+00	1.924E+00	2.023E+02
α_3	2.97E-04	5.14E-03	3.64E-03	1.51E-02	0.00E+00	1.049E+00	2.032E+02
α_4	1.42E-06	1.87E-03	6.45E-04	7.89E-03	0.00E+00	3.822E-01	2.039E+02
α_5	3.26E-20	3.76E-04	3.50E-07	2.18E-03	0.00E+00	7.674E-02	2.042E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
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α_1	0.9687319	0.9839580	0.9852861	0.9946434	1.0000000	2.352E+02	3.835E+00
α_2	1.02E-03	7.12E-03	5.80E-03	1.77E-02	0.00E+00	1.701E+00	2.374E+02
α_3	3.98E-04	5.05E-03	3.75E-03	1.41E-02	0.00E+00	1.207E+00	2.378E+02
α_4	2.29E-05	2.49E-03	1.31E-03	8.98E-03	0.00E+00	5.960E-01	2.385E+02
α_5	3.62E-09	9.25E-04	1.24E-04	4.64E-03	0.00E+00	2.211E-01	2.388E+02
α_6	3.61E-15	4.59E-04	4.65E-06	2.65E-03	0.00E+00	1.098E-01	2.389E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9738649	0.9851699	0.9859945	0.9936476	1.0000000	3.818E+02	5.747E+00
α_2	1.18E-03	5.79E-03	4.96E-03	1.32E-02	0.00E+00	2.243E+00	3.853E+02
α_3	5.64E-04	4.20E-03	3.39E-03	1.06E-02	0.00E+00	1.630E+00	3.859E+02
α_4	1.74E-04	2.79E-03	2.00E-03	8.13E-03	0.00E+00	1.083E+00	3.865E+02
α_5	1.05E-05	1.46E-03	7.36E-04	5.36E-03	0.00E+00	5.654E-01	3.870E+02
α_6	2.71E-10	4.94E-04	4.57E-05	2.58E-03	0.00E+00	1.916E-01	3.874E+02
α_7	6.15E-41	8.98E-05	3.34E-12	3.94E-04	0.00E+00	3.480E-02	3.875E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9751044	0.9858888	0.9866776	0.9939688	1.0000000	4.000E+02	5.726E+00
α_2	8.97E-04	4.97E-03	4.19E-03	1.17E-02	0.00E+00	2.018E+00	4.037E+02
α_3	3.54E-04	3.43E-03	2.65E-03	9.14E-03	0.00E+00	1.391E+00	4.044E+02
α_4	1.56E-04	2.62E-03	1.86E-03	7.67E-03	0.00E+00	1.062E+00	4.047E+02
α_5	3.06E-05	1.73E-03	1.01E-03	5.88E-03	0.00E+00	7.026E-01	4.050E+02
α_6	3.38E-07	8.62E-04	2.65E-04	3.75E-03	0.00E+00	3.497E-01	4.054E+02
α_7	1.30E-15	2.66E-04	2.44E-06	1.54E-03	0.00E+00	1.078E-01	4.056E+02
α_8	2.72E-17	2.33E-04	9.89E-07	1.36E-03	0.00E+00	9.469E-02	4.057E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.84E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.42E-02	1.23E-02	1.23E-02	9.42E-03	7.12E-03	5.79E-03	4.97E-03
α_3		4.01E-03	3.92E-03	5.14E-03	5.05E-03	4.20E-03	3.43E-03
α_4			2.26E-03	1.87E-03	2.49E-03	2.79E-03	2.62E-03
α_5				3.76E-04	9.25E-04	1.46E-03	1.73E-03
α_6					4.59E-04	4.94E-04	8.62E-04
α_7						8.98E-05	2.66E-04
α_8							2.33E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.84E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.42E-02	1.63E-02	1.85E-02	1.68E-02	1.60E-02	1.48E-02	1.41E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01

Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	10.00	10.00	10.00	10.00	10.00	10.00	10.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9669418	0.9914664	0.9961919	0.9999716	5.616E+01	4.834E-01	--
α_2	2.84E-05	8.53E-03	3.81E-03	3.31E-02	4.834E-01	5.616E+01	0.818

CCCG = 3, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9765692	0.9915674	0.9936897	0.9993116	1.441E+02	1.226E+00	--
α_2	3.34E-04	6.87E-03	4.74E-03	2.07E-02	9.769E-01	1.413E+02	0.935
α_3	2.50E-08	1.56E-03	2.71E-04	7.59E-03	2.487E-01	1.587E+02	0.836

CCCG = 4, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9749738	0.9893054	0.9909485	0.9980185	1.903E+02	2.057E+00	--
α_2	8.31E-04	7.53E-03	5.90E-03	1.98E-02	1.442E+00	1.901E+02	0.971
α_3	2.66E-06	2.13E-03	7.99E-04	8.74E-03	4.114E-01	1.931E+02	0.961
α_4	1.37E-09	1.04E-03	1.14E-04	5.34E-03	2.036E-01	1.954E+02	0.951

CCCG = 5, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9793551	0.9895438	0.9904554	0.9966178	3.486E+02	3.683E+00	--
α_2	1.31E-03	6.42E-03	5.51E-03	1.47E-02	2.243E+00	3.469E+02	1.021
α_3	1.39E-04	2.76E-03	1.91E-03	8.27E-03	9.912E-01	3.588E+02	0.990
α_4	7.20E-07	1.06E-03	3.57E-04	4.48E-03	3.765E-01	3.562E+02	0.999
α_5	1.91E-21	2.20E-04	1.26E-07	1.27E-03	7.237E-02	3.285E+02	1.084

CCCG = 6, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9798755	0.9894865	0.9903037	0.9963061	3.895E+02	4.139E+00	--
α_2	1.06E-03	5.49E-03	4.67E-03	1.28E-02	2.128E+00	3.852E+02	1.049
α_3	1.91E-04	2.77E-03	2.02E-03	7.94E-03	1.134E+00	4.078E+02	0.994
α_4	8.84E-06	1.35E-03	6.71E-04	5.01E-03	5.533E-01	4.085E+02	0.994
α_5	2.15E-09	5.53E-04	7.39E-05	2.78E-03	2.210E-01	3.991E+02	1.018
α_6	4.33E-16	3.40E-04	2.37E-06	1.97E-03	1.027E-01	3.019E+02	1.346

CCCG = 7, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9833050	0.9902908	0.9907798	0.9956070	6.560E+02	6.432E+00	--
α_2	1.15E-03	4.43E-03	3.93E-03	9.43E-03	2.840E+00	6.382E+02	1.076
α_3	3.80E-04	2.56E-03	2.09E-03	6.33E-03	1.746E+00	6.808E+02	1.010
α_4	9.92E-05	1.59E-03	1.14E-03	4.63E-03	1.084E+00	6.799E+02	1.013
α_5	4.50E-06	7.92E-04	3.84E-04	2.96E-03	5.376E-01	6.783E+02	1.016
α_6	2.57E-10	2.93E-04	2.95E-05	1.51E-03	1.979E-01	6.761E+02	1.020
α_7	9.98E-53	4.45E-05	4.46E-15	1.52E-04	2.656E-02	5.964E+02	1.156

CCCG = 8, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9838232	0.9907025	0.9911954	0.9958987	6.513E+02	6.112E+00	--
α_2	8.05E-04	3.72E-03	3.21E-03	8.36E-03	2.364E+00	6.335E+02	1.084
α_3	2.67E-04	2.24E-03	1.77E-03	5.81E-03	1.512E+00	6.734E+02	1.021
α_4	9.02E-05	1.54E-03	1.09E-03	4.52E-03	1.056E+00	6.850E+02	1.005
α_5	1.52E-05	1.00E-03	5.70E-04	3.45E-03	6.745E-01	6.736E+02	1.022
α_6	6.11E-08	4.55E-04	1.16E-04	2.06E-03	3.076E-01	6.761E+02	1.019
α_7	1.11E-15	1.58E-04	1.56E-06	9.13E-04	1.093E-01	6.905E+02	0.998
α_8	2.88E-18	1.87E-04	5.19E-07	1.09E-03	8.885E-02	4.756E+02	1.449

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.92E-01	9.89E-01	9.90E-01	9.89E-01	9.90E-01	9.91E-01
α_2	8.53E-03	6.87E-03	7.53E-03	6.42E-03	5.49E-03	4.43E-03	3.72E-03
α_3		1.56E-03	2.13E-03	2.76E-03	2.77E-03	2.56E-03	2.24E-03
α_4			1.04E-03	1.06E-03	1.35E-03	1.59E-03	1.54E-03
α_5				2.20E-04	5.53E-04	7.92E-04	1.00E-03
α_6					3.40E-04	2.93E-04	4.55E-04
α_7						4.45E-05	1.58E-04
α_8							1.87E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.92E-01	9.89E-01	9.90E-01	9.89E-01	9.90E-01	9.91E-01
Beta	8.53E-03	8.43E-03	1.07E-02	1.05E-02	1.05E-02	9.71E-03	9.30E-03
Gamma		1.86E-01	2.96E-01	3.86E-01	4.77E-01	5.44E-01	6.00E-01
Delta			3.29E-01	3.17E-01	4.48E-01	5.15E-01	5.98E-01
Epsilon				1.73E-01	3.98E-01	4.15E-01	5.39E-01
Mu					3.81E-01	2.99E-01	4.44E-01
Omega						1.32E-01	4.31E-01
Sigma							5.41E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9039074	0.9756562	0.9896249	0.9999449	1.803E+01	4.498E-01	--
α_2	5.51E-05	2.43E-02	1.04E-02	9.61E-02	4.498E-01	1.803E+01	0.818

CCCG = 3, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9182806	0.9706761	0.9780733	0.9977503	3.900E+01	1.178E+00	--
α_2	1.07E-03	2.39E-02	1.64E-02	7.22E-02	9.387E-01	3.838E+01	0.935
α_3	5.75E-08	5.45E-03	8.84E-04	2.67E-02	2.396E-01	4.371E+01	0.836

CCCG = 4, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9181073	0.9655071	0.9709905	0.9941315	5.314E+01	1.898E+00	--
α_2	2.13E-03	2.35E-02	1.79E-02	6.36E-02	1.285E+00	5.351E+01	0.971
α_3	6.57E-06	7.10E-03	2.55E-03	2.96E-02	3.927E-01	5.495E+01	0.961
α_4	1.52E-08	3.95E-03	5.30E-04	1.98E-02	2.207E-01	5.571E+01	0.951

CCCG = 5, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9361411	0.9678308	0.9706539	0.9898679	1.055E+02	3.506E+00	--
α_2	3.30E-03	1.85E-02	1.56E-02	4.35E-02	1.992E+00	1.059E+02	1.021
α_3	6.01E-04	9.70E-03	6.96E-03	2.82E-02	1.078E+00	1.101E+02	0.990
α_4	1.73E-06	3.30E-03	1.07E-03	1.41E-02	3.632E-01	1.098E+02	0.999
α_5	6.60E-21	7.14E-04	4.14E-07	4.13E-03	7.248E-02	1.015E+02	1.084

CCCG = 6, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9405160	0.9685819	0.9708930	0.9887485	1.295E+02	4.199E+00	--
α_2	2.56E-03	1.48E-02	1.24E-02	3.53E-02	1.941E+00	1.289E+02	1.049
α_3	9.26E-04	9.64E-03	7.40E-03	2.60E-02	1.332E+00	1.368E+02	0.994
α_4	4.80E-05	4.47E-03	2.41E-03	1.59E-02	6.181E-01	1.376E+02	0.994
α_5	1.18E-08	1.71E-03	2.55E-04	8.49E-03	2.313E-01	1.347E+02	1.018
α_6	6.88E-20	7.53E-04	7.11E-07	4.38E-03	7.684E-02	1.019E+02	1.346

CCCG = 7, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9483801	0.9700284	0.9715265	0.9865594	2.014E+02	6.223E+00	--
α_2	3.24E-03	1.32E-02	1.16E-02	2.86E-02	2.654E+00	1.981E+02	1.076
α_3	1.05E-03	7.70E-03	6.22E-03	1.94E-02	1.645E+00	2.121E+02	1.010
α_4	3.48E-04	5.23E-03	3.79E-03	1.50E-02	1.115E+00	2.121E+02	1.013
α_5	2.75E-05	2.84E-03	1.50E-03	1.02E-02	6.034E-01	2.120E+02	1.016
α_6	1.49E-10	8.40E-04	6.27E-05	4.46E-03	1.780E-01	2.116E+02	1.020
α_7	7.98E-51	1.46E-04	3.01E-14	5.17E-04	2.734E-02	1.867E+02	1.156

CCCG = 8, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9495187	0.9706705	0.9721331	0.9868265	2.067E+02	6.246E+00	--
α_2	2.81E-03	1.21E-02	1.06E-02	2.67E-02	2.504E+00	2.036E+02	1.084
α_3	6.96E-04	6.49E-03	5.06E-03	1.72E-02	1.419E+00	2.174E+02	1.021
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	1.005
α_5	6.92E-05	3.36E-03	2.01E-03	1.12E-02	7.337E-01	2.179E+02	1.022
α_6	1.81E-06	1.81E-03	6.55E-04	7.54E-03	3.975E-01	2.189E+02	1.019
α_7	3.44E-20	3.44E-04	3.30E-07	2.00E-03	7.703E-02	2.238E+02	0.998
α_8	5.27E-18	5.67E-04	1.42E-06	3.31E-03	8.749E-02	1.541E+02	1.449

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.76E-01	9.71E-01	9.66E-01	9.68E-01	9.69E-01	9.70E-01	9.71E-01
α_2	2.43E-02	2.39E-02	2.35E-02	1.85E-02	1.48E-02	1.32E-02	1.21E-02
α_3		5.45E-03	7.10E-03	9.70E-03	9.64E-03	7.70E-03	6.49E-03
α_4			3.95E-03	3.30E-03	4.47E-03	5.23E-03	4.62E-03
α_5				7.14E-04	1.71E-03	2.84E-03	3.36E-03
α_6					7.53E-04	8.40E-04	1.81E-03
α_7						1.46E-04	3.44E-04
α_8							5.67E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.76E-01	9.71E-01	9.66E-01	9.68E-01	9.69E-01	9.70E-01	9.71E-01
Beta	2.43E-02	2.93E-02	3.45E-02	3.22E-02	3.14E-02	3.00E-02	2.93E-02
Gamma		1.86E-01	3.20E-01	4.26E-01	5.28E-01	5.59E-01	5.86E-01
Delta			3.57E-01	2.93E-01	4.19E-01	5.41E-01	6.23E-01
Epsilon				1.78E-01	3.56E-01	4.23E-01	5.68E-01
Mu					3.05E-01	2.58E-01	4.48E-01
Omega						1.48E-01	3.35E-01
Sigma							6.23E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7993445	0.9516148	0.9820732	0.9999614	7.476E+00	3.801E-01	--
α_2	3.86E-05	4.84E-02	1.79E-02	2.01E-01	3.801E-01	7.476E+00	0.818

CCCG = 3, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8244703	0.9403594	0.9576283	0.9970688	1.514E+01	9.600E-01	--
α_2	6.57E-04	4.28E-02	2.52E-02	1.45E-01	6.673E-01	1.491E+01	0.935
α_3	1.49E-06	1.68E-02	4.08E-03	7.73E-02	2.927E-01	1.712E+01	0.836

CCCG = 4, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8345324	0.9319946	0.9434743	0.9900741	2.287E+01	1.669E+00	--
α_2	2.50E-03	4.26E-02	3.08E-02	1.23E-01	1.039E+00	2.337E+01	0.971
α_3	1.38E-05	1.58E-02	5.67E-03	6.58E-02	3.887E-01	2.427E+01	0.961
α_4	1.13E-07	9.69E-03	1.61E-03	4.74E-02	2.414E-01	2.468E+01	0.951

CCCG = 5, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8829700	0.9405189	0.9454817	0.9810838	5.514E+01	3.487E+00	--
α_2	4.85E-03	3.09E-02	2.57E-02	7.49E-02	1.791E+00	5.614E+01	1.021
α_3	1.62E-03	2.02E-02	1.52E-02	5.61E-02	1.207E+00	5.849E+01	0.990
α_4	1.30E-05	7.34E-03	2.94E-03	2.95E-02	4.340E-01	5.873E+01	0.999
α_5	2.24E-26	1.01E-03	3.60E-08	5.56E-03	5.493E-02	5.447E+01	1.084

CCCG = 6, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8963254	0.9458225	0.9499098	0.9813384	6.817E+01	3.905E+00	--
α_2	1.85E-03	1.90E-02	1.47E-02	5.11E-02	1.335E+00	6.878E+01	1.049
α_3	2.55E-03	2.07E-02	1.65E-02	5.30E-02	1.531E+00	7.250E+01	0.994
α_4	1.88E-04	9.71E-03	5.79E-03	3.26E-02	7.191E-01	7.332E+01	0.994
α_5	5.00E-08	3.41E-03	5.85E-04	1.66E-02	2.467E-01	7.204E+01	1.018
α_6	1.47E-20	1.33E-03	8.04E-07	7.74E-03	7.279E-02	5.459E+01	1.346

CCCG = 7, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9152450	0.9513584	0.9538793	0.9788567	1.129E+02	5.770E+00	--
α_2	1.70E-03	1.36E-02	1.09E-02	3.49E-02	1.549E+00	1.120E+02	1.076
α_3	2.93E-03	1.64E-02	1.39E-02	3.88E-02	1.989E+00	1.189E+02	1.010
α_4	9.61E-04	1.07E-02	8.11E-03	2.91E-02	1.287E+00	1.194E+02	1.013
α_5	9.61E-05	5.75E-03	3.34E-03	1.96E-02	6.913E-01	1.196E+02	1.016
α_6	1.44E-08	1.94E-03	2.93E-04	9.60E-03	2.327E-01	1.196E+02	1.020
α_7	1.36E-64	2.00E-04	3.03E-17	5.04E-04	2.112E-02	1.057E+02	1.156

CCCG = 8, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9258527	0.9556033	0.9575151	0.9788232	1.510E+02	7.016E+00	--
α_2	1.36E-03	1.05E-02	8.45E-03	2.68E-02	1.583E+00	1.488E+02	1.084
α_3	2.21E-03	1.24E-02	1.05E-02	2.94E-02	1.986E+00	1.576E+02	1.021
α_4	1.44E-03	1.03E-02	8.37E-03	2.58E-02	1.672E+00	1.606E+02	1.005
α_5	3.36E-04	6.34E-03	4.43E-03	1.89E-02	1.011E+00	1.585E+02	1.022
α_6	2.70E-05	3.57E-03	1.82E-03	1.31E-02	5.709E-01	1.594E+02	1.019
α_7	2.54E-10	1.11E-03	8.68E-05	5.86E-03	1.809E-01	1.632E+02	0.998
α_8	1.60E-107	1.11E-04	3.35E-27	8.30E-05	1.245E-02	1.125E+02	1.449

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.52E-01	9.40E-01	9.32E-01	9.41E-01	9.46E-01	9.51E-01	9.56E-01
α_2	4.84E-02	4.28E-02	4.26E-02	3.09E-02	1.90E-02	1.36E-02	1.05E-02
α_3		1.68E-02	1.58E-02	2.02E-02	2.07E-02	1.64E-02	1.24E-02
α_4			9.69E-03	7.34E-03	9.71E-03	1.07E-02	1.03E-02
α_5				1.01E-03	3.41E-03	5.75E-03	6.34E-03
α_6					1.33E-03	1.94E-03	3.57E-03
α_7						2.00E-04	1.11E-03
α_8							1.11E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.52E-01	9.40E-01	9.32E-01	9.41E-01	9.46E-01	9.51E-01	9.56E-01
Beta	4.84E-02	5.96E-02	6.80E-02	5.95E-02	5.42E-02	4.86E-02	4.44E-02
Gamma		2.82E-01	3.74E-01	4.80E-01	6.49E-01	7.20E-01	7.63E-01
Delta			3.81E-01	2.92E-01	4.11E-01	5.30E-01	6.33E-01
Epsilon				1.21E-01	3.28E-01	4.25E-01	5.19E-01
Mu					2.81E-01	2.71E-01	4.30E-01
Omega						9.33E-02	2.54E-01
Sigma							9.08E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9455151	0.9860366	0.9938768	0.9999597	3.323E+01	4.706E-01	--
α_2	4.03E-05	1.40E-02	6.12E-03	5.45E-02	4.706E-01	3.323E+01	0.818

CCCG = 3, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9559830	0.9846762	0.9888809	0.9989951	7.084E+01	1.103E+00	--
α_2	3.35E-04	1.16E-02	7.38E-03	3.72E-02	8.104E-01	6.913E+01	0.935
α_3	3.15E-07	3.74E-03	8.78E-04	1.72E-02	2.921E-01	7.788E+01	0.836

CCCG = 4, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9619048	0.9839469	0.9865155	0.9972033	1.197E+02	1.953E+00	--
α_2	1.01E-03	1.08E-02	8.28E-03	2.94E-02	1.312E+00	1.198E+02	0.971
α_3	5.92E-06	3.52E-03	1.39E-03	1.42E-02	4.307E-01	1.219E+02	0.961
α_4	3.38E-09	1.70E-03	2.01E-04	8.64E-03	2.099E-01	1.234E+02	0.951

CCCG = 5, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9697235	0.9853465	0.9868440	0.9958511	2.089E+02	3.107E+00	--
α_2	1.13E-03	8.02E-03	6.52E-03	2.00E-02	1.684E+00	2.083E+02	1.021
α_3	1.93E-04	4.36E-03	2.96E-03	1.33E-02	9.426E-01	2.155E+02	0.990
α_4	1.34E-06	1.78E-03	6.12E-04	7.51E-03	3.816E-01	2.141E+02	0.999
α_5	1.99E-16	4.99E-04	2.74E-06	2.90E-03	9.865E-02	1.976E+02	1.084

CCCG = 6, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9728543	0.9860967	0.9872578	0.9953718	2.711E+02	3.822E+00	--
α_2	9.21E-04	6.36E-03	5.19E-03	1.58E-02	1.714E+00	2.679E+02	1.049
α_3	2.55E-04	3.89E-03	2.81E-03	1.12E-02	1.108E+00	2.836E+02	0.994
α_4	3.02E-05	2.29E-03	1.27E-03	7.98E-03	6.509E-01	2.841E+02	0.994
α_5	1.81E-08	9.12E-04	1.64E-04	4.40E-03	2.536E-01	2.777E+02	1.018
α_6	7.39E-17	4.55E-04	2.07E-06	2.65E-03	9.572E-02	2.101E+02	1.346

CCCG = 7, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9763925	0.9869295	0.9877374	0.9947071	3.923E+02	5.195E+00	--
α_2	1.04E-03	5.48E-03	4.65E-03	1.28E-02	2.105E+00	3.820E+02	1.076
α_3	3.03E-04	3.23E-03	2.46E-03	8.76E-03	1.320E+00	4.077E+02	1.010
α_4	1.25E-04	2.44E-03	1.69E-03	7.32E-03	9.967E-01	4.071E+02	1.013
α_5	6.53E-06	1.29E-03	6.13E-04	4.87E-03	5.249E-01	4.062E+02	1.016
α_6	3.59E-10	4.83E-04	4.72E-05	2.50E-03	1.956E-01	4.051E+02	1.020
α_7	4.22E-28	1.48E-04	3.36E-09	8.03E-04	5.291E-02	3.574E+02	1.156

CCCG = 8, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9778577	0.9873997	0.9880950	0.9945673	4.570E+02	5.832E+00	--
α_2	1.01E-03	4.98E-03	4.27E-03	1.14E-02	2.229E+00	4.450E+02	1.084
α_3	2.28E-04	2.65E-03	2.00E-03	7.33E-03	1.260E+00	4.734E+02	1.021
α_4	1.23E-04	2.16E-03	1.52E-03	6.37E-03	1.042E+00	4.814E+02	1.005
α_5	3.77E-05	1.61E-03	9.84E-04	5.30E-03	7.626E-01	4.735E+02	1.022
α_6	1.57E-07	6.88E-04	1.92E-04	3.06E-03	3.271E-01	4.754E+02	1.019
α_7	2.68E-13	2.77E-04	7.41E-06	1.55E-03	1.344E-01	4.856E+02	0.998
α_8	2.07E-20	2.30E-04	2.15E-07	1.33E-03	7.682E-02	3.345E+02	1.449

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.85E-01	9.84E-01	9.85E-01	9.86E-01	9.87E-01	9.87E-01
α_2	1.40E-02	1.16E-02	1.08E-02	8.02E-03	6.36E-03	5.48E-03	4.98E-03
α_3		3.74E-03	3.52E-03	4.36E-03	3.89E-03	3.23E-03	2.65E-03
α_4			1.70E-03	1.78E-03	2.29E-03	2.44E-03	2.16E-03
α_5				4.99E-04	9.12E-04	1.29E-03	1.61E-03
α_6					4.55E-04	4.83E-04	6.88E-04
α_7						1.48E-04	2.77E-04
α_8							2.30E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.85E-01	9.84E-01	9.85E-01	9.86E-01	9.87E-01	9.87E-01
Beta	1.40E-02	1.53E-02	1.61E-02	1.47E-02	1.39E-02	1.31E-02	1.26E-02
Gamma		2.44E-01	3.25E-01	4.53E-01	5.43E-01	5.81E-01	6.04E-01
Delta			3.25E-01	3.43E-01	4.84E-01	5.75E-01	6.51E-01
Epsilon				2.19E-01	3.74E-01	4.40E-01	5.65E-01
Mu					3.33E-01	3.28E-01	4.26E-01
Omega						2.35E-01	4.24E-01
Sigma							4.54E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9861192	0.9963987	0.9983740	0.9999868	1.365E+02	4.932E-01	--
α_2	1.32E-05	3.60E-03	1.63E-03	1.39E-02	4.932E-01	1.365E+02	0.818

CCCG = 3, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9888379	0.9961901	0.9972936	0.9997744	2.770E+02	1.059E+00	--
α_2	4.97E-05	2.66E-03	1.57E-03	8.97E-03	7.137E-01	2.678E+02	0.935
α_3	4.14E-07	1.15E-03	3.48E-04	5.03E-03	3.458E-01	2.998E+02	0.836

CCCG = 4, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9902508	0.9958096	0.9964438	0.9992006	5.025E+02	2.115E+00	--
α_2	3.82E-04	3.08E-03	2.45E-03	7.93E-03	1.549E+00	5.010E+02	0.971
α_3	1.63E-08	5.21E-04	1.02E-04	2.48E-03	2.646E-01	5.073E+02	0.961
α_4	6.48E-08	5.87E-04	1.44E-04	2.68E-03	3.010E-01	5.127E+02	0.951

CCCG = 5, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9930997	0.9961677	0.9964031	0.9984322	1.384E+03	5.325E+00	--
α_2	8.41E-04	2.64E-03	2.40E-03	5.24E-03	3.632E+00	1.374E+03	1.021
α_3	9.37E-05	9.53E-04	7.32E-04	2.57E-03	1.354E+00	1.419E+03	0.990
α_4	2.00E-08	2.10E-04	5.02E-05	9.66E-04	2.961E-01	1.407E+03	0.999
α_5	9.74E-35	3.27E-05	3.60E-11	1.62E-04	4.243E-02	1.297E+03	1.084

CCCG = 6, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9926092	0.9959707	0.9962372	0.9984218	1.220E+03	4.936E+00	--
α_2	6.40E-04	2.41E-03	2.14E-03	5.09E-03	2.915E+00	1.208E+03	1.049
α_3	8.39E-05	9.83E-04	7.38E-04	2.72E-03	1.257E+00	1.278E+03	0.994
α_4	1.60E-06	3.93E-04	1.80E-04	1.51E-03	5.031E-01	1.278E+03	0.994
α_5	2.68E-15	9.25E-05	1.22E-06	5.30E-04	1.155E-01	1.249E+03	1.018
α_6	7.19E-13	1.54E-04	5.63E-06	8.51E-04	1.451E-01	9.441E+02	1.346

CCCG = 7, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9941762	0.9963141	0.9964397	0.9980236	2.610E+03	9.654E+00	--
α_2	7.39E-04	1.91E-03	1.78E-03	3.52E-03	4.851E+00	2.538E+03	1.076
α_3	2.65E-04	1.03E-03	9.14E-04	2.21E-03	2.800E+00	2.704E+03	1.010
α_4	5.24E-05	5.12E-04	3.96E-04	1.37E-03	1.384E+00	2.700E+03	1.013
α_5	6.44E-07	1.82E-04	8.14E-05	7.04E-04	4.902E-01	2.692E+03	1.016
α_6	1.02E-15	4.27E-05	5.41E-07	2.45E-04	1.146E-01	2.682E+03	1.020
α_7	3.25E-93	6.19E-06	6.58E-25	7.35E-06	1.464E-02	2.365E+03	1.156

CCCG = 8, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9938373	0.9963367	0.9965049	0.9982621	1.944E+03	7.148E+00	--
α_2	4.23E-04	1.56E-03	1.39E-03	3.28E-03	2.980E+00	1.908E+03	1.084
α_3	1.67E-04	9.66E-04	8.08E-04	2.31E-03	1.960E+00	2.026E+03	1.021
α_4	4.14E-05	5.66E-04	4.15E-04	1.61E-03	1.166E+00	2.060E+03	1.005
α_5	1.51E-06	2.65E-04	1.28E-04	9.93E-04	5.375E-01	2.026E+03	1.022
α_6	1.96E-11	8.88E-05	6.89E-06	4.69E-04	1.805E-01	2.032E+03	1.019
α_7	1.03E-35	1.99E-05	1.49E-11	9.75E-05	4.139E-02	2.075E+03	0.998
α_8	1.21E-08	1.98E-04	4.36E-05	9.22E-04	2.827E-01	1.429E+03	1.449

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	3.60E-03	2.66E-03	3.08E-03	2.64E-03	2.41E-03	1.91E-03	1.56E-03
α_3		1.15E-03	5.21E-04	9.53E-04	9.83E-04	1.03E-03	9.66E-04
α_4			5.87E-04	2.10E-04	3.93E-04	5.12E-04	5.66E-04
α_5				3.27E-05	9.25E-05	1.82E-04	2.65E-04
α_6					1.54E-04	4.27E-05	8.88E-05
α_7						6.19E-06	1.99E-05
α_8							1.98E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	3.60E-03	3.81E-03	4.19E-03	3.83E-03	4.03E-03	3.69E-03	3.66E-03
Gamma		3.02E-01	2.64E-01	3.12E-01	4.03E-01	4.82E-01	5.74E-01
Delta			5.30E-01	2.03E-01	3.94E-01	4.18E-01	5.41E-01
Epsilon				1.35E-01	3.85E-01	3.11E-01	5.03E-01
Mu					6.24E-01	2.12E-01	5.36E-01
Omega						1.27E-01	7.10E-01
Sigma							9.08E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.4.2 PWR-RCS-MOV-CC: Pressurizer PORV Block Motor-Operated Valves Fail to Open

Generic CCF Parameters

Plant Type: PWR
System Group: Clean Water
System: Reactor Coolant
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9319869	0.9825706	0.9923504	0.9999473	1.0000000	2.641E+01	4.685E-01
α_2	4.94E-05	1.74E-02	7.65E-03	6.80E-02	0.00E+00	4.685E-01	2.641E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9491259	0.9821250	0.9869099	0.9987658	1.0000000	6.198E+01	1.128E+00
α_2	4.53E-04	1.35E-02	8.81E-03	4.25E-02	0.00E+00	8.512E-01	6.226E+01
α_3	2.19E-07	4.39E-03	9.41E-04	2.06E-02	0.00E+00	2.768E-01	6.283E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9530858	0.9803911	0.9836046	0.9967121	1.0000000	9.468E+01	1.894E+00
α_2	1.13E-03	1.30E-02	9.87E-03	3.58E-02	0.00E+00	1.260E+00	9.531E+01
α_3	4.53E-06	4.17E-03	1.53E-03	1.73E-02	0.00E+00	4.024E-01	9.617E+01
α_4	1.66E-08	2.40E-03	3.58E-04	1.19E-02	0.00E+00	2.315E-01	9.634E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9652486	0.9826895	0.9842843	0.9946781	1.0000000	1.948E+02	3.432E+00
α_2	1.65E-03	9.70E-03	8.11E-03	2.32E-02	0.00E+00	1.924E+00	1.963E+02
α_3	3.06E-04	5.29E-03	3.75E-03	1.55E-02	0.00E+00	1.049E+00	1.972E+02
α_4	1.47E-06	1.93E-03	6.65E-04	8.13E-03	0.00E+00	3.822E-01	1.979E+02
α_5	3.36E-20	3.87E-04	3.61E-07	2.25E-03	0.00E+00	7.674E-02	1.982E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9679315	0.9835450	0.9849062	0.9944998	1.0000000	2.292E+02	3.835E+00
α_2	1.05E-03	7.30E-03	5.95E-03	1.82E-02	0.00E+00	1.701E+00	2.314E+02

α_3	4.09E-04	5.18E-03	3.85E-03	1.45E-02	0.00E+00	1.207E+00	2.318E+02
α_4	2.34E-05	2.56E-03	1.34E-03	9.21E-03	0.00E+00	5.960E-01	2.325E+02
α_5	3.71E-09	9.49E-04	1.27E-04	4.76E-03	0.00E+00	2.211E-01	2.328E+02
α_6	3.71E-15	4.71E-04	4.77E-06	2.72E-03	0.00E+00	1.098E-01	2.329E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9734614	0.9849367	0.9857739	0.9935469	1.0000000	3.758E+02	5.747E+00
α_2	1.20E-03	5.88E-03	5.04E-03	1.34E-02	0.00E+00	2.243E+00	3.793E+02
α_3	5.73E-04	4.27E-03	3.44E-03	1.08E-02	0.00E+00	1.630E+00	3.799E+02
α_4	1.77E-04	2.84E-03	2.03E-03	8.26E-03	0.00E+00	1.083E+00	3.805E+02
α_5	1.07E-05	1.48E-03	7.47E-04	5.44E-03	0.00E+00	5.654E-01	3.810E+02
α_6	2.76E-10	5.02E-04	4.64E-05	2.62E-03	0.00E+00	1.916E-01	3.814E+02
α_7	6.25E-41	9.12E-05	3.39E-12	4.00E-04	0.00E+00	3.480E-02	3.815E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9747326	0.9856770	0.9864773	0.9938818	1.0000000	3.940E+02	5.726E+00
α_2	9.10E-04	5.05E-03	4.25E-03	1.19E-02	0.00E+00	2.018E+00	3.977E+02
α_3	3.59E-04	3.48E-03	2.69E-03	9.28E-03	0.00E+00	1.391E+00	3.984E+02
α_4	1.58E-04	2.66E-03	1.89E-03	7.78E-03	0.00E+00	1.062E+00	3.987E+02
α_5	3.10E-05	1.76E-03	1.03E-03	5.97E-03	0.00E+00	7.026E-01	3.990E+02
α_6	3.44E-07	8.75E-04	2.69E-04	3.80E-03	0.00E+00	3.497E-01	3.994E+02
α_7	1.32E-15	2.70E-04	2.48E-06	1.56E-03	0.00E+00	1.078E-01	3.996E+02
α_8	2.76E-17	2.37E-04	1.00E-06	1.38E-03	0.00E+00	9.469E-02	3.997E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.82E-01	9.80E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.74E-02	1.35E-02	1.30E-02	9.70E-03	7.30E-03	5.88E-03	5.05E-03
α_3		4.39E-03	4.17E-03	5.29E-03	5.18E-03	4.27E-03	3.48E-03
α_4			2.40E-03	1.93E-03	2.56E-03	2.84E-03	2.66E-03
α_5				3.87E-04	9.49E-04	1.48E-03	1.76E-03
α_6					4.71E-04	5.02E-04	8.75E-04
α_7						9.12E-05	2.70E-04
α_8							2.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.82E-01	9.80E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.74E-02	1.79E-02	1.96E-02	1.73E-02	1.65E-02	1.51E-02	1.43E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8020880	0.9522928	0.9823454	0.9999620	7.587E+00	3.801E-01	--
α_2	3.80E-05	4.77E-02	1.77E-02	1.98E-01	3.801E-01	7.587E+00	0.806

CCCG = 3, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8483662	0.9487261	0.9637856	0.9975022	1.776E+01	9.600E-01	--
α_2	5.86E-04	3.84E-02	2.26E-02	1.30E-01	6.673E-01	1.669E+01	0.839
α_3	1.12E-06	1.28E-02	3.09E-03	5.91E-02	2.927E-01	2.251E+01	0.639

CCCG = 4, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8595315	0.9425762	0.9524728	0.9916865	2.740E+01	1.669E+00	--
α_2	2.17E-03	3.72E-02	2.68E-02	1.08E-01	1.039E+00	2.692E+01	0.848
α_3	1.12E-05	1.29E-02	4.61E-03	5.38E-02	3.887E-01	2.977E+01	0.786
α_4	8.53E-08	7.38E-03	1.22E-03	3.61E-02	2.414E-01	3.248E+01	0.724

CCCG = 5, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9009890	0.9498564	0.9541225	0.9841287	6.605E+01	3.487E+00	--
α_2	4.24E-03	2.71E-02	2.25E-02	6.58E-02	1.791E+00	6.430E+01	0.895
α_3	1.29E-03	1.61E-02	1.21E-02	4.49E-02	1.207E+00	7.361E+01	0.790
α_4	1.05E-05	5.92E-03	2.37E-03	2.39E-02	4.340E-01	7.286E+01	0.807
α_5	2.20E-26	9.89E-04	3.53E-08	5.46E-03	5.493E-02	5.547E+01	1.065

CCCG = 6, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9111081	0.9536802	0.9572322	0.9841045	8.039E+01	3.905E+00	--
α_2	1.78E-03	1.84E-02	1.42E-02	4.93E-02	1.335E+00	7.133E+01	1.012
α_3	1.98E-03	1.61E-02	1.29E-02	4.14E-02	1.531E+00	9.341E+01	0.775
α_4	1.50E-04	7.76E-03	4.62E-03	2.61E-02	7.191E-01	9.195E+01	0.794
α_5	4.20E-08	2.87E-03	4.91E-04	1.39E-02	2.467E-01	8.580E+01	0.855
α_6	1.32E-20	1.20E-03	7.22E-07	6.95E-03	7.279E-02	6.079E+01	1.209

CCCG = 7, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9270244	0.9582070	0.9604044	0.9818812	1.323E+02	5.770E+00	--
α_2	1.74E-03	1.40E-02	1.12E-02	3.58E-02	1.549E+00	1.094E+02	1.102
α_3	2.30E-03	1.29E-02	1.09E-02	3.05E-02	1.989E+00	1.520E+02	0.793
α_4	7.70E-04	8.56E-03	6.50E-03	2.34E-02	1.287E+00	1.491E+02	0.813
α_5	7.67E-05	4.60E-03	2.67E-03	1.57E-02	6.913E-01	1.496E+02	0.813
α_6	1.15E-08	1.55E-03	2.34E-04	7.68E-03	2.327E-01	1.497E+02	0.815
α_7	1.37E-64	2.02E-04	3.06E-17	5.09E-04	2.112E-02	1.045E+02	1.168

CCCG = 8, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9353413	0.9613475	0.9630321	0.9815996	1.745E+02	7.016E+00	--
α_2	1.47E-03	1.14E-02	9.15E-03	2.90E-02	1.583E+00	1.373E+02	1.174
α_3	1.80E-03	1.02E-02	8.54E-03	2.40E-02	1.986E+00	1.935E+02	0.834
α_4	1.13E-03	8.05E-03	6.53E-03	2.02E-02	1.672E+00	2.060E+02	0.785
α_5	2.78E-04	5.25E-03	3.67E-03	1.56E-02	1.011E+00	1.915E+02	0.847
α_6	2.13E-05	2.81E-03	1.43E-03	1.03E-02	5.709E-01	2.022E+02	0.804
α_7	1.92E-10	8.38E-04	6.56E-05	4.43E-03	1.809E-01	2.156E+02	0.756
α_8	2.06E-107	1.42E-04	4.32E-27	1.07E-04	1.245E-02	8.750E+01	1.863

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.52E-01	9.49E-01	9.43E-01	9.50E-01	9.54E-01	9.58E-01	9.61E-01
α_2	4.77E-02	3.84E-02	3.72E-02	2.71E-02	1.84E-02	1.40E-02	1.14E-02
α_3		1.28E-02	1.29E-02	1.61E-02	1.61E-02	1.29E-02	1.02E-02
α_4			7.38E-03	5.92E-03	7.76E-03	8.56E-03	8.05E-03
α_5				9.89E-04	2.87E-03	4.60E-03	5.25E-03
α_6					1.20E-03	1.55E-03	2.81E-03
α_7						2.02E-04	8.38E-04
α_8							1.42E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.52E-01	9.49E-01	9.43E-01	9.50E-01	9.54E-01	9.58E-01	9.61E-01
Beta	4.77E-02	5.13E-02	5.74E-02	5.01E-02	4.63E-02	4.18E-02	3.87E-02
Gamma		2.50E-01	3.53E-01	4.60E-01	6.03E-01	6.66E-01	7.05E-01
Delta			3.64E-01	3.00E-01	4.23E-01	5.36E-01	6.27E-01
Epsilon				1.43E-01	3.44E-01	4.26E-01	5.29E-01
Mu					2.94E-01	2.76E-01	4.19E-01
Omega						1.15E-01	2.58E-01
Sigma							1.45E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9420979	0.9851550	0.9934824	0.9999571	3.123E+01	4.706E-01	--
α_2	4.29E-05	1.48E-02	6.52E-03	5.79E-02	4.706E-01	3.123E+01	0.806

CCCG = 3, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9606996	0.9863298	0.9900905	0.9991049	7.955E+01	1.103E+00	--
α_2	3.09E-04	1.07E-02	6.83E-03	3.44E-02	8.104E-01	7.474E+01	0.839
α_3	2.47E-07	2.94E-03	6.91E-04	1.36E-02	2.921E-01	9.894E+01	0.639

CCCG = 4, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9670581	0.9861321	0.9883596	0.9975875	1.388E+02	1.953E+00	--
α_2	8.98E-04	9.62E-03	7.35E-03	2.61E-02	1.312E+00	1.350E+02	0.848
α_3	4.92E-06	2.93E-03	1.16E-03	1.18E-02	4.307E-01	1.466E+02	0.786
α_4	2.62E-09	1.32E-03	1.55E-04	6.70E-03	2.099E-01	1.593E+02	0.724

CCCG = 5, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740533	0.9874522	0.9887396	0.9964512	2.445E+02	3.107E+00	--
α_2	1.00E-03	7.10E-03	5.77E-03	1.77E-02	1.684E+00	2.357E+02	0.895
α_3	1.55E-04	3.51E-03	2.38E-03	1.07E-02	9.426E-01	2.678E+02	0.790
α_4	1.09E-06	1.45E-03	4.98E-04	6.12E-03	3.816E-01	2.628E+02	0.807
α_5	1.98E-16	4.95E-04	2.71E-06	2.88E-03	9.865E-02	1.993E+02	1.065

CCCG = 6, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9760540	0.9877426	0.9887695	0.9959228	3.080E+02	3.822E+00	--
α_2	8.95E-04	6.18E-03	5.04E-03	1.54E-02	1.714E+00	2.757E+02	1.012
α_3	2.00E-04	3.06E-03	2.21E-03	8.82E-03	1.108E+00	3.614E+02	0.775
α_4	2.43E-05	1.84E-03	1.03E-03	6.42E-03	6.509E-01	3.532E+02	0.794
α_5	1.53E-08	7.72E-04	1.39E-04	3.72E-03	2.536E-01	3.283E+02	0.855
α_6	6.68E-17	4.12E-04	1.87E-06	2.40E-03	9.572E-02	2.323E+02	1.209

CCCG = 7, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9788038	0.9882694	0.9889964	0.9952523	4.377E+02	5.195E+00	--
α_2	1.07E-03	5.64E-03	4.78E-03	1.31E-02	2.105E+00	3.712E+02	1.102
α_3	2.39E-04	2.55E-03	1.94E-03	6.92E-03	1.320E+00	5.171E+02	0.793
α_4	1.00E-04	1.97E-03	1.37E-03	5.90E-03	9.967E-01	5.050E+02	0.813
α_5	5.24E-06	1.04E-03	4.93E-04	3.91E-03	5.249E-01	5.055E+02	0.813
α_6	2.88E-10	3.88E-04	3.79E-05	2.01E-03	1.956E-01	5.043E+02	0.815
α_7	4.29E-28	1.50E-04	3.41E-09	8.16E-04	5.291E-02	3.519E+02	1.168

CCCG = 8, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794713	0.9883212	0.9889668	0.9949663	4.935E+02	5.832E+00	--
α_2	1.10E-03	5.42E-03	4.64E-03	1.24E-02	2.229E+00	4.091E+02	1.174
α_3	1.87E-04	2.18E-03	1.64E-03	6.01E-03	1.260E+00	5.777E+02	0.834
α_4	9.62E-05	1.69E-03	1.19E-03	5.00E-03	1.042E+00	6.140E+02	0.785
α_5	3.14E-05	1.34E-03	8.19E-04	4.41E-03	7.626E-01	5.692E+02	0.847
α_6	1.25E-07	5.45E-04	1.52E-04	2.42E-03	3.271E-01	6.003E+02	0.804
α_7	2.04E-13	2.10E-04	5.64E-06	1.18E-03	1.344E-01	6.387E+02	0.756
α_8	2.67E-20	2.96E-04	2.78E-07	1.72E-03	7.682E-02	2.591E+02	1.863

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.86E-01	9.86E-01	9.87E-01	9.88E-01	9.88E-01	9.88E-01
α_2	1.48E-02	1.07E-02	9.62E-03	7.10E-03	6.18E-03	5.64E-03	5.42E-03
α_3		2.94E-03	2.93E-03	3.51E-03	3.06E-03	2.55E-03	2.18E-03
α_4			1.32E-03	1.45E-03	1.84E-03	1.97E-03	1.69E-03
α_5				4.95E-04	7.72E-04	1.04E-03	1.34E-03
α_6					4.12E-04	3.88E-04	5.45E-04
α_7						1.50E-04	2.10E-04
α_8							2.96E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.86E-01	9.86E-01	9.87E-01	9.88E-01	9.88E-01	9.88E-01
Beta	1.48E-02	1.37E-02	1.39E-02	1.25E-02	1.23E-02	1.17E-02	1.17E-02
Gamma		2.15E-01	3.06E-01	4.35E-01	4.96E-01	5.19E-01	5.36E-01
Delta			3.10E-01	3.57E-01	4.97E-01	5.82E-01	6.52E-01
Epsilon				2.54E-01	3.92E-01	4.44E-01	5.85E-01
Mu					3.48E-01	3.42E-01	4.40E-01
Omega						2.79E-01	4.82E-01
Sigma							5.85E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9861904	0.9964172	0.9983824	0.9999868	1.372E+02	4.932E-01	--
α_2	1.32E-05	3.58E-03	1.62E-03	1.38E-02	4.932E-01	1.372E+02	0.806

CCCG = 3, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9903937	0.9967220	0.9976722	0.9998060	3.222E+02	1.059E+00	--
α_2	4.48E-05	2.39E-03	1.41E-03	8.08E-03	7.137E-01	2.973E+02	0.839
α_3	3.17E-07	8.83E-04	2.67E-04	3.86E-03	3.458E-01	3.911E+02	0.639

CCCG = 4, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9916877	0.9964282	0.9969693	0.9993189	5.899E+02	2.115E+00	--
α_2	3.34E-04	2.70E-03	2.15E-03	6.94E-03	1.549E+00	5.728E+02	0.848
α_3	1.33E-08	4.27E-04	8.35E-05	2.03E-03	2.646E-01	6.193E+02	0.786
α_4	4.95E-08	4.48E-04	1.10E-04	2.05E-03	3.010E-01	6.719E+02	0.724

CCCG = 5, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941017	0.9967248	0.9969261	0.9986604	1.620E+03	5.325E+00	--
α_2	7.37E-04	2.31E-03	2.10E-03	4.60E-03	3.632E+00	1.567E+03	0.895
α_3	7.48E-05	7.61E-04	5.84E-04	2.05E-03	1.354E+00	1.777E+03	0.790
α_4	1.61E-08	1.70E-04	4.06E-05	7.81E-04	2.961E-01	1.742E+03	0.807
α_5	9.57E-35	3.21E-05	3.54E-11	1.59E-04	4.243E-02	1.320E+03	1.065

CCCG = 6, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9933564	0.9963785	0.9966183	0.9985818	1.358E+03	4.936E+00	--
α_2	6.18E-04	2.32E-03	2.07E-03	4.91E-03	2.915E+00	1.251E+03	1.012
α_3	6.54E-05	7.67E-04	5.76E-04	2.12E-03	1.257E+00	1.637E+03	0.775
α_4	1.28E-06	3.15E-04	1.44E-04	1.21E-03	5.031E-01	1.599E+03	0.794
α_5	2.25E-15	7.78E-05	1.03E-06	4.46E-04	1.155E-01	1.485E+03	0.855
α_6	6.46E-13	1.38E-04	5.06E-06	7.65E-04	1.451E-01	1.050E+03	1.209

CCCG = 7, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9946831	0.9966352	0.9967499	0.9981959	2.860E+03	9.654E+00	--
α_2	7.57E-04	1.95E-03	1.82E-03	3.60E-03	4.851E+00	2.477E+03	1.102
α_3	2.08E-04	8.12E-04	7.18E-04	1.74E-03	2.800E+00	3.444E+03	0.793
α_4	4.20E-05	4.11E-04	3.18E-04	1.10E-03	1.384E+00	3.363E+03	0.813
α_5	5.16E-07	1.46E-04	6.51E-05	5.64E-04	4.902E-01	3.363E+03	0.813
α_6	8.13E-16	3.42E-05	4.33E-07	1.96E-04	1.146E-01	3.354E+03	0.815
α_7	3.29E-93	6.26E-06	6.66E-25	7.43E-06	1.464E-02	2.340E+03	1.168

CCCG = 8, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941447	0.9965196	0.9966794	0.9983490	2.047E+03	7.148E+00	--
α_2	4.58E-04	1.69E-03	1.51E-03	3.55E-03	2.980E+00	1.761E+03	1.174
α_3	1.37E-04	7.89E-04	6.60E-04	1.88E-03	1.960E+00	2.481E+03	0.834
α_4	3.23E-05	4.42E-04	3.24E-04	1.25E-03	1.166E+00	2.637E+03	0.785
α_5	1.25E-06	2.20E-04	1.06E-04	8.23E-04	5.375E-01	2.444E+03	0.847
α_6	1.55E-11	7.01E-05	5.44E-06	3.71E-04	1.805E-01	2.575E+03	0.804
α_7	7.81E-36	1.51E-05	1.13E-11	7.39E-05	4.139E-02	2.740E+03	0.756
α_8	1.55E-08	2.54E-04	5.61E-05	1.19E-03	2.827E-01	1.111E+03	1.863

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01
α_2	3.58E-03	2.39E-03	2.70E-03	2.31E-03	2.32E-03	1.95E-03	1.69E-03
α_3		8.83E-04	4.27E-04	7.61E-04	7.67E-04	8.12E-04	7.89E-04
α_4			4.48E-04	1.70E-04	3.15E-04	4.11E-04	4.42E-04
α_5				3.21E-05	7.78E-05	1.46E-04	2.20E-04
α_6					1.38E-04	3.42E-05	7.01E-05
α_7						6.26E-06	1.51E-05
α_8							2.54E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01
Beta	3.58E-03	3.28E-03	3.57E-03	3.28E-03	3.62E-03	3.36E-03	3.48E-03
Gamma		2.69E-01	2.45E-01	2.94E-01	3.58E-01	4.19E-01	5.15E-01
Delta			5.12E-01	2.10E-01	4.09E-01	4.24E-01	5.59E-01
Epsilon				1.59E-01	4.07E-01	3.12E-01	5.59E-01
Mu					6.40E-01	2.17E-01	6.07E-01
Omega						1.55E-01	7.94E-01
Sigma							9.44E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.4.3 PWR-RCS-MOV-OO: Pressurizer PORV Block Motor-Operated Valves Fail to Close

Generic CCF Parameters

Plant Type: PWR
 System Group: Clean Water
 System: Reactor Coolant
 Component Group: Valve
 Component Type: Motor Operated Valve
 Failure Mode: Fail to Close
 Date Range: 2006 through 2020
 Prior: Default 2015

Total Number of Independent Failure Events: 5.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9344075	0.9831957	0.9926358	0.9999492	1.0000000	2.741E+01	4.685E-01
α_2	4.76E-05	1.68E-02	7.37E-03	6.56E-02	0.00E+00	4.685E-01	2.741E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9499123	0.9824038	0.9871113	0.9987856	1.0000000	6.298E+01	1.128E+00
α_2	4.46E-04	1.33E-02	8.67E-03	4.18E-02	0.00E+00	8.512E-01	6.326E+01
α_3	2.16E-07	4.32E-03	9.26E-04	2.03E-02	0.00E+00	2.768E-01	6.383E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9535624	0.9805921	0.9837738	0.9967462	1.0000000	9.568E+01	1.894E+00
α_2	1.12E-03	1.29E-02	9.77E-03	3.55E-02	0.00E+00	1.260E+00	9.631E+01
α_3	4.49E-06	4.12E-03	1.52E-03	1.71E-02	0.00E+00	4.024E-01	9.717E+01
α_4	1.65E-08	2.37E-03	3.54E-04	1.17E-02	0.00E+00	2.315E-01	9.734E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9654219	0.9827764	0.9843634	0.9947051	1.0000000	1.958E+02	3.432E+00
α_2	1.64E-03	9.66E-03	8.07E-03	2.31E-02	0.00E+00	1.924E+00	1.973E+02
α_3	3.05E-04	5.26E-03	3.73E-03	1.55E-02	0.00E+00	1.049E+00	1.982E+02
α_4	1.46E-06	1.92E-03	6.61E-04	8.09E-03	0.00E+00	3.822E-01	1.989E+02
α_5	3.35E-20	3.85E-04	3.59E-07	2.24E-03	0.00E+00	7.674E-02	1.992E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9680677	0.9836153	0.9849709	0.9945233	1.0000000	2.302E+02	3.835E+00
α_2	1.04E-03	7.27E-03	5.92E-03	1.81E-02	0.00E+00	1.701E+00	2.324E+02

α_3	4.07E-04	5.16E-03	3.83E-03	1.44E-02	0.00E+00	1.207E+00	2.328E+02
α_4	2.33E-05	2.55E-03	1.34E-03	9.17E-03	0.00E+00	5.960E-01	2.335E+02
α_5	3.70E-09	9.45E-04	1.26E-04	4.74E-03	0.00E+00	2.211E-01	2.338E+02
α_6	3.69E-15	4.69E-04	4.75E-06	2.71E-03	0.00E+00	1.098E-01	2.339E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9735302	0.9849761	0.9858111	0.9935639	1.0000000	3.768E+02	5.747E+00
α_2	1.20E-03	5.86E-03	5.03E-03	1.34E-02	0.00E+00	2.243E+00	3.803E+02
α_3	5.72E-04	4.26E-03	3.43E-03	1.08E-02	0.00E+00	1.630E+00	3.809E+02
α_4	1.76E-04	2.83E-03	2.03E-03	8.23E-03	0.00E+00	1.083E+00	3.815E+02
α_5	1.07E-05	1.48E-03	7.45E-04	5.43E-03	0.00E+00	5.654E-01	3.820E+02
α_6	2.75E-10	5.01E-04	4.63E-05	2.61E-03	0.00E+00	1.916E-01	3.824E+02
α_7	6.23E-41	9.10E-05	3.38E-12	3.99E-04	0.00E+00	3.480E-02	3.825E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9747953	0.9857127	0.9865111	0.9938970	1.0000000	3.950E+02	5.726E+00
α_2	9.08E-04	5.04E-03	4.24E-03	1.19E-02	0.00E+00	2.018E+00	3.987E+02
α_3	3.58E-04	3.47E-03	2.69E-03	9.26E-03	0.00E+00	1.391E+00	3.994E+02
α_4	1.58E-04	2.65E-03	1.88E-03	7.76E-03	0.00E+00	1.062E+00	3.997E+02
α_5	3.09E-05	1.75E-03	1.02E-03	5.95E-03	0.00E+00	7.026E-01	4.000E+02
α_6	3.43E-07	8.73E-04	2.68E-04	3.80E-03	0.00E+00	3.497E-01	4.004E+02
α_7	1.32E-15	2.69E-04	2.47E-06	1.55E-03	0.00E+00	1.078E-01	4.006E+02
α_8	2.75E-17	2.36E-04	1.00E-06	1.38E-03	0.00E+00	9.469E-02	4.007E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.68E-02	1.33E-02	1.29E-02	9.66E-03	7.27E-03	5.86E-03	5.04E-03
α_3		4.32E-03	4.12E-03	5.26E-03	5.16E-03	4.26E-03	3.47E-03
α_4			2.37E-03	1.92E-03	2.55E-03	2.83E-03	2.65E-03
α_5				3.85E-04	9.45E-04	1.48E-03	1.75E-03
α_6					4.69E-04	5.01E-04	8.73E-04
α_7						9.10E-05	2.69E-04
α_8							2.36E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.68E-02	1.76E-02	1.94E-02	1.72E-02	1.64E-02	1.50E-02	1.43E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.00	5.00	5.00	5.00	5.00	5.00	5.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9442724	0.9855768	0.9935131	0.9999516	3.303E+01	4.834E-01	--
α_2	4.84E-05	1.44E-02	6.49E-03	5.57E-02	4.834E-01	3.303E+01	1.382

CCCG = 3, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9605001	0.9857428	0.9892975	0.9988301	8.474E+01	1.226E+00	--
α_2	5.58E-04	1.14E-02	7.90E-03	3.43E-02	9.769E-01	8.461E+01	1.553
α_3	4.56E-08	2.84E-03	4.95E-04	1.38E-02	2.487E-01	8.722E+01	1.520

CCCG = 4, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9583286	0.9821359	0.9848456	0.9966745	1.131E+02	2.057E+00	--
α_2	1.35E-03	1.21E-02	9.54E-03	3.19E-02	1.442E+00	1.173E+02	1.566
α_3	4.64E-06	3.69E-03	1.39E-03	1.52E-02	4.114E-01	1.110E+02	1.669
α_4	2.67E-09	2.03E-03	2.22E-04	1.04E-02	2.036E-01	1.003E+02	1.850

CCCG = 5, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9673260	0.9834147	0.9848439	0.9946195	2.184E+02	3.683E+00	--
α_2	2.01E-03	9.82E-03	8.43E-03	2.24E-02	2.243E+00	2.263E+02	1.559
α_3	2.40E-04	4.77E-03	3.30E-03	1.43E-02	9.912E-01	2.070E+02	1.713
α_4	1.17E-06	1.72E-03	5.81E-04	7.28E-03	3.765E-01	2.189E+02	1.625
α_5	2.49E-21	2.87E-04	1.64E-07	1.66E-03	7.237E-02	2.518E+02	1.414

CCCG = 6, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9690956	0.9838234	0.9850671	0.9943018	2.517E+02	4.139E+00	--
α_2	1.47E-03	7.63E-03	6.49E-03	1.77E-02	2.128E+00	2.767E+02	1.458
α_3	3.45E-04	4.99E-03	3.63E-03	1.43E-02	1.134E+00	2.263E+02	1.787
α_4	1.47E-05	2.24E-03	1.11E-03	8.29E-03	5.533E-01	2.464E+02	1.646
α_5	3.36E-09	8.62E-04	1.15E-04	4.33E-03	2.210E-01	2.560E+02	1.586
α_6	5.82E-16	4.56E-04	3.18E-06	2.65E-03	1.027E-01	2.250E+02	1.806

CCCG = 7, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9746499	0.9852360	0.9859722	0.9933078	4.292E+02	6.432E+00	--
α_2	1.55E-03	5.97E-03	5.29E-03	1.27E-02	2.840E+00	4.728E+02	1.450
α_3	6.41E-04	4.32E-03	3.53E-03	1.07E-02	1.746E+00	4.027E+02	1.705
α_4	1.64E-04	2.62E-03	1.88E-03	7.62E-03	1.084E+00	4.124E+02	1.668
α_5	7.65E-06	1.34E-03	6.52E-04	5.03E-03	5.376E-01	3.994E+02	1.724
α_6	4.04E-10	4.59E-04	4.64E-05	2.37E-03	1.979E-01	4.307E+02	1.600
α_7	1.16E-52	5.17E-05	5.18E-15	1.77E-04	2.656E-02	5.141E+02	1.341

CCCG = 8, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9757025	0.9860160	0.9867506	0.9938208	4.310E+02	6.112E+00	--
α_2	1.07E-03	4.93E-03	4.26E-03	1.11E-02	2.364E+00	4.771E+02	1.437
α_3	4.30E-04	3.61E-03	2.86E-03	9.36E-03	1.512E+00	4.174E+02	1.645
α_4	1.50E-04	2.56E-03	1.81E-03	7.51E-03	1.056E+00	4.117E+02	1.670
α_5	2.42E-05	1.60E-03	9.10E-04	5.51E-03	6.745E-01	4.215E+02	1.632
α_6	1.12E-07	8.35E-04	2.12E-04	3.79E-03	3.076E-01	3.681E+02	1.871
α_7	1.67E-15	2.39E-04	2.36E-06	1.38E-03	1.093E-01	4.572E+02	1.507
α_8	3.30E-18	2.14E-04	5.94E-07	1.25E-03	8.885E-02	4.153E+02	1.659

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.86E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.44E-02	1.14E-02	1.21E-02	9.82E-03	7.63E-03	5.97E-03	4.93E-03
α_3		2.84E-03	3.69E-03	4.77E-03	4.99E-03	4.32E-03	3.61E-03
α_4			2.03E-03	1.72E-03	2.24E-03	2.62E-03	2.56E-03
α_5				2.87E-04	8.62E-04	1.34E-03	1.60E-03
α_6					4.56E-04	4.59E-04	8.35E-04
α_7						5.17E-05	2.39E-04
α_8							2.14E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.86E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.44E-02	1.43E-02	1.79E-02	1.66E-02	1.62E-02	1.48E-02	1.40E-02
Gamma		1.99E-01	3.20E-01	4.08E-01	5.28E-01	5.96E-01	6.47E-01
Delta			3.54E-01	2.96E-01	4.17E-01	5.09E-01	6.01E-01
Epsilon				1.43E-01	3.71E-01	4.14E-01	5.30E-01
Mu					3.46E-01	2.75E-01	4.46E-01
Omega						1.01E-01	3.52E-01
Sigma							4.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9049074	0.9755111	0.9891046	0.9999281	1.875E+01	4.706E-01	--
α_2	7.19E-05	2.45E-02	1.09E-02	9.51E-02	4.706E-01	1.875E+01	1.382

CCCG = 3, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9244544	0.9735482	0.9806777	0.9982472	4.058E+01	1.103E+00	--
α_2	5.70E-04	1.96E-02	1.25E-02	6.25E-02	8.104E-01	4.063E+01	1.553
α_3	5.85E-07	6.90E-03	1.63E-03	3.18E-02	2.921E-01	4.206E+01	1.520

CCCG = 4, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9359381	0.9728692	0.9771241	0.9952375	7.002E+01	1.953E+00	--
α_2	1.66E-03	1.76E-02	1.35E-02	4.76E-02	1.312E+00	7.309E+01	1.566
α_3	1.04E-05	6.17E-03	2.45E-03	2.49E-02	4.307E-01	6.942E+01	1.669
α_4	6.67E-09	3.33E-03	3.95E-04	1.70E-02	2.099E-01	6.278E+01	1.850

CCCG = 5, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9517347	0.9765609	0.9789166	0.9933328	1.294E+02	3.107E+00	--
α_2	1.75E-03	1.23E-02	1.00E-02	3.07E-02	1.684E+00	1.351E+02	1.559
α_3	3.36E-04	7.57E-03	5.15E-03	2.31E-02	9.426E-01	1.236E+02	1.713
α_4	2.19E-06	2.91E-03	1.00E-03	1.23E-02	3.816E-01	1.309E+02	1.625
α_5	2.62E-16	6.54E-04	3.59E-06	3.81E-03	9.865E-02	1.507E+02	1.414

CCCG = 6, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577022	0.9782758	0.9800629	0.9927416	1.721E+02	3.822E+00	--
α_2	1.29E-03	8.86E-03	7.24E-03	2.20E-02	1.714E+00	1.917E+02	1.458
α_3	4.62E-04	7.02E-03	5.08E-03	2.02E-02	1.108E+00	1.567E+02	1.787
α_4	5.03E-05	3.80E-03	2.12E-03	1.33E-02	6.509E-01	1.707E+02	1.646
α_5	2.83E-08	1.43E-03	2.57E-04	6.88E-03	2.536E-01	1.775E+02	1.586
α_6	9.95E-17	6.13E-04	2.79E-06	3.57E-03	9.572E-02	1.560E+02	1.806

CCCG = 7, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9639168	0.9799784	0.9811992	0.9918698	2.543E+02	5.195E+00	--
α_2	1.41E-03	7.40E-03	6.28E-03	1.72E-02	2.105E+00	2.823E+02	1.450
α_3	5.14E-04	5.46E-03	4.17E-03	1.48E-02	1.320E+00	2.405E+02	1.705
α_4	2.06E-04	4.03E-03	2.80E-03	1.21E-02	9.967E-01	2.462E+02	1.668
α_5	1.11E-05	2.20E-03	1.04E-03	8.28E-03	5.249E-01	2.385E+02	1.724
α_6	5.65E-10	7.59E-04	7.43E-05	3.94E-03	1.956E-01	2.574E+02	1.600
α_7	4.91E-28	1.72E-04	3.90E-09	9.34E-04	5.291E-02	3.073E+02	1.341

CCCG = 8, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9666282	0.9809728	0.9820096	0.9917765	3.007E+02	5.832E+00	--
α_2	1.35E-03	6.62E-03	5.68E-03	1.51E-02	2.229E+00	3.343E+02	1.437
α_3	3.68E-04	4.29E-03	3.23E-03	1.18E-02	1.260E+00	2.927E+02	1.645
α_4	2.05E-04	3.60E-03	2.54E-03	1.06E-02	1.042E+00	2.887E+02	1.670
α_5	6.05E-05	2.57E-03	1.58E-03	8.48E-03	7.626E-01	2.956E+02	1.632
α_6	2.90E-07	1.27E-03	3.54E-04	5.63E-03	3.271E-01	2.582E+02	1.871
α_7	4.06E-13	4.19E-04	1.12E-05	2.35E-03	1.344E-01	3.209E+02	1.507
α_8	2.38E-20	2.63E-04	2.47E-07	1.53E-03	7.682E-02	2.915E+02	1.659

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.76E-01	9.74E-01	9.73E-01	9.77E-01	9.78E-01	9.80E-01	9.81E-01
α_2	2.45E-02	1.96E-02	1.76E-02	1.23E-02	8.86E-03	7.40E-03	6.62E-03
α_3		6.90E-03	6.17E-03	7.57E-03	7.02E-03	5.46E-03	4.29E-03
α_4			3.33E-03	2.91E-03	3.80E-03	4.03E-03	3.60E-03
α_5				6.54E-04	1.43E-03	2.20E-03	2.57E-03
α_6					6.13E-04	7.59E-04	1.27E-03
α_7						1.72E-04	4.19E-04
α_8							2.63E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.76E-01	9.74E-01	9.73E-01	9.77E-01	9.78E-01	9.80E-01	9.81E-01
Beta	2.45E-02	2.65E-02	2.71E-02	2.34E-02	2.17E-02	2.00E-02	1.90E-02
Gamma		2.61E-01	3.50E-01	4.75E-01	5.92E-01	6.30E-01	6.52E-01
Delta			3.51E-01	3.20E-01	4.54E-01	5.67E-01	6.54E-01
Epsilon				1.84E-01	3.49E-01	4.37E-01	5.57E-01
Mu					3.01E-01	2.98E-01	4.31E-01
Omega						1.85E-01	3.50E-01
Sigma							3.86E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9761394	0.9938026	0.9971925	0.9999771	7.909E+01	4.932E-01	--
α_2	2.29E-05	6.20E-03	2.81E-03	2.39E-02	4.932E-01	7.909E+01	1.382

CCCG = 3, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9807985	0.9934370	0.9953299	0.9996104	1.604E+02	1.059E+00	--
α_2	8.34E-05	4.45E-03	2.63E-03	1.50E-02	7.137E-01	1.596E+02	1.553
α_3	7.60E-07	2.11E-03	6.39E-04	9.21E-03	3.458E-01	1.635E+02	1.520

CCCG = 4, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9836190	0.9929503	0.9940119	0.9986528	2.978E+02	2.115E+00	--
α_2	6.20E-04	4.99E-03	3.98E-03	1.28E-02	1.549E+00	3.086E+02	1.566
α_3	2.84E-08	9.09E-04	1.78E-04	4.32E-03	2.646E-01	2.909E+02	1.669
α_4	1.27E-07	1.15E-03	2.82E-04	5.24E-03	3.010E-01	2.623E+02	1.850

CCCG = 5, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9890795	0.9939308	0.9943019	0.9975149	8.720E+02	5.325E+00	--
α_2	1.29E-03	4.03E-03	3.67E-03	8.01E-03	3.632E+00	8.971E+02	1.559
α_3	1.62E-04	1.65E-03	1.27E-03	4.45E-03	1.354E+00	8.185E+02	1.713
α_4	3.25E-08	3.43E-04	8.18E-05	1.57E-03	2.961E-01	8.639E+02	1.625
α_5	1.27E-34	4.27E-05	4.71E-11	2.12E-04	4.243E-02	9.928E+02	1.414

CCCG = 6, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9887782	0.9938780	0.9942814	0.9976001	8.013E+02	4.936E+00	--
α_2	8.91E-04	3.35E-03	2.98E-03	7.08E-03	2.915E+00	8.675E+02	1.458
α_3	1.51E-04	1.77E-03	1.33E-03	4.89E-03	1.257E+00	7.089E+02	1.787
α_4	2.65E-06	6.52E-04	2.99E-04	2.50E-03	5.031E-01	7.706E+02	1.646
α_5	4.18E-15	1.44E-04	1.91E-06	8.28E-04	1.155E-01	7.999E+02	1.586
α_6	9.66E-13	2.06E-04	7.56E-06	1.14E-03	1.451E-01	7.026E+02	1.806

CCCG = 7, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9912375	0.9944518	0.9946400	0.9970234	1.730E+03	9.654E+00	--
α_2	9.97E-04	2.57E-03	2.40E-03	4.74E-03	4.851E+00	1.880E+03	1.450
α_3	4.48E-04	1.75E-03	1.54E-03	3.74E-03	2.800E+00	1.600E+03	1.705
α_4	8.63E-05	8.45E-04	6.52E-04	2.26E-03	1.384E+00	1.637E+03	1.668
α_5	1.09E-06	3.09E-04	1.38E-04	1.20E-03	4.902E-01	1.584E+03	1.724
α_6	1.60E-15	6.71E-05	8.50E-07	3.85E-04	1.146E-01	1.708E+03	1.600
α_7	3.78E-93	7.19E-06	7.65E-25	8.54E-06	1.464E-02	2.037E+03	1.341

CCCG = 8, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9908967	0.9945861	0.9948338	0.9974301	1.313E+03	7.148E+00	--
α_2	5.62E-04	2.07E-03	1.84E-03	4.35E-03	2.980E+00	1.436E+03	1.437
α_3	2.70E-04	1.56E-03	1.30E-03	3.72E-03	1.960E+00	1.256E+03	1.645
α_4	6.88E-05	9.41E-04	6.90E-04	2.67E-03	1.166E+00	1.238E+03	1.670
α_5	2.41E-06	4.24E-04	2.05E-04	1.59E-03	5.375E-01	1.267E+03	1.632
α_6	3.61E-11	1.63E-04	1.27E-05	8.63E-04	1.805E-01	1.106E+03	1.871
α_7	1.56E-35	3.01E-05	2.26E-11	1.47E-04	4.139E-02	1.373E+03	1.507
α_8	1.38E-08	2.27E-04	5.00E-05	1.06E-03	2.827E-01	1.247E+03	1.659

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.93E-01	9.93E-01	9.94E-01	9.94E-01	9.94E-01	9.95E-01
α_2	6.20E-03	4.45E-03	4.99E-03	4.03E-03	3.35E-03	2.57E-03	2.07E-03
α_3		2.11E-03	9.09E-04	1.65E-03	1.77E-03	1.75E-03	1.56E-03
α_4			1.15E-03	3.43E-04	6.52E-04	8.45E-04	9.41E-04
α_5				4.27E-05	1.44E-04	3.09E-04	4.24E-04
α_6					2.06E-04	6.71E-05	1.63E-04
α_7						7.19E-06	3.01E-05
α_8							2.27E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.93E-01	9.93E-01	9.94E-01	9.94E-01	9.94E-01	9.95E-01
Beta	6.20E-03	6.56E-03	7.05E-03	6.07E-03	6.12E-03	5.55E-03	5.41E-03
Gamma		3.22E-01	2.92E-01	3.36E-01	4.53E-01	5.36E-01	6.18E-01
Delta			5.58E-01	1.89E-01	3.62E-01	4.13E-01	5.34E-01
Epsilon				1.11E-01	3.50E-01	3.12E-01	4.73E-01
Mu					5.88E-01	1.94E-01	4.98E-01
Omega						9.67E-02	6.11E-01
Sigma							8.83E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.5 Auxiliary Feedwater Motor-Operated Valves

2.3.5.1 AFW-MOV-FTOC: AFW Motor-Operated Valves Fail to Open/Close

Generic CCF Parameters

System Group: Clean Water
System: Auxiliary Feedwater
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Close, Fail to Open, Fail to Open or Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 56.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9767335	0.9940679	0.9974409	0.9999818	1.0000000	7.851E+01	4.685E-01
α_2	1.65E-05	5.93E-03	2.56E-03	2.33E-02	0.00E+00	4.685E-01	7.851E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9720222	0.9902086	0.9928599	0.9993250	1.0000000	1.141E+02	1.128E+00
α_2	2.46E-04	7.39E-03	4.80E-03	2.34E-02	0.00E+00	8.512E-01	1.144E+02
α_3	1.20E-07	2.40E-03	5.13E-04	1.13E-02	0.00E+00	2.768E-01	1.149E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9694361	0.9872629	0.9893720	0.9978741	1.0000000	1.468E+02	1.894E+00
α_2	7.31E-04	8.47E-03	6.39E-03	2.33E-02	0.00E+00	1.260E+00	1.474E+02
α_3	2.94E-06	2.71E-03	9.93E-04	1.12E-02	0.00E+00	4.024E-01	1.483E+02
α_4	1.08E-08	1.56E-03	2.32E-04	7.71E-03	0.00E+00	2.315E-01	1.484E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9724448	0.9862917	0.9875671	0.9957884	1.0000000	2.469E+02	3.432E+00
α_2	1.31E-03	7.69E-03	6.42E-03	1.84E-02	0.00E+00	1.924E+00	2.484E+02
α_3	2.42E-04	4.19E-03	2.97E-03	1.23E-02	0.00E+00	1.049E+00	2.493E+02
α_4	1.16E-06	1.53E-03	5.26E-04	6.44E-03	0.00E+00	3.822E-01	2.500E+02
α_5	2.66E-20	3.07E-04	2.85E-07	1.78E-03	0.00E+00	7.674E-02	2.503E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9737589	0.9865514	0.9876744	0.9955109	1.0000000	2.813E+02	3.835E+00
α_2	8.55E-04	5.97E-03	4.86E-03	1.49E-02	0.00E+00	1.701E+00	2.835E+02

α_3	3.34E-04	4.23E-03	3.15E-03	1.18E-02	0.00E+00	1.207E+00	2.839E+02
α_4	1.91E-05	2.09E-03	1.10E-03	7.53E-03	0.00E+00	5.960E-01	2.846E+02
α_5	3.03E-09	7.75E-04	1.04E-04	3.89E-03	0.00E+00	2.211E-01	2.849E+02
α_6	3.03E-15	3.85E-04	3.90E-06	2.22E-03	0.00E+00	1.098E-01	2.850E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9766375	0.9867465	0.9874907	0.9943259	1.0000000	4.279E+02	5.747E+00
α_2	1.06E-03	5.17E-03	4.43E-03	1.18E-02	0.00E+00	2.243E+00	4.314E+02
α_3	5.04E-04	3.76E-03	3.03E-03	9.51E-03	0.00E+00	1.630E+00	4.320E+02
α_4	1.55E-04	2.50E-03	1.79E-03	7.27E-03	0.00E+00	1.083E+00	4.326E+02
α_5	9.42E-06	1.30E-03	6.57E-04	4.79E-03	0.00E+00	5.654E-01	4.331E+02
α_6	2.43E-10	4.42E-04	4.08E-05	2.30E-03	0.00E+00	1.916E-01	4.335E+02
α_7	5.50E-41	8.03E-05	2.98E-12	3.52E-04	0.00E+00	3.480E-02	4.336E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9776385	0.9873285	0.9880431	0.9945867	1.0000000	4.461E+02	5.726E+00
α_2	8.05E-04	4.47E-03	3.76E-03	1.05E-02	0.00E+00	2.018E+00	4.498E+02
α_3	3.18E-04	3.08E-03	2.38E-03	8.21E-03	0.00E+00	1.391E+00	4.505E+02
α_4	1.40E-04	2.35E-03	1.67E-03	6.89E-03	0.00E+00	1.062E+00	4.508E+02
α_5	2.74E-05	1.55E-03	9.08E-04	5.28E-03	0.00E+00	7.026E-01	4.511E+02
α_6	3.04E-07	7.74E-04	2.38E-04	3.37E-03	0.00E+00	3.497E-01	4.515E+02
α_7	1.17E-15	2.39E-04	2.19E-06	1.38E-03	0.00E+00	1.078E-01	4.517E+02
α_8	2.44E-17	2.10E-04	8.88E-07	1.22E-03	0.00E+00	9.469E-02	4.518E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.90E-01	9.87E-01	9.86E-01	9.87E-01	9.87E-01	9.87E-01
α_2	5.93E-03	7.39E-03	8.47E-03	7.69E-03	5.97E-03	5.17E-03	4.47E-03
α_3		2.40E-03	2.71E-03	4.19E-03	4.23E-03	3.76E-03	3.08E-03
α_4			1.56E-03	1.53E-03	2.09E-03	2.50E-03	2.35E-03
α_5				3.07E-04	7.75E-04	1.30E-03	1.55E-03
α_6					3.85E-04	4.42E-04	7.74E-04
α_7						8.03E-05	2.39E-04
α_8							2.10E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.90E-01	9.87E-01	9.86E-01	9.87E-01	9.87E-01	9.87E-01
Beta	5.93E-03	9.79E-03	1.27E-02	1.37E-02	1.34E-02	1.33E-02	1.27E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	56.10	56.10	56.10	56.10	56.10	56.10	56.10
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 22.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.401

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9859597	0.9963833	0.9983965	0.9999881	1.332E+02	4.834E-01	--
α_2	1.19E-05	3.62E-03	1.60E-03	1.40E-02	4.834E-01	1.332E+02	0.500

CCCG = 3, Gamma = 0.401

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9850761	0.9946371	0.9959934	0.9995633	2.273E+02	1.226E+00	--
α_2	2.08E-04	4.29E-03	2.95E-03	1.29E-02	9.769E-01	2.269E+02	0.673
α_3	1.72E-08	1.08E-03	1.86E-04	5.22E-03	2.487E-01	2.309E+02	0.664

CCCG = 4, Gamma = 0.401

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9822113	0.9924086	0.9935813	0.9985963	2.689E+02	2.057E+00	--
α_2	5.83E-04	5.29E-03	4.14E-03	1.39E-02	1.442E+00	2.714E+02	0.757
α_3	1.89E-06	1.51E-03	5.67E-04	6.21E-03	4.114E-01	2.721E+02	0.758
α_4	1.04E-09	7.96E-04	8.68E-05	4.08E-03	2.036E-01	2.556E+02	0.807

CCCG = 5, Gamma = 0.401

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9829778	0.9913843	0.9921380	0.9972156	4.238E+02	3.683E+00	--
α_2	1.07E-03	5.25E-03	4.50E-03	1.20E-02	2.243E+00	4.253E+02	0.881
α_3	1.17E-04	2.34E-03	1.62E-03	7.01E-03	9.912E-01	4.233E+02	0.888
α_4	5.91E-07	8.68E-04	2.93E-04	3.68E-03	3.765E-01	4.334E+02	0.869
α_5	1.43E-21	1.65E-04	9.41E-08	9.54E-04	7.237E-02	4.382E+02	0.860

CCCG = 6, Gamma = 0.401

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9832270	0.9912427	0.9919256	0.9969255	4.685E+02	4.139E+00	--
α_2	8.52E-04	4.43E-03	3.77E-03	1.03E-02	2.128E+00	4.780E+02	0.889
α_3	1.68E-04	2.44E-03	1.77E-03	6.98E-03	1.134E+00	4.642E+02	0.918
α_4	7.55E-06	1.16E-03	5.73E-04	4.28E-03	5.533E-01	4.780E+02	0.892
α_5	1.77E-09	4.54E-04	6.06E-05	2.28E-03	2.210E-01	4.863E+02	0.878
α_6	3.53E-16	2.77E-04	1.93E-06	1.61E-03	1.027E-01	3.700E+02	1.154

CCCG = 7, Gamma = 0.401

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9851954	0.9913929	0.9918274	0.9961071	7.409E+02	6.432E+00	--
α_2	9.74E-04	3.75E-03	3.32E-03	7.98E-03	2.840E+00	7.552E+02	0.937
α_3	3.54E-04	2.39E-03	1.95E-03	5.91E-03	1.746E+00	7.291E+02	0.972
α_4	9.07E-05	1.46E-03	1.04E-03	4.24E-03	1.084E+00	7.436E+02	0.953
α_5	4.10E-06	7.21E-04	3.49E-04	2.70E-03	5.376E-01	7.452E+02	0.952
α_6	2.28E-10	2.60E-04	2.62E-05	1.34E-03	1.979E-01	7.618E+02	0.932
α_7	7.95E-53	3.55E-05	3.55E-15	1.21E-04	2.656E-02	7.485E+02	0.949

CCCG = 8, Gamma = 0.401

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9856968	0.9917820	0.9922186	0.9963763	7.376E+02	6.112E+00	--
α_2	6.71E-04	3.10E-03	2.68E-03	6.97E-03	2.364E+00	7.601E+02	0.931
α_3	2.46E-04	2.07E-03	1.63E-03	5.36E-03	1.512E+00	7.305E+02	0.969
α_4	8.39E-05	1.43E-03	1.01E-03	4.20E-03	1.056E+00	7.369E+02	0.962
α_5	1.36E-05	8.97E-04	5.11E-04	3.09E-03	6.745E-01	7.512E+02	0.944
α_6	5.64E-08	4.20E-04	1.07E-04	1.91E-03	3.076E-01	7.322E+02	0.969
α_7	9.89E-16	1.41E-04	1.40E-06	8.16E-04	1.093E-01	7.728E+02	0.918
α_8	2.51E-18	1.63E-04	4.52E-07	9.48E-04	8.885E-02	5.460E+02	1.300

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.95E-01	9.92E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01
α_2	3.62E-03	4.29E-03	5.29E-03	5.25E-03	4.43E-03	3.75E-03	3.10E-03
α_3		1.08E-03	1.51E-03	2.34E-03	2.44E-03	2.39E-03	2.07E-03
α_4			7.96E-04	8.68E-04	1.16E-03	1.46E-03	1.43E-03
α_5				1.65E-04	4.54E-04	7.21E-04	8.97E-04
α_6					2.77E-04	2.60E-04	4.20E-04
α_7						3.55E-05	1.41E-04
α_8							1.63E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.95E-01	9.92E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01
Beta	3.62E-03	5.36E-03	7.59E-03	8.62E-03	8.76E-03	8.61E-03	8.22E-03
Gamma		2.01E-01	3.04E-01	3.91E-01	4.94E-01	5.65E-01	6.23E-01
Delta			3.45E-01	3.07E-01	4.37E-01	5.08E-01	5.96E-01
Epsilon				1.60E-01	3.88E-01	4.11E-01	5.31E-01
Mu					3.79E-01	2.91E-01	4.47E-01
Omega						1.20E-01	4.20E-01
Sigma							5.35E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	22.50	22.50	22.50	22.50	22.50	22.50	22.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 6.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.107

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9556004	0.9888172	0.9953231	0.9999752	3.977E+01	4.498E-01	--
α_2	2.48E-05	1.12E-02	4.68E-03	4.44E-02	4.498E-01	3.977E+01	0.500

CCCG = 3, Gamma = 0.107

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9469128	0.9810520	0.9859143	0.9985599	6.101E+01	1.178E+00	--
α_2	6.70E-04	1.51E-02	1.03E-02	4.60E-02	9.387E-01	6.107E+01	0.673
α_3	4.00E-08	3.81E-03	6.15E-04	1.87E-02	2.396E-01	6.266E+01	0.664

CCCG = 4, Gamma = 0.107

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9406514	0.9751131	0.9791398	0.9957941	7.438E+01	1.898E+00	--
α_2	1.51E-03	1.67E-02	1.27E-02	4.55E-02	1.285E+00	7.560E+01	0.757
α_3	4.72E-06	5.11E-03	1.83E-03	2.13E-02	3.927E-01	7.641E+01	0.758
α_4	1.18E-08	3.06E-03	4.10E-04	1.54E-02	2.207E-01	7.186E+01	0.807

CCCG = 5, Gamma = 0.107

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9465929	0.9731492	0.9755302	0.9915653	1.271E+02	3.506E+00	--
α_2	2.72E-03	1.53E-02	1.29E-02	3.60E-02	1.992E+00	1.286E+02	0.881
α_3	5.15E-04	8.32E-03	5.96E-03	2.42E-02	1.078E+00	1.285E+02	0.888
α_4	1.44E-06	2.74E-03	8.87E-04	1.18E-02	3.632E-01	1.322E+02	0.869
α_5	5.00E-21	5.41E-04	3.13E-07	3.13E-03	7.248E-02	1.338E+02	0.860

CCCG = 6, Gamma = 0.107

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9494735	0.9733572	0.9753358	0.9904791	1.534E+02	4.199E+00	--
α_2	2.09E-03	1.21E-02	1.02E-02	2.89E-02	1.941E+00	1.581E+02	0.889
α_3	8.24E-04	8.59E-03	6.59E-03	2.32E-02	1.332E+00	1.538E+02	0.918
α_4	4.16E-05	3.88E-03	2.09E-03	1.38E-02	6.181E-01	1.589E+02	0.892
α_5	9.79E-09	1.43E-03	2.12E-04	7.07E-03	2.313E-01	1.619E+02	0.878
α_6	5.69E-20	6.23E-04	5.87E-07	3.62E-03	7.684E-02	1.233E+02	1.154

CCCG = 7, Gamma = 0.107

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9538565	0.9732334	0.9745800	0.9880106	2.263E+02	6.223E+00	--
α_2	2.75E-03	1.13E-02	9.90E-03	2.44E-02	2.654E+00	2.332E+02	0.937
α_3	9.87E-04	7.23E-03	5.85E-03	1.82E-02	1.645E+00	2.257E+02	0.972
α_4	3.20E-04	4.81E-03	3.48E-03	1.38E-02	1.115E+00	2.306E+02	0.953
α_5	2.52E-05	2.60E-03	1.38E-03	9.33E-03	6.034E-01	2.314E+02	0.952
α_6	1.33E-10	7.51E-04	5.60E-05	3.98E-03	1.780E-01	2.369E+02	0.932
α_7	6.39E-51	1.17E-04	2.41E-14	4.15E-04	2.734E-02	2.329E+02	0.949

CCCG = 8, Gamma = 0.107

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9550805	0.9739269	0.9752357	0.9883029	2.333E+02	6.246E+00	--
α_2	2.36E-03	1.02E-02	8.91E-03	2.25E-02	2.504E+00	2.429E+02	0.931
α_3	6.46E-04	6.02E-03	4.69E-03	1.59E-02	1.419E+00	2.342E+02	0.969
α_4	2.38E-04	4.32E-03	3.04E-03	1.28E-02	1.027E+00	2.365E+02	0.962
α_5	6.25E-05	3.03E-03	1.82E-03	1.01E-02	7.337E-01	2.413E+02	0.944
α_6	1.68E-06	1.69E-03	6.09E-04	7.02E-03	3.975E-01	2.354E+02	0.969
α_7	3.10E-20	3.10E-04	2.97E-07	1.80E-03	7.703E-02	2.487E+02	0.918
α_8	4.62E-18	4.98E-04	1.24E-06	2.90E-03	8.749E-02	1.757E+02	1.300

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.81E-01	9.75E-01	9.73E-01	9.73E-01	9.73E-01	9.74E-01
α_2	1.12E-02	1.51E-02	1.67E-02	1.53E-02	1.21E-02	1.13E-02	1.02E-02
α_3		3.81E-03	5.11E-03	8.32E-03	8.59E-03	7.23E-03	6.02E-03
α_4			3.06E-03	2.74E-03	3.88E-03	4.81E-03	4.32E-03
α_5				5.41E-04	1.43E-03	2.60E-03	3.03E-03
α_6					6.23E-04	7.51E-04	1.69E-03
α_7						1.17E-04	3.10E-04
α_8							4.98E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.81E-01	9.75E-01	9.73E-01	9.73E-01	9.73E-01	9.74E-01
Beta	1.12E-02	1.89E-02	2.49E-02	2.69E-02	2.66E-02	2.68E-02	2.61E-02
Gamma		2.01E-01	3.28E-01	4.32E-01	5.45E-01	5.80E-01	6.09E-01
Delta			3.75E-01	2.83E-01	4.08E-01	5.34E-01	6.21E-01
Epsilon				1.65E-01	3.46E-01	4.19E-01	5.61E-01
Mu					3.04E-01	2.50E-01	4.51E-01
Omega						1.35E-01	3.24E-01
Sigma							6.16E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.00	6.00	6.00	6.00	6.00	6.00	6.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.053

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9053508	0.9774413	0.9920057	0.9999829	1.647E+01	3.801E-01	--
α_2	1.71E-05	2.26E-02	7.99E-03	9.46E-02	3.801E-01	1.647E+01	0.500

CCCG = 3, Gamma = 0.053

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8842684	0.9611376	0.9727881	0.9981312	2.374E+01	9.600E-01	--
α_2	4.08E-04	2.71E-02	1.57E-02	9.27E-02	6.673E-01	2.393E+01	0.673
α_3	1.03E-06	1.17E-02	2.81E-03	5.40E-02	2.927E-01	2.466E+01	0.664

CCCG = 4, Gamma = 0.053

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8781071	0.9503625	0.9590456	0.9928564	3.196E+01	1.669E+00	--
α_2	1.78E-03	3.06E-02	2.19E-02	8.90E-02	1.039E+00	3.292E+01	0.757
α_3	9.97E-06	1.15E-02	4.09E-03	4.79E-02	3.887E-01	3.353E+01	0.758
α_4	8.77E-08	7.58E-03	1.26E-03	3.71E-02	2.414E-01	3.159E+01	0.807

CCCG = 5, Gamma = 0.053

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9006757	0.9496947	0.9539730	0.9840762	6.583E+01	3.487E+00	--
α_2	4.04E-03	2.58E-02	2.14E-02	6.27E-02	1.791E+00	6.756E+01	0.881
α_3	1.40E-03	1.75E-02	1.31E-02	4.88E-02	1.207E+00	6.761E+01	0.888
α_4	1.09E-05	6.17E-03	2.47E-03	2.49E-02	4.340E-01	6.993E+01	0.869
α_5	1.72E-26	7.73E-04	2.75E-08	4.26E-03	5.493E-02	7.103E+01	0.860

CCCG = 6, Gamma = 0.053

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9102767	0.9532395	0.9568220	0.9839499	7.960E+01	3.905E+00	--
α_2	1.52E-03	1.57E-02	1.21E-02	4.22E-02	1.335E+00	8.365E+01	0.889
α_3	2.29E-03	1.86E-02	1.49E-02	4.77E-02	1.531E+00	8.083E+01	0.918
α_4	1.64E-04	8.49E-03	5.06E-03	2.85E-02	7.191E-01	8.399E+01	0.892
α_5	4.19E-08	2.86E-03	4.90E-04	1.39E-02	2.467E-01	8.587E+01	0.878
α_6	1.22E-20	1.11E-03	6.70E-07	6.45E-03	7.279E-02	6.544E+01	1.154

CCCG = 7, Gamma = 0.053

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9226424	0.9556628	0.9579815	0.9807595	1.244E+02	5.770E+00	--
α_2	1.46E-03	1.17E-02	9.33E-03	2.99E-02	1.549E+00	1.310E+02	0.937
α_3	2.77E-03	1.56E-02	1.31E-02	3.67E-02	1.989E+00	1.258E+02	0.972
α_4	8.89E-04	9.88E-03	7.51E-03	2.70E-02	1.287E+00	1.289E+02	0.953
α_5	8.85E-05	5.30E-03	3.08E-03	1.81E-02	6.913E-01	1.297E+02	0.952
α_6	1.29E-08	1.75E-03	2.63E-04	8.63E-03	2.327E-01	1.330E+02	0.932
α_7	1.10E-64	1.61E-04	2.44E-17	4.06E-04	2.112E-02	1.309E+02	0.949

CCCG = 8, Gamma = 0.053

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9321511	0.9594184	0.9611799	0.9806684	1.659E+02	7.016E+00	--
α_2	1.15E-03	8.93E-03	7.16E-03	2.28E-02	1.583E+00	1.757E+02	0.931
α_3	2.07E-03	1.17E-02	9.82E-03	2.76E-02	1.986E+00	1.682E+02	0.969
α_4	1.36E-03	9.74E-03	7.92E-03	2.44E-02	1.672E+00	1.699E+02	0.962
α_5	3.06E-04	5.78E-03	4.04E-03	1.72E-02	1.011E+00	1.738E+02	0.944
α_6	2.54E-05	3.35E-03	1.71E-03	1.23E-02	5.709E-01	1.697E+02	0.969
α_7	2.31E-10	1.01E-03	7.89E-05	5.32E-03	1.809E-01	1.795E+02	0.918
α_8	1.42E-107	9.81E-05	2.97E-27	7.35E-05	1.245E-02	1.270E+02	1.300

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.77E-01	9.61E-01	9.50E-01	9.50E-01	9.53E-01	9.56E-01	9.59E-01
α_2	2.26E-02	2.71E-02	3.06E-02	2.58E-02	1.57E-02	1.17E-02	8.93E-03
α_3		1.17E-02	1.15E-02	1.75E-02	1.86E-02	1.56E-02	1.17E-02
α_4			7.58E-03	6.17E-03	8.49E-03	9.88E-03	9.74E-03
α_5				7.73E-04	2.86E-03	5.30E-03	5.78E-03
α_6					1.11E-03	1.75E-03	3.35E-03
α_7						1.61E-04	1.01E-03
α_8							9.81E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.77E-01	9.61E-01	9.50E-01	9.50E-01	9.53E-01	9.56E-01	9.59E-01
Beta	2.26E-02	3.89E-02	4.96E-02	5.03E-02	4.68E-02	4.43E-02	4.06E-02
Gamma		3.02E-01	3.84E-01	4.87E-01	6.64E-01	7.36E-01	7.80E-01
Delta			3.98E-01	2.84E-01	4.01E-01	5.23E-01	6.31E-01
Epsilon				1.11E-01	3.19E-01	4.22E-01	5.12E-01
Mu					2.79E-01	2.65E-01	4.35E-01
Omega						8.46E-02	2.48E-01
Sigma							8.88E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 21.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.383

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9799922	0.9948919	0.9977868	0.9999855	9.166E+01	4.706E-01	--
α_2	1.45E-05	5.11E-03	2.21E-03	2.00E-02	4.706E-01	9.166E+01	0.500

CCCG = 3, Gamma = 0.383

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9745864	0.9911819	0.9936263	0.9994252	1.239E+02	1.103E+00	--
α_2	1.87E-04	6.51E-03	4.13E-03	2.09E-02	8.104E-01	1.237E+02	0.673
α_3	1.94E-07	2.31E-03	5.42E-04	1.07E-02	2.921E-01	1.261E+02	0.664

CCCG = 4, Gamma = 0.383

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9739753	0.9890584	0.9908250	0.9981004	1.765E+02	1.953E+00	--
α_2	6.80E-04	7.30E-03	5.57E-03	1.98E-02	1.312E+00	1.785E+02	0.757
α_3	4.03E-06	2.40E-03	9.47E-04	9.70E-03	4.307E-01	1.792E+02	0.758
α_4	2.48E-09	1.25E-03	1.47E-04	6.34E-03	2.099E-01	1.683E+02	0.807

CCCG = 5, Gamma = 0.383

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9756780	0.9882414	0.9894496	0.9966758	2.611E+02	3.107E+00	--
α_2	9.00E-04	6.37E-03	5.18E-03	1.59E-02	1.684E+00	2.625E+02	0.881
α_3	1.59E-04	3.60E-03	2.44E-03	1.10E-02	9.426E-01	2.612E+02	0.888
α_4	1.07E-06	1.42E-03	4.89E-04	6.01E-03	3.816E-01	2.677E+02	0.869
α_5	1.46E-16	3.64E-04	2.00E-06	2.12E-03	9.865E-02	2.707E+02	0.860

CCCG = 6, Gamma = 0.383

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9776043	0.9885394	0.9895010	0.9961893	3.297E+02	3.822E+00	--
α_2	7.32E-04	5.06E-03	4.12E-03	1.26E-02	1.714E+00	3.373E+02	0.889
α_3	2.21E-04	3.37E-03	2.43E-03	9.73E-03	1.108E+00	3.274E+02	0.918
α_4	2.54E-05	1.93E-03	1.07E-03	6.73E-03	6.509E-01	3.372E+02	0.892
α_5	1.46E-08	7.38E-04	1.33E-04	3.56E-03	2.536E-01	3.432E+02	0.878
α_6	5.94E-17	3.66E-04	1.66E-06	2.13E-03	9.572E-02	2.612E+02	1.154

CCCG = 7, Gamma = 0.383

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9793356	0.9885648	0.9892739	0.9953723	4.491E+02	5.195E+00	--
α_2	8.67E-04	4.57E-03	3.87E-03	1.06E-02	2.105E+00	4.588E+02	0.937
α_3	2.79E-04	2.97E-03	2.27E-03	8.07E-03	1.320E+00	4.430E+02	0.972
α_4	1.12E-04	2.20E-03	1.53E-03	6.59E-03	9.967E-01	4.518E+02	0.953
α_5	5.85E-06	1.16E-03	5.50E-04	4.37E-03	5.249E-01	4.529E+02	0.952
α_6	3.14E-10	4.22E-04	4.13E-05	2.19E-03	1.956E-01	4.631E+02	0.932
α_7	3.32E-28	1.16E-04	2.63E-09	6.31E-04	5.291E-02	4.550E+02	0.949

CCCG = 8, Gamma = 0.383

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9805808	0.9889544	0.9895658	0.9952404	5.222E+02	5.832E+00	--
α_2	8.36E-04	4.12E-03	3.53E-03	9.44E-03	2.229E+00	5.384E+02	0.931
α_3	2.08E-04	2.43E-03	1.83E-03	6.70E-03	1.260E+00	5.178E+02	0.969
α_4	1.13E-04	1.99E-03	1.40E-03	5.87E-03	1.042E+00	5.222E+02	0.962
α_5	3.36E-05	1.43E-03	8.75E-04	4.72E-03	7.626E-01	5.324E+02	0.944
α_6	1.44E-07	6.30E-04	1.76E-04	2.80E-03	3.271E-01	5.191E+02	0.969
α_7	2.38E-13	2.45E-04	6.57E-06	1.38E-03	1.344E-01	5.479E+02	0.918
α_8	1.79E-20	1.98E-04	1.86E-07	1.15E-03	7.682E-02	3.871E+02	1.300

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.91E-01	9.89E-01	9.88E-01	9.89E-01	9.89E-01	9.89E-01
α_2	5.11E-03	6.51E-03	7.30E-03	6.37E-03	5.06E-03	4.57E-03	4.12E-03
α_3		2.31E-03	2.40E-03	3.60E-03	3.37E-03	2.97E-03	2.43E-03
α_4			1.25E-03	1.42E-03	1.93E-03	2.20E-03	1.99E-03
α_5				3.64E-04	7.38E-04	1.16E-03	1.43E-03
α_6					3.66E-04	4.22E-04	6.30E-04
α_7						1.16E-04	2.45E-04
α_8							1.98E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.91E-01	9.89E-01	9.88E-01	9.89E-01	9.89E-01	9.89E-01
Beta	5.11E-03	8.82E-03	1.09E-02	1.18E-02	1.15E-02	1.14E-02	1.10E-02
Gamma		2.62E-01	3.33E-01	4.58E-01	5.59E-01	6.01E-01	6.27E-01
Delta			3.42E-01	3.32E-01	4.73E-01	5.67E-01	6.49E-01
Epsilon				2.04E-01	3.64E-01	4.35E-01	5.57E-01
Mu					3.32E-01	3.17E-01	4.29E-01
Omega						2.16E-01	4.13E-01
Sigma							4.47E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	21.50	21.50	21.50	21.50	21.50	21.50	21.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 3.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.055

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9915161	0.9978002	0.9990086	0.9999919	2.237E+02	4.932E-01	--
α_2	8.07E-06	2.20E-03	9.91E-04	8.48E-03	4.932E-01	2.237E+02	0.500

CCCG = 3, Gamma = 0.055

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9917100	0.9971718	0.9979922	0.9998327	3.736E+02	1.059E+00	--
α_2	3.58E-05	1.91E-03	1.13E-03	6.46E-03	7.137E-01	3.722E+02	0.673
α_3	3.29E-07	9.14E-04	2.76E-04	3.99E-03	3.458E-01	3.779E+02	0.664

CCCG = 4, Gamma = 0.055

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9922929	0.9966886	0.9971905	0.9993687	6.365E+02	2.115E+00	--
α_2	2.97E-04	2.40E-03	1.91E-03	6.18E-03	1.549E+00	6.432E+02	0.757
α_3	1.28E-08	4.11E-04	8.03E-05	1.95E-03	2.646E-01	6.438E+02	0.758
α_4	5.50E-08	4.98E-04	1.22E-04	2.28E-03	3.010E-01	6.041E+02	0.807

CCCG = 5, Gamma = 0.055

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9939857	0.9966603	0.9968656	0.9986340	1.589E+03	5.325E+00	--
α_2	7.26E-04	2.28E-03	2.07E-03	4.52E-03	3.632E+00	1.592E+03	0.881
α_3	8.40E-05	8.55E-04	6.56E-04	2.30E-03	1.354E+00	1.582E+03	0.888
α_4	1.73E-08	1.83E-04	4.36E-05	8.40E-04	2.961E-01	1.619E+03	0.869
α_5	7.72E-35	2.59E-05	2.86E-11	1.29E-04	4.243E-02	1.636E+03	0.860

CCCG = 6, Gamma = 0.055

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9935582	0.9964886	0.9967212	0.9986250	1.401E+03	4.936E+00	--
α_2	5.42E-04	2.04E-03	1.81E-03	4.31E-03	2.915E+00	1.426E+03	0.889
α_3	7.74E-05	9.07E-04	6.82E-04	2.51E-03	1.257E+00	1.384E+03	0.918
α_4	1.44E-06	3.53E-04	1.62E-04	1.35E-03	5.031E-01	1.424E+03	0.892
α_5	2.31E-15	7.97E-05	1.05E-06	4.57E-04	1.155E-01	1.448E+03	0.878
α_6	6.16E-13	1.32E-04	4.82E-06	7.29E-04	1.451E-01	1.102E+03	1.154

CCCG = 7, Gamma = 0.055

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9947010	0.9966466	0.9967609	0.9982020	2.869E+03	9.654E+00	--
α_2	6.43E-04	1.66E-03	1.55E-03	3.06E-03	4.851E+00	2.915E+03	0.937
α_3	2.55E-04	9.95E-04	8.79E-04	2.13E-03	2.800E+00	2.812E+03	0.972
α_4	4.93E-05	4.83E-04	3.73E-04	1.29E-03	1.384E+00	2.867E+03	0.953
α_5	6.04E-07	1.71E-04	7.63E-05	6.60E-04	4.902E-01	2.872E+03	0.952
α_6	9.29E-16	3.90E-05	4.95E-07	2.24E-04	1.146E-01	2.935E+03	0.932
α_7	2.67E-93	5.08E-06	5.40E-25	6.03E-06	1.464E-02	2.883E+03	0.949

CCCG = 8, Gamma = 0.055

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9944090	0.9966769	0.9968295	0.9984237	2.144E+03	7.148E+00	--
α_2	3.63E-04	1.34E-03	1.19E-03	2.81E-03	2.980E+00	2.222E+03	0.931
α_3	1.59E-04	9.17E-04	7.67E-04	2.19E-03	1.960E+00	2.134E+03	0.969
α_4	3.96E-05	5.41E-04	3.97E-04	1.54E-03	1.166E+00	2.152E+03	0.962
α_5	1.39E-06	2.45E-04	1.19E-04	9.17E-04	5.375E-01	2.194E+03	0.944
α_6	1.87E-11	8.44E-05	6.55E-06	4.46E-04	1.805E-01	2.138E+03	0.969
α_7	9.49E-36	1.83E-05	1.37E-11	8.97E-05	4.139E-02	2.256E+03	0.918
α_8	1.08E-08	1.77E-04	3.91E-05	8.27E-04	2.827E-01	1.593E+03	1.300

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01
α_2	2.20E-03	1.91E-03	2.40E-03	2.28E-03	2.04E-03	1.66E-03	1.34E-03
α_3		9.14E-04	4.11E-04	8.55E-04	9.07E-04	9.95E-04	9.17E-04
α_4			4.98E-04	1.83E-04	3.53E-04	4.83E-04	5.41E-04
α_5				2.59E-05	7.97E-05	1.71E-04	2.45E-04
α_6					1.32E-04	3.90E-05	8.44E-05
α_7						5.08E-06	1.83E-05
α_8							1.77E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01
Beta	2.20E-03	2.83E-03	3.31E-03	3.34E-03	3.51E-03	3.35E-03	3.32E-03
Gamma		3.23E-01	2.74E-01	3.19E-01	4.19E-01	5.05E-01	5.97E-01
Delta			5.48E-01	1.96E-01	3.84E-01	4.12E-01	5.38E-01
Epsilon				1.24E-01	3.75E-01	3.08E-01	4.92E-01
Mu					6.23E-01	2.05E-01	5.34E-01
Omega						1.15E-01	6.99E-01
Sigma							9.06E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.10	3.10	3.10	3.10	3.10	3.10	3.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.5.2 AFW-MOV-CC: AFW Motor-Operated Valves Fail to Open

Generic CCF Parameters

System Group: Clean Water
System: Auxiliary Feedwater
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 31.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9662487	0.9913844	0.9962619	0.9999737	1.0000000	5.391E+01	4.685E-01
α_2	2.41E-05	8.62E-03	3.74E-03	3.37E-02	0.00E+00	4.685E-01	5.391E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9644684	0.9875502	0.9909137	0.9991407	1.0000000	8.948E+01	1.128E+00
α_2	3.14E-04	9.39E-03	6.11E-03	2.97E-02	0.00E+00	8.512E-01	8.976E+01
α_3	1.52E-07	3.06E-03	6.53E-04	1.43E-02	0.00E+00	2.768E-01	9.033E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9634165	0.9847374	0.9872580	0.9974485	1.0000000	1.222E+02	1.894E+00
α_2	8.77E-04	1.02E-02	7.67E-03	2.79E-02	0.00E+00	1.260E+00	1.228E+02
α_3	3.52E-06	3.24E-03	1.19E-03	1.34E-02	0.00E+00	4.024E-01	1.237E+02
α_4	1.29E-08	1.87E-03	2.78E-04	9.24E-03	0.00E+00	2.315E-01	1.238E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9694579	0.9847980	0.9862088	0.9953318	1.0000000	2.223E+02	3.432E+00
α_2	1.45E-03	8.52E-03	7.12E-03	2.04E-02	0.00E+00	1.924E+00	2.238E+02
α_3	2.69E-04	4.65E-03	3.29E-03	1.37E-02	0.00E+00	1.049E+00	2.247E+02
α_4	1.29E-06	1.69E-03	5.83E-04	7.14E-03	0.00E+00	3.822E-01	2.254E+02
α_5	2.95E-20	3.40E-04	3.17E-07	1.97E-03	0.00E+00	7.674E-02	2.257E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9712936	0.9852817	0.9865081	0.9950888	1.0000000	2.567E+02	3.835E+00
α_2	9.36E-04	6.53E-03	5.32E-03	1.63E-02	0.00E+00	1.701E+00	2.589E+02
α_3	3.65E-04	4.63E-03	3.44E-03	1.30E-02	0.00E+00	1.207E+00	2.593E+02
α_4	2.10E-05	2.29E-03	1.20E-03	8.24E-03	0.00E+00	5.960E-01	2.600E+02

α_5	3.32E-09	8.49E-04	1.13E-04	4.26E-03	0.00E+00	2.211E-01	2.603E+02
α_6	3.31E-15	4.21E-04	4.26E-06	2.43E-03	0.00E+00	1.098E-01	2.604E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9752330	0.9859494	0.9867319	0.9939830	1.0000000	4.033E+02	5.747E+00
α_2	1.12E-03	5.48E-03	4.70E-03	1.25E-02	0.00E+00	2.243E+00	4.068E+02
α_3	5.34E-04	3.98E-03	3.21E-03	1.01E-02	0.00E+00	1.630E+00	4.074E+02
α_4	1.65E-04	2.65E-03	1.89E-03	7.70E-03	0.00E+00	1.083E+00	4.080E+02
α_5	9.99E-06	1.38E-03	6.97E-04	5.08E-03	0.00E+00	5.654E-01	4.085E+02
α_6	2.57E-10	4.68E-04	4.33E-05	2.44E-03	0.00E+00	1.916E-01	4.089E+02
α_7	5.83E-41	8.51E-05	3.16E-12	3.73E-04	0.00E+00	3.480E-02	4.090E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9763517	0.9865989	0.9873541	0.9942791	1.0000000	4.215E+02	5.726E+00
α_2	8.51E-04	4.72E-03	3.98E-03	1.11E-02	0.00E+00	2.018E+00	4.252E+02
α_3	3.36E-04	3.25E-03	2.52E-03	8.68E-03	0.00E+00	1.391E+00	4.259E+02
α_4	1.48E-04	2.49E-03	1.77E-03	7.28E-03	0.00E+00	1.062E+00	4.262E+02
α_5	2.90E-05	1.64E-03	9.61E-04	5.59E-03	0.00E+00	7.026E-01	4.265E+02
α_6	3.21E-07	8.19E-04	2.51E-04	3.56E-03	0.00E+00	3.497E-01	4.269E+02
α_7	1.23E-15	2.52E-04	2.32E-06	1.46E-03	0.00E+00	1.078E-01	4.271E+02
α_8	2.58E-17	2.22E-04	9.39E-07	1.29E-03	0.00E+00	9.469E-02	4.272E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.88E-01	9.85E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01
α_2	8.62E-03	9.39E-03	1.02E-02	8.52E-03	6.53E-03	5.48E-03	4.72E-03
α_3		3.06E-03	3.24E-03	4.65E-03	4.63E-03	3.98E-03	3.25E-03
α_4			1.87E-03	1.69E-03	2.29E-03	2.65E-03	2.49E-03
α_5				3.40E-04	8.49E-04	1.38E-03	1.64E-03
α_6					4.21E-04	4.68E-04	8.19E-04
α_7						8.51E-05	2.52E-04
α_8							2.22E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.88E-01	9.85E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01
Beta	8.62E-03	1.24E-02	1.53E-02	1.52E-02	1.47E-02	1.41E-02	1.34E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	31.50	31.50	31.50	31.50	31.50	31.50	31.50
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 13.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.413

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9797037	0.9947682	0.9976755	0.9999827	9.191E+01	4.834E-01	--
α_2	1.73E-05	5.23E-03	2.32E-03	2.03E-02	4.834E-01	9.191E+01	0.620

CCCG = 3, Gamma = 0.413

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9811221	0.9932114	0.9949244	0.9994466	1.793E+02	1.226E+00	--
α_2	2.65E-04	5.46E-03	3.76E-03	1.64E-02	9.769E-01	1.779E+02	0.805
α_3	2.12E-08	1.33E-03	2.30E-04	6.44E-03	2.487E-01	1.871E+02	0.768

CCCG = 4, Gamma = 0.413

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9785043	0.9908202	0.9922344	0.9983009	2.220E+02	2.057E+00	--
α_2	7.07E-04	6.41E-03	5.02E-03	1.69E-02	1.442E+00	2.235E+02	0.876
α_3	2.27E-06	1.81E-03	6.80E-04	7.45E-03	4.114E-01	2.267E+02	0.867
α_4	1.26E-09	9.57E-04	1.04E-04	4.91E-03	2.036E-01	2.124E+02	0.926

CCCG = 5, Gamma = 0.413

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9808390	0.9902979	0.9911450	0.9968629	3.759E+02	3.683E+00	--
α_2	1.21E-03	5.93E-03	5.09E-03	1.35E-02	2.243E+00	3.758E+02	0.972
α_3	1.32E-04	2.62E-03	1.81E-03	7.87E-03	9.912E-01	3.772E+02	0.971
α_4	6.57E-07	9.64E-04	3.26E-04	4.09E-03	3.765E-01	3.904E+02	0.940
α_5	1.60E-21	1.84E-04	1.05E-07	1.06E-03	7.237E-02	3.929E+02	0.935

CCCG = 6, Gamma = 0.413

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9812531	0.9902086	0.9909707	0.9965609	4.186E+02	4.139E+00	--
α_2	9.62E-04	5.00E-03	4.25E-03	1.16E-02	2.128E+00	4.234E+02	0.981
α_3	1.87E-04	2.71E-03	1.97E-03	7.76E-03	1.134E+00	4.174E+02	0.997
α_4	8.33E-06	1.27E-03	6.32E-04	4.72E-03	5.533E-01	4.336E+02	0.961
α_5	1.95E-09	5.01E-04	6.69E-05	2.51E-03	2.210E-01	4.407E+02	0.947
α_6	3.89E-16	3.06E-04	2.13E-06	1.77E-03	1.027E-01	3.359E+02	1.243

CCCG = 7, Gamma = 0.413

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839382	0.9906601	0.9911308	0.9957746	6.822E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.851E+02	1.018
α_3	3.81E-04	2.56E-03	2.10E-03	6.35E-03	1.746E+00	6.791E+02	1.029
α_4	9.72E-05	1.56E-03	1.12E-03	4.54E-03	1.084E+00	6.934E+02	1.009
α_5	4.40E-06	7.74E-04	3.75E-04	2.90E-03	5.376E-01	6.939E+02	1.009
α_6	2.41E-10	2.75E-04	2.77E-05	1.42E-03	1.979E-01	7.198E+02	0.973
α_7	8.36E-53	3.73E-05	3.74E-15	1.28E-04	2.656E-02	7.113E+02	0.985

CCCG = 8, Gamma = 0.413

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9844523	0.9910650	0.9915390	0.9960591	6.780E+02	6.112E+00	--
α_2	7.43E-04	3.44E-03	2.97E-03	7.72E-03	2.364E+00	6.858E+02	1.017
α_3	2.65E-04	2.23E-03	1.76E-03	5.78E-03	1.512E+00	6.778E+02	1.031
α_4	8.95E-05	1.53E-03	1.08E-03	4.48E-03	1.056E+00	6.908E+02	1.012
α_5	1.46E-05	9.63E-04	5.48E-04	3.32E-03	6.745E-01	6.998E+02	1.000
α_6	6.10E-08	4.54E-04	1.15E-04	2.06E-03	3.076E-01	6.770E+02	1.034
α_7	1.02E-15	1.46E-04	1.44E-06	8.44E-04	1.093E-01	7.470E+02	0.937
α_8	2.85E-18	1.84E-04	5.12E-07	1.07E-03	8.885E-02	4.818E+02	1.453

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.93E-01	9.91E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	5.23E-03	5.46E-03	6.41E-03	5.93E-03	5.00E-03	4.13E-03	3.44E-03
α_3		1.33E-03	1.81E-03	2.62E-03	2.71E-03	2.56E-03	2.23E-03
α_4			9.57E-04	9.64E-04	1.27E-03	1.56E-03	1.53E-03
α_5				1.84E-04	5.01E-04	7.74E-04	9.63E-04
α_6					3.06E-04	2.75E-04	4.54E-04
α_7						3.73E-05	1.46E-04
α_8							1.84E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.93E-01	9.91E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	5.23E-03	6.79E-03	9.18E-03	9.70E-03	9.79E-03	9.34E-03	8.93E-03
Gamma		1.96E-01	3.02E-01	3.88E-01	4.89E-01	5.58E-01	6.16E-01
Delta			3.46E-01	3.05E-01	4.34E-01	5.08E-01	5.95E-01
Epsilon				1.60E-01	3.88E-01	4.10E-01	5.34E-01
Mu					3.79E-01	2.87E-01	4.49E-01
Omega						1.20E-01	4.21E-01
Sigma							5.58E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	13.00	13.00	13.00	13.00	13.00	13.00	13.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9314052	0.9826776	0.9926916	0.9999612	2.552E+01	4.498E-01	--
α_2	3.88E-05	1.73E-02	7.31E-03	6.86E-02	4.498E-01	2.552E+01	0.620

CCCG = 3, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9304944	0.9751162	0.9814399	0.9980986	4.617E+01	1.178E+00	--
α_2	8.90E-04	2.00E-02	1.37E-02	6.07E-02	9.387E-01	4.598E+01	0.805
α_3	5.13E-08	4.88E-03	7.89E-04	2.39E-02	2.396E-01	4.889E+01	0.768

CCCG = 4, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9266995	0.9691785	0.9741117	0.9947696	5.970E+01	1.898E+00	--
α_2	1.88E-03	2.08E-02	1.59E-02	5.64E-02	1.285E+00	6.060E+01	0.876
α_3	5.81E-06	6.28E-03	2.25E-03	2.62E-02	3.927E-01	6.210E+01	0.867
α_4	1.46E-08	3.77E-03	5.06E-04	1.89E-02	2.207E-01	5.828E+01	0.926

CCCG = 5, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9393693	0.9694758	0.9721632	0.9903938	1.113E+02	3.506E+00	--
α_2	3.12E-03	1.74E-02	1.47E-02	4.11E-02	1.992E+00	1.124E+02	0.972
α_3	5.84E-04	9.42E-03	6.76E-03	2.74E-02	1.078E+00	1.133E+02	0.971
α_4	1.62E-06	3.07E-03	9.95E-04	1.32E-02	3.632E-01	1.178E+02	0.940
α_5	5.64E-21	6.10E-04	3.53E-07	3.53E-03	7.248E-02	1.188E+02	0.935

CCCG = 6, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9432773	0.9700557	0.9722649	0.9892834	1.360E+02	4.199E+00	--
α_2	2.38E-03	1.38E-02	1.15E-02	3.28E-02	1.941E+00	1.390E+02	0.981
α_3	9.22E-04	9.61E-03	7.37E-03	2.59E-02	1.332E+00	1.373E+02	0.997
α_4	4.61E-05	4.30E-03	2.32E-03	1.53E-02	6.181E-01	1.432E+02	0.961
α_5	1.09E-08	1.58E-03	2.35E-04	7.84E-03	2.313E-01	1.459E+02	0.947
α_6	6.31E-20	6.90E-04	6.51E-07	4.02E-03	7.684E-02	1.112E+02	1.243

CCCG = 7, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9497408	0.9708253	0.9722859	0.9869205	2.071E+02	6.223E+00	--
α_2	3.05E-03	1.25E-02	1.10E-02	2.70E-02	2.654E+00	2.104E+02	1.018
α_3	1.06E-03	7.80E-03	6.31E-03	1.96E-02	1.645E+00	2.092E+02	1.029
α_4	3.45E-04	5.18E-03	3.75E-03	1.49E-02	1.115E+00	2.139E+02	1.009
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.144E+02	1.009
α_6	1.42E-10	7.98E-04	5.95E-05	4.24E-03	1.780E-01	2.228E+02	0.973
α_7	6.76E-51	1.24E-04	2.55E-14	4.38E-04	2.734E-02	2.202E+02	0.985

CCCG = 8, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9509585	0.9715141	0.9729371	0.9872093	2.130E+02	6.246E+00	--
α_2	2.62E-03	1.14E-02	9.91E-03	2.50E-02	2.504E+00	2.181E+02	1.017
α_3	6.99E-04	6.52E-03	5.08E-03	1.72E-02	1.419E+00	2.163E+02	1.031
α_4	2.55E-04	4.63E-03	3.25E-03	1.37E-02	1.027E+00	2.207E+02	1.012
α_5	6.74E-05	3.27E-03	1.96E-03	1.09E-02	7.337E-01	2.238E+02	1.000
α_6	1.83E-06	1.83E-03	6.61E-04	7.62E-03	3.975E-01	2.167E+02	1.034
α_7	3.22E-20	3.22E-04	3.09E-07	1.87E-03	7.703E-02	2.394E+02	0.937
α_8	5.27E-18	5.66E-04	1.42E-06	3.31E-03	8.749E-02	1.544E+02	1.453

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.75E-01	9.69E-01	9.69E-01	9.70E-01	9.71E-01	9.72E-01
α_2	1.73E-02	2.00E-02	2.08E-02	1.74E-02	1.38E-02	1.25E-02	1.14E-02
α_3		4.88E-03	6.28E-03	9.42E-03	9.61E-03	7.80E-03	6.52E-03
α_4			3.77E-03	3.07E-03	4.30E-03	5.18E-03	4.63E-03
α_5				6.10E-04	1.58E-03	2.81E-03	3.27E-03
α_6					6.90E-04	7.98E-04	1.83E-03
α_7						1.24E-04	3.22E-04
α_8							5.66E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.75E-01	9.69E-01	9.69E-01	9.70E-01	9.71E-01	9.72E-01
Beta	1.73E-02	2.49E-02	3.08E-02	3.05E-02	2.99E-02	2.92E-02	2.85E-02
Gamma		1.96E-01	3.26E-01	4.29E-01	5.40E-01	5.73E-01	6.02E-01
Delta			3.75E-01	2.81E-01	4.06E-01	5.33E-01	6.20E-01
Epsilon				1.66E-01	3.46E-01	4.18E-01	5.64E-01
Mu					3.04E-01	2.47E-01	4.54E-01
Omega						1.35E-01	3.27E-01
Sigma							6.38E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8672347	0.9682361	0.9885656	0.9999755	1.159E+01	3.801E-01	--
α_2	2.45E-05	3.18E-02	1.14E-02	1.33E-01	3.801E-01	1.159E+01	0.620

CCCG = 3, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8550271	0.9510429	0.9654778	0.9976208	1.865E+01	9.600E-01	--
α_2	5.23E-04	3.45E-02	2.02E-02	1.17E-01	6.673E-01	1.867E+01	0.805
α_3	1.27E-06	1.45E-02	3.49E-03	6.65E-02	2.927E-01	1.996E+01	0.768

CCCG = 4, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8545217	0.9404653	0.9506838	0.9913670	2.637E+01	1.669E+00	--
α_2	2.15E-03	3.68E-02	2.65E-02	1.07E-01	1.039E+00	2.717E+01	0.876
α_3	1.19E-05	1.36E-02	4.89E-03	5.70E-02	3.887E-01	2.810E+01	0.867
α_4	1.05E-07	9.05E-03	1.50E-03	4.43E-02	2.414E-01	2.643E+01	0.926

CCCG = 5, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8895121	0.9439170	0.9486299	0.9821953	5.869E+01	3.487E+00	--
α_2	4.54E-03	2.89E-02	2.40E-02	7.02E-02	1.791E+00	6.008E+01	0.972
α_3	1.56E-03	1.95E-02	1.46E-02	5.42E-02	1.207E+00	6.070E+01	0.971
α_4	1.20E-05	6.79E-03	2.72E-03	2.73E-02	4.340E-01	6.352E+01	0.940
α_5	1.90E-26	8.54E-04	3.04E-08	4.71E-03	5.493E-02	6.427E+01	0.935

CCCG = 6, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9010657	0.9483473	0.9522647	0.9822295	7.169E+01	3.905E+00	--
α_2	1.70E-03	1.76E-02	1.35E-02	4.72E-02	1.335E+00	7.469E+01	0.981
α_3	2.52E-03	2.05E-02	1.64E-02	5.25E-02	1.531E+00	7.324E+01	0.997
α_4	1.79E-04	9.27E-03	5.53E-03	3.11E-02	7.191E-01	7.684E+01	0.961
α_5	4.59E-08	3.13E-03	5.36E-04	1.52E-02	2.467E-01	7.853E+01	0.947
α_6	1.34E-20	1.21E-03	7.32E-07	7.04E-03	7.279E-02	5.994E+01	1.243

CCCG = 7, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169797	0.9523688	0.9548426	0.9793039	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.28E-02	1.549E+00	1.194E+02	1.018
α_3	2.96E-03	1.66E-02	1.40E-02	3.92E-02	1.989E+00	1.177E+02	1.029
α_4	9.49E-04	1.05E-02	8.01E-03	2.88E-02	1.287E+00	1.208E+02	1.009
α_5	9.46E-05	5.66E-03	3.29E-03	1.93E-02	6.913E-01	1.214E+02	1.009
α_6	1.36E-08	1.84E-03	2.77E-04	9.09E-03	2.327E-01	1.264E+02	0.973
α_7	1.15E-64	1.69E-04	2.56E-17	4.25E-04	2.112E-02	1.250E+02	0.985

CCCG = 8, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9272939	0.9564770	0.9583546	0.9792462	1.542E+02	7.016E+00	--
α_2	1.27E-03	9.82E-03	7.88E-03	2.50E-02	1.583E+00	1.596E+02	1.017
α_3	2.22E-03	1.25E-02	1.05E-02	2.95E-02	1.986E+00	1.571E+02	1.031
α_4	1.45E-03	1.03E-02	8.38E-03	2.58E-02	1.672E+00	1.604E+02	1.012
α_5	3.27E-04	6.16E-03	4.31E-03	1.83E-02	1.011E+00	1.631E+02	1.000
α_6	2.73E-05	3.60E-03	1.83E-03	1.32E-02	5.709E-01	1.581E+02	1.034
α_7	2.37E-10	1.03E-03	8.10E-05	5.47E-03	1.809E-01	1.748E+02	0.937
α_8	1.59E-107	1.10E-04	3.34E-27	8.28E-05	1.245E-02	1.129E+02	1.453

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.51E-01	9.40E-01	9.44E-01	9.48E-01	9.52E-01	9.56E-01
α_2	3.18E-02	3.45E-02	3.68E-02	2.89E-02	1.76E-02	1.28E-02	9.82E-03
α_3		1.45E-02	1.36E-02	1.95E-02	2.05E-02	1.66E-02	1.25E-02
α_4			9.05E-03	6.79E-03	9.27E-03	1.05E-02	1.03E-02
α_5				8.54E-04	3.13E-03	5.66E-03	6.16E-03
α_6					1.21E-03	1.84E-03	3.60E-03
α_7						1.69E-04	1.03E-03
α_8							1.10E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.51E-01	9.40E-01	9.44E-01	9.48E-01	9.52E-01	9.56E-01
Beta	3.18E-02	4.90E-02	5.95E-02	5.61E-02	5.17E-02	4.76E-02	4.35E-02
Gamma		2.95E-01	3.81E-01	4.84E-01	6.60E-01	7.31E-01	7.74E-01
Delta			3.99E-01	2.82E-01	3.99E-01	5.23E-01	6.30E-01
Epsilon				1.12E-01	3.19E-01	4.21E-01	5.14E-01
Mu					2.79E-01	2.62E-01	4.35E-01
Omega						8.41E-02	2.41E-01
Sigma							9.64E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 13.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.413

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9695875	0.9922268	0.9966200	0.9999778	6.007E+01	4.706E-01	--
α_2	2.22E-05	7.77E-03	3.38E-03	3.04E-02	4.706E-01	6.007E+01	0.620

CCCG = 3, Gamma = 0.413

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9665313	0.9883703	0.9915800	0.9992400	9.370E+01	1.103E+00	--
α_2	2.49E-04	8.65E-03	5.50E-03	2.78E-02	8.104E-01	9.286E+01	0.805
α_3	2.50E-07	2.98E-03	6.99E-04	1.37E-02	2.921E-01	9.779E+01	0.768

CCCG = 4, Gamma = 0.413

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9680231	0.9865408	0.9887043	0.9976593	1.431E+02	1.953E+00	--
α_2	8.40E-04	9.01E-03	6.88E-03	2.44E-02	1.312E+00	1.444E+02	0.876
α_3	4.92E-06	2.93E-03	1.16E-03	1.18E-02	4.307E-01	1.467E+02	0.867
α_4	3.04E-09	1.52E-03	1.80E-04	7.76E-03	2.099E-01	1.375E+02	0.926

CCCG = 5, Gamma = 0.413

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9723303	0.9866146	0.9879858	0.9962127	2.290E+02	3.107E+00	--
α_2	1.03E-03	7.29E-03	5.93E-03	1.82E-02	1.684E+00	2.292E+02	0.972
α_3	1.81E-04	4.08E-03	2.77E-03	1.25E-02	9.426E-01	2.300E+02	0.971
α_4	1.20E-06	1.60E-03	5.50E-04	6.75E-03	3.816E-01	2.382E+02	0.940
α_5	1.64E-16	4.11E-04	2.25E-06	2.39E-03	9.865E-02	2.399E+02	0.935

CCCG = 6, Gamma = 0.413

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9748534	0.9871253	0.9882026	0.9957162	2.931E+02	3.822E+00	--
α_2	8.31E-04	5.74E-03	4.68E-03	1.43E-02	1.714E+00	2.969E+02	0.981
α_3	2.48E-04	3.77E-03	2.72E-03	1.09E-02	1.108E+00	2.926E+02	0.997
α_4	2.82E-05	2.14E-03	1.19E-03	7.46E-03	6.509E-01	3.040E+02	0.961
α_5	1.62E-08	8.20E-04	1.48E-04	3.95E-03	2.536E-01	3.092E+02	0.947
α_6	6.58E-17	4.06E-04	1.84E-06	2.36E-03	9.572E-02	2.356E+02	1.243

CCCG = 7, Gamma = 0.413

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9774655	0.9875258	0.9882978	0.9949498	4.113E+02	5.195E+00	--
α_2	9.61E-04	5.06E-03	4.30E-03	1.18E-02	2.105E+00	4.135E+02	1.018
α_3	3.01E-04	3.21E-03	2.45E-03	8.72E-03	1.320E+00	4.100E+02	1.029
α_4	1.21E-04	2.38E-03	1.65E-03	7.12E-03	9.967E-01	4.185E+02	1.009
α_5	6.33E-06	1.25E-03	5.94E-04	4.72E-03	5.249E-01	4.190E+02	1.009
α_6	3.34E-10	4.50E-04	4.40E-05	2.33E-03	1.956E-01	4.347E+02	0.973
α_7	3.51E-28	1.23E-04	2.79E-09	6.68E-04	5.291E-02	4.297E+02	0.985

CCCG = 8, Gamma = 0.413

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9788287	0.9879543	0.9886197	0.9948075	4.783E+02	5.832E+00	--
α_2	9.30E-04	4.58E-03	3.93E-03	1.05E-02	2.229E+00	4.840E+02	1.017
α_3	2.25E-04	2.63E-03	1.98E-03	7.25E-03	1.260E+00	4.787E+02	1.031
α_4	1.21E-04	2.13E-03	1.50E-03	6.29E-03	1.042E+00	4.878E+02	1.012
α_5	3.62E-05	1.54E-03	9.43E-04	5.08E-03	7.626E-01	4.941E+02	1.000
α_6	1.56E-07	6.84E-04	1.91E-04	3.04E-03	3.271E-01	4.782E+02	1.034
α_7	2.47E-13	2.55E-04	6.82E-06	1.43E-03	1.344E-01	5.277E+02	0.937
α_8	2.03E-20	2.26E-04	2.12E-07	1.31E-03	7.682E-02	3.404E+02	1.453

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.88E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01	9.88E-01
α_2	7.77E-03	8.65E-03	9.01E-03	7.29E-03	5.74E-03	5.06E-03	4.58E-03
α_3		2.98E-03	2.93E-03	4.08E-03	3.77E-03	3.21E-03	2.63E-03
α_4			1.52E-03	1.60E-03	2.14E-03	2.38E-03	2.13E-03
α_5				4.11E-04	8.20E-04	1.25E-03	1.54E-03
α_6					4.06E-04	4.50E-04	6.84E-04
α_7						1.23E-04	2.55E-04
α_8							2.26E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.88E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01	9.88E-01
Beta	7.77E-03	1.16E-02	1.35E-02	1.34E-02	1.29E-02	1.25E-02	1.20E-02
Gamma		2.56E-01	3.31E-01	4.55E-01	5.54E-01	5.94E-01	6.19E-01
Delta			3.42E-01	3.30E-01	4.71E-01	5.67E-01	6.48E-01
Epsilon				2.04E-01	3.65E-01	4.34E-01	5.59E-01
Mu					3.31E-01	3.14E-01	4.30E-01
Omega						2.15E-01	4.13E-01
Sigma							4.70E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	13.00	13.00	13.00	13.00	13.00	13.00	13.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.048

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9893224	0.9972307	0.9987510	0.9999898	1.776E+02	4.932E-01	--
α_2	1.02E-05	2.77E-03	1.25E-03	1.07E-02	4.932E-01	1.776E+02	0.620

CCCG = 3, Gamma = 0.048

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9901336	0.9966331	0.9976089	0.9998007	3.136E+02	1.059E+00	--
α_2	4.30E-05	2.30E-03	1.36E-03	7.77E-03	7.137E-01	3.094E+02	0.805
α_3	3.83E-07	1.07E-03	3.22E-04	4.65E-03	3.458E-01	3.243E+02	0.768

CCCG = 4, Gamma = 0.048

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9910781	0.9961658	0.9967464	0.9992688	5.494E+02	2.115E+00	--
α_2	3.45E-04	2.79E-03	2.22E-03	7.18E-03	1.549E+00	5.538E+02	0.876
α_3	1.47E-08	4.72E-04	9.23E-05	2.24E-03	2.646E-01	5.606E+02	0.867
α_4	6.33E-08	5.73E-04	1.41E-04	2.62E-03	3.010E-01	5.248E+02	0.926

CCCG = 5, Gamma = 0.048

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9933838	0.9963257	0.9965514	0.9984969	1.444E+03	5.325E+00	--
α_2	8.01E-04	2.51E-03	2.29E-03	4.99E-03	3.632E+00	1.442E+03	0.972
α_3	9.19E-05	9.36E-04	7.19E-04	2.52E-03	1.354E+00	1.445E+03	0.971
α_4	1.88E-08	1.98E-04	4.73E-05	9.10E-04	2.961E-01	1.494E+03	0.940
α_5	8.40E-35	2.82E-05	3.11E-11	1.40E-04	4.243E-02	1.503E+03	0.935

CCCG = 6, Gamma = 0.048

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9929389	0.9961506	0.9964054	0.9984924	1.277E+03	4.936E+00	--
α_2	5.99E-04	2.25E-03	2.00E-03	4.76E-03	2.915E+00	1.291E+03	0.981
α_3	8.43E-05	9.88E-04	7.42E-04	2.73E-03	1.257E+00	1.271E+03	0.997
α_4	1.55E-06	3.81E-04	1.74E-04	1.46E-03	5.031E-01	1.320E+03	0.961
α_5	2.49E-15	8.61E-05	1.14E-06	4.94E-04	1.155E-01	1.341E+03	0.947
α_6	6.64E-13	1.42E-04	5.20E-06	7.87E-04	1.451E-01	1.021E+03	1.243

CCCG = 7, Gamma = 0.048

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9943130	0.9964008	0.9965234	0.9980701	2.673E+03	9.654E+00	--
α_2	7.00E-04	1.81E-03	1.69E-03	3.33E-03	4.851E+00	2.679E+03	1.018
α_3	2.70E-04	1.05E-03	9.32E-04	2.26E-03	2.800E+00	2.653E+03	1.029
α_4	5.22E-05	5.11E-04	3.94E-04	1.37E-03	1.384E+00	2.708E+03	1.009
α_5	6.40E-07	1.81E-04	8.09E-05	7.00E-04	4.902E-01	2.709E+03	1.009
α_6	9.70E-16	4.08E-05	5.17E-07	2.34E-04	1.146E-01	2.809E+03	0.973
α_7	2.77E-93	5.28E-06	5.61E-25	6.27E-06	1.464E-02	2.775E+03	0.985

CCCG = 8, Gamma = 0.048

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9939801	0.9964217	0.9965859	0.9983025	1.990E+03	7.148E+00	--
α_2	3.97E-04	1.47E-03	1.31E-03	3.08E-03	2.980E+00	2.031E+03	1.017
α_3	1.69E-04	9.76E-04	8.16E-04	2.33E-03	1.960E+00	2.006E+03	1.031
α_4	4.17E-05	5.70E-04	4.18E-04	1.62E-03	1.166E+00	2.044E+03	1.012
α_5	1.47E-06	2.60E-04	1.26E-04	9.72E-04	5.375E-01	2.070E+03	1.000
α_6	1.99E-11	9.02E-05	7.00E-06	4.77E-04	1.805E-01	2.002E+03	1.034
α_7	9.69E-36	1.87E-05	1.40E-11	9.17E-05	4.139E-02	2.208E+03	0.937
α_8	1.21E-08	1.98E-04	4.38E-05	9.25E-04	2.827E-01	1.424E+03	1.453

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	2.77E-03	2.30E-03	2.79E-03	2.51E-03	2.25E-03	1.81E-03	1.47E-03
α_3		1.07E-03	4.72E-04	9.36E-04	9.88E-04	1.05E-03	9.76E-04
α_4			5.73E-04	1.98E-04	3.81E-04	5.11E-04	5.70E-04
α_5				2.82E-05	8.61E-05	1.81E-04	2.60E-04
α_6					1.42E-04	4.08E-05	9.02E-05
α_7						5.28E-06	1.87E-05
α_8							1.98E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	2.77E-03	3.37E-03	3.83E-03	3.67E-03	3.85E-03	3.60E-03	3.58E-03
Gamma		3.16E-01	2.73E-01	3.16E-01	4.15E-01	4.98E-01	5.91E-01
Delta			5.49E-01	1.95E-01	3.81E-01	4.12E-01	5.38E-01
Epsilon				1.25E-01	3.75E-01	3.08E-01	4.99E-01
Mu					6.22E-01	2.03E-01	5.42E-01
Omega						1.14E-01	7.07E-01
Sigma							9.14E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.50	1.50	1.50	1.50	1.50	1.50	1.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.5.3 AFW-MOV-OO: AFW Motor-Operated Valves Fail to Close

Generic CCF Parameters

System Group: Clean Water
System: Auxiliary Feedwater
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 21.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9587708	0.9894669	0.9954242	0.9999680	1.0000000	4.401E+01	4.685E-01
α_2	2.95E-05	1.05E-02	4.58E-03	4.12E-02	0.00E+00	4.685E-01	4.401E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9601459	0.9860230	0.9897844	0.9990346	1.0000000	7.958E+01	1.128E+00
α_2	3.53E-04	1.05E-02	6.87E-03	3.33E-02	0.00E+00	8.512E-01	7.986E+01
α_3	1.71E-07	3.43E-03	7.34E-04	1.61E-02	0.00E+00	2.768E-01	8.043E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9602635	0.9834140	0.9861468	0.9972247	1.0000000	1.123E+02	1.894E+00
α_2	9.53E-04	1.10E-02	8.34E-03	3.03E-02	0.00E+00	1.260E+00	1.129E+02
α_3	3.83E-06	3.52E-03	1.29E-03	1.46E-02	0.00E+00	4.024E-01	1.138E+02
α_4	1.41E-08	2.03E-03	3.02E-04	1.00E-02	0.00E+00	2.315E-01	1.139E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9680655	0.9841009	0.9855695	0.9951160	1.0000000	2.124E+02	3.432E+00
α_2	1.52E-03	8.91E-03	7.45E-03	2.13E-02	0.00E+00	1.924E+00	2.139E+02
α_3	2.81E-04	4.86E-03	3.44E-03	1.43E-02	0.00E+00	1.049E+00	2.148E+02
α_4	1.35E-06	1.77E-03	6.10E-04	7.47E-03	0.00E+00	3.822E-01	2.155E+02
α_5	3.09E-20	3.56E-04	3.31E-07	2.07E-03	0.00E+00	7.674E-02	2.158E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9701712	0.9847004	0.9859688	0.9948934	1.0000000	2.468E+02	3.835E+00
α_2	9.73E-04	6.79E-03	5.53E-03	1.69E-02	0.00E+00	1.701E+00	2.490E+02
α_3	3.80E-04	4.82E-03	3.58E-03	1.35E-02	0.00E+00	1.207E+00	2.494E+02
α_4	2.18E-05	2.38E-03	1.25E-03	8.57E-03	0.00E+00	5.960E-01	2.501E+02

α_5	3.45E-09	8.82E-04	1.18E-04	4.42E-03	0.00E+00	2.211E-01	2.504E+02
α_6	3.45E-15	4.38E-04	4.43E-06	2.53E-03	0.00E+00	1.098E-01	2.505E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9746219	0.9856009	0.9864023	0.9938371	1.0000000	3.934E+02	5.747E+00
α_2	1.15E-03	5.62E-03	4.82E-03	1.28E-02	0.00E+00	2.243E+00	3.969E+02
α_3	5.48E-04	4.08E-03	3.29E-03	1.03E-02	0.00E+00	1.630E+00	3.975E+02
α_4	1.69E-04	2.71E-03	1.94E-03	7.89E-03	0.00E+00	1.083E+00	3.981E+02
α_5	1.02E-05	1.42E-03	7.14E-04	5.20E-03	0.00E+00	5.654E-01	3.986E+02
α_6	2.64E-10	4.80E-04	4.43E-05	2.50E-03	0.00E+00	1.916E-01	3.990E+02
α_7	5.97E-41	8.72E-05	3.24E-12	3.82E-04	0.00E+00	3.480E-02	3.991E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9757939	0.9862810	0.9870485	0.9941372	1.0000000	4.116E+02	5.726E+00
α_2	8.72E-04	4.84E-03	4.07E-03	1.14E-02	0.00E+00	2.018E+00	4.153E+02
α_3	3.44E-04	3.33E-03	2.58E-03	8.89E-03	0.00E+00	1.391E+00	4.160E+02
α_4	1.51E-04	2.54E-03	1.81E-03	7.45E-03	0.00E+00	1.062E+00	4.163E+02
α_5	2.97E-05	1.68E-03	9.84E-04	5.72E-03	0.00E+00	7.026E-01	4.166E+02
α_6	3.29E-07	8.38E-04	2.57E-04	3.64E-03	0.00E+00	3.497E-01	4.170E+02
α_7	1.26E-15	2.58E-04	2.37E-06	1.49E-03	0.00E+00	1.078E-01	4.172E+02
α_8	2.64E-17	2.27E-04	9.61E-07	1.32E-03	0.00E+00	9.469E-02	4.173E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.86E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
α_2	1.05E-02	1.05E-02	1.10E-02	8.91E-03	6.79E-03	5.62E-03	4.84E-03
α_3		3.43E-03	3.52E-03	4.86E-03	4.82E-03	4.08E-03	3.33E-03
α_4			2.03E-03	1.77E-03	2.38E-03	2.71E-03	2.54E-03
α_5				3.56E-04	8.82E-04	1.42E-03	1.68E-03
α_6					4.38E-04	4.80E-04	8.38E-04
α_7						8.72E-05	2.58E-04
α_8							2.27E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.86E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
Beta	1.05E-02	1.40E-02	1.66E-02	1.59E-02	1.53E-02	1.44E-02	1.37E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	21.60	21.60	21.60	21.60	21.60	21.60	21.60
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 7.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.347

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9764203	0.9939196	0.9972954	0.9999799	7.902E+01	4.834E-01	--
α_2	2.01E-05	6.08E-03	2.70E-03	2.36E-02	4.834E-01	7.902E+01	0.652

CCCG = 3, Gamma = 0.347

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9805013	0.9929874	0.9947563	0.9994282	1.735E+02	1.226E+00	--
α_2	2.71E-04	5.57E-03	3.84E-03	1.68E-02	9.769E-01	1.743E+02	0.790
α_3	2.30E-08	1.44E-03	2.50E-04	6.98E-03	2.487E-01	1.724E+02	0.802

CCCG = 4, Gamma = 0.347

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9784844	0.9908117	0.9922272	0.9982993	2.218E+02	2.057E+00	--
α_2	7.05E-04	6.39E-03	5.00E-03	1.68E-02	1.442E+00	2.243E+02	0.848
α_3	2.30E-06	1.83E-03	6.89E-04	7.54E-03	4.114E-01	2.239E+02	0.854
α_4	1.27E-09	9.65E-04	1.05E-04	4.95E-03	2.036E-01	2.108E+02	0.908

CCCG = 5, Gamma = 0.347

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9816761	0.9907232	0.9915338	0.9970010	3.933E+02	3.683E+00	--
α_2	1.15E-03	5.64E-03	4.84E-03	1.29E-02	2.243E+00	3.952E+02	0.910
α_3	1.26E-04	2.51E-03	1.74E-03	7.54E-03	9.912E-01	3.938E+02	0.916
α_4	6.44E-07	9.44E-04	3.19E-04	4.01E-03	3.765E-01	3.983E+02	0.908
α_5	1.54E-21	1.78E-04	1.01E-07	1.03E-03	7.237E-02	4.063E+02	0.890

CCCG = 6, Gamma = 0.347

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9822806	0.9907470	0.9914679	0.9967508	4.432E+02	4.139E+00	--
α_2	8.97E-04	4.66E-03	3.96E-03	1.08E-02	2.128E+00	4.542E+02	0.903
α_3	1.77E-04	2.57E-03	1.87E-03	7.36E-03	1.134E+00	4.397E+02	0.934
α_4	8.05E-06	1.23E-03	6.11E-04	4.56E-03	5.533E-01	4.486E+02	0.917
α_5	1.88E-09	4.84E-04	6.46E-05	2.43E-03	2.210E-01	4.564E+02	0.902
α_6	3.83E-16	3.01E-04	2.09E-06	1.75E-03	1.027E-01	3.411E+02	1.207

CCCG = 7, Gamma = 0.347

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9851820	0.9913851	0.9918199	0.9961036	7.402E+02	6.432E+00	--
α_2	9.62E-04	3.70E-03	3.28E-03	7.88E-03	2.840E+00	7.646E+02	0.906
α_3	3.59E-04	2.42E-03	1.98E-03	5.99E-03	1.746E+00	7.199E+02	0.963
α_4	9.15E-05	1.47E-03	1.05E-03	4.27E-03	1.084E+00	7.370E+02	0.942
α_5	4.11E-06	7.23E-04	3.50E-04	2.71E-03	5.376E-01	7.428E+02	0.935
α_6	2.34E-10	2.66E-04	2.69E-05	1.38E-03	1.979E-01	7.426E+02	0.936
α_7	8.15E-53	3.64E-05	3.65E-15	1.24E-04	2.656E-02	7.296E+02	0.953

CCCG = 8, Gamma = 0.347

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9857508	0.9918130	0.9922480	0.9963900	7.405E+02	6.112E+00	--
α_2	6.55E-04	3.03E-03	2.61E-03	6.81E-03	2.364E+00	7.789E+02	0.889
α_3	2.48E-04	2.08E-03	1.65E-03	5.41E-03	1.512E+00	7.244E+02	0.957
α_4	8.53E-05	1.45E-03	1.03E-03	4.27E-03	1.056E+00	7.249E+02	0.957
α_5	1.36E-05	9.01E-04	5.13E-04	3.11E-03	6.745E-01	7.480E+02	0.928
α_6	5.58E-08	4.16E-04	1.06E-04	1.89E-03	3.076E-01	7.398E+02	0.939
α_7	1.05E-15	1.50E-04	1.48E-06	8.63E-04	1.093E-01	7.303E+02	0.951
α_8	2.43E-18	1.57E-04	4.37E-07	9.17E-04	8.885E-02	5.650E+02	1.229

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01
α_2	6.08E-03	5.57E-03	6.39E-03	5.64E-03	4.66E-03	3.70E-03	3.03E-03
α_3		1.44E-03	1.83E-03	2.51E-03	2.57E-03	2.42E-03	2.08E-03
α_4			9.65E-04	9.44E-04	1.23E-03	1.47E-03	1.45E-03
α_5				1.78E-04	4.84E-04	7.23E-04	9.01E-04
α_6					3.01E-04	2.66E-04	4.16E-04
α_7						3.64E-05	1.50E-04
α_8							1.57E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01
Beta	6.08E-03	7.01E-03	9.19E-03	9.28E-03	9.25E-03	8.61E-03	8.19E-03
Gamma		2.05E-01	3.05E-01	3.92E-01	4.96E-01	5.70E-01	6.30E-01
Delta			3.45E-01	3.09E-01	4.39E-01	5.08E-01	5.96E-01
Epsilon				1.59E-01	3.89E-01	4.11E-01	5.27E-01
Mu					3.83E-01	2.95E-01	4.45E-01
Omega						1.20E-01	4.25E-01
Sigma							5.12E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.50	7.50	7.50	7.50	7.50	7.50	7.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.185

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9358562	0.9838096	0.9931803	0.9999638	2.733E+01	4.498E-01	--
α_2	3.62E-05	1.62E-02	6.82E-03	6.41E-02	4.498E-01	2.733E+01	0.652

CCCG = 3, Gamma = 0.185

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9343700	0.9765207	0.9825013	0.9982082	4.901E+01	1.178E+00	--
α_2	8.28E-04	1.86E-02	1.28E-02	5.66E-02	9.387E-01	4.940E+01	0.790
α_3	5.09E-08	4.83E-03	7.82E-04	2.37E-02	2.396E-01	4.935E+01	0.802

CCCG = 4, Gamma = 0.185

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9311370	0.9710697	0.9757163	0.9950970	6.372E+01	1.898E+00	--
α_2	1.75E-03	1.94E-02	1.48E-02	5.27E-02	1.285E+00	6.495E+01	0.848
α_3	5.52E-06	5.97E-03	2.14E-03	2.49E-02	3.927E-01	6.543E+01	0.854
α_4	1.37E-08	3.56E-03	4.78E-04	1.79E-02	2.207E-01	6.169E+01	0.908

CCCG = 5, Gamma = 0.185

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9438383	0.9717496	0.9742479	0.9911194	1.206E+02	3.506E+00	--
α_2	2.86E-03	1.60E-02	1.35E-02	3.78E-02	1.992E+00	1.223E+02	0.910
α_3	5.41E-04	8.73E-03	6.26E-03	2.54E-02	1.078E+00	1.223E+02	0.916
α_4	1.53E-06	2.91E-03	9.44E-04	1.25E-02	3.632E-01	1.243E+02	0.908
α_5	5.27E-21	5.71E-04	3.30E-07	3.30E-03	7.248E-02	1.270E+02	0.890

CCCG = 6, Gamma = 0.185

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9477675	0.9724490	0.9744913	0.9901506	1.482E+02	4.199E+00	--
α_2	2.15E-03	1.25E-02	1.05E-02	2.97E-02	1.941E+00	1.535E+02	0.903
α_3	8.51E-04	8.87E-03	6.81E-03	2.40E-02	1.332E+00	1.488E+02	0.934
α_4	4.34E-05	4.04E-03	2.18E-03	1.44E-02	6.181E-01	1.523E+02	0.917
α_5	1.02E-08	1.49E-03	2.21E-04	7.37E-03	2.313E-01	1.553E+02	0.902
α_6	6.04E-20	6.61E-04	6.24E-07	3.85E-03	7.684E-02	1.161E+02	1.207

CCCG = 7, Gamma = 0.185

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9543651	0.9735307	0.9748632	0.9881451	2.289E+02	6.223E+00	--
α_2	2.69E-03	1.10E-02	9.66E-03	2.38E-02	2.654E+00	2.391E+02	0.906
α_3	9.87E-04	7.24E-03	5.85E-03	1.82E-02	1.645E+00	2.257E+02	0.963
α_4	3.19E-04	4.80E-03	3.47E-03	1.38E-02	1.115E+00	2.314E+02	0.942
α_5	2.49E-05	2.58E-03	1.37E-03	9.24E-03	6.034E-01	2.335E+02	0.935
α_6	1.35E-10	7.61E-04	5.67E-05	4.04E-03	1.780E-01	2.338E+02	0.936
α_7	6.48E-51	1.19E-04	2.44E-14	4.20E-04	2.734E-02	2.298E+02	0.953

CCCG = 8, Gamma = 0.185

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9558496	0.9743767	0.9756641	0.9885066	2.375E+02	6.246E+00	--
α_2	2.27E-03	9.83E-03	8.58E-03	2.17E-02	2.504E+00	2.522E+02	0.889
α_3	6.43E-04	6.00E-03	4.68E-03	1.59E-02	1.419E+00	2.352E+02	0.957
α_4	2.39E-04	4.34E-03	3.05E-03	1.29E-02	1.027E+00	2.356E+02	0.957
α_5	6.20E-05	3.01E-03	1.80E-03	1.00E-02	7.337E-01	2.433E+02	0.928
α_6	1.64E-06	1.65E-03	5.95E-04	6.86E-03	3.975E-01	2.408E+02	0.939
α_7	3.24E-20	3.24E-04	3.11E-07	1.88E-03	7.703E-02	2.380E+02	0.951
α_8	4.41E-18	4.75E-04	1.19E-06	2.77E-03	8.749E-02	1.841E+02	1.229

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.77E-01	9.71E-01	9.72E-01	9.72E-01	9.74E-01	9.74E-01
α_2	1.62E-02	1.86E-02	1.94E-02	1.60E-02	1.25E-02	1.10E-02	9.83E-03
α_3		4.83E-03	5.97E-03	8.73E-03	8.87E-03	7.24E-03	6.00E-03
α_4			3.56E-03	2.91E-03	4.04E-03	4.80E-03	4.34E-03
α_5				5.71E-04	1.49E-03	2.58E-03	3.01E-03
α_6					6.61E-04	7.61E-04	1.65E-03
α_7						1.19E-04	3.24E-04
α_8							4.75E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.77E-01	9.71E-01	9.72E-01	9.72E-01	9.74E-01	9.74E-01
Beta	1.62E-02	2.35E-02	2.89E-02	2.83E-02	2.76E-02	2.65E-02	2.56E-02
Gamma		2.06E-01	3.29E-01	4.33E-01	5.47E-01	5.85E-01	6.16E-01
Delta			3.74E-01	2.85E-01	4.11E-01	5.33E-01	6.20E-01
Epsilon				1.64E-01	3.47E-01	4.19E-01	5.57E-01
Mu					3.08E-01	2.55E-01	4.49E-01
Omega						1.35E-01	3.26E-01
Sigma							5.95E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.046

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8392842	0.9614312	0.9859523	0.9999698	9.475E+00	3.801E-01	--
α_2	3.02E-05	3.86E-02	1.40E-02	1.61E-01	3.801E-01	9.475E+00	0.652

CCCG = 3, Gamma = 0.046

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8454148	0.9476975	0.9630324	0.9974493	1.739E+01	9.600E-01	--
α_2	5.50E-04	3.62E-02	2.12E-02	1.23E-01	6.673E-01	1.777E+01	0.790
α_3	1.42E-06	1.61E-02	3.90E-03	7.41E-02	2.927E-01	1.787E+01	0.802

CCCG = 4, Gamma = 0.046

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8523894	0.9395653	0.9499202	0.9912304	2.595E+01	1.669E+00	--
α_2	2.17E-03	3.72E-02	2.68E-02	1.08E-01	1.039E+00	2.690E+01	0.848
α_3	1.22E-05	1.40E-02	5.02E-03	5.85E-02	3.887E-01	2.737E+01	0.854
α_4	1.07E-07	9.24E-03	1.54E-03	4.53E-02	2.414E-01	2.587E+01	0.908

CCCG = 5, Gamma = 0.046

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8939603	0.9462224	0.9507632	0.9829471	6.135E+01	3.487E+00	--
α_2	4.32E-03	2.76E-02	2.29E-02	6.69E-02	1.791E+00	6.315E+01	0.910
α_3	1.49E-03	1.87E-02	1.40E-02	5.20E-02	1.207E+00	6.330E+01	0.916
α_4	1.18E-05	6.66E-03	2.67E-03	2.68E-02	4.340E-01	6.471E+01	0.908
α_5	1.84E-26	8.27E-04	2.95E-08	4.56E-03	5.493E-02	6.634E+01	0.890

CCCG = 6, Gamma = 0.046

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9060369	0.9509898	0.9547273	0.9831598	7.576E+01	3.905E+00	--
α_2	1.59E-03	1.64E-02	1.26E-02	4.40E-02	1.335E+00	8.016E+01	0.903
α_3	2.39E-03	1.94E-02	1.55E-02	4.98E-02	1.531E+00	7.720E+01	0.934
α_4	1.73E-04	8.96E-03	5.34E-03	3.01E-02	7.191E-01	7.950E+01	0.917
α_5	4.43E-08	3.03E-03	5.18E-04	1.47E-02	2.467E-01	8.130E+01	0.902
α_6	1.32E-20	1.19E-03	7.21E-07	6.94E-03	7.279E-02	6.086E+01	1.207

CCCG = 7, Gamma = 0.046

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9226701	0.9556788	0.9579968	0.9807666	1.244E+02	5.770E+00	--
α_2	1.43E-03	1.15E-02	9.17E-03	2.94E-02	1.549E+00	1.333E+02	0.906
α_3	2.80E-03	1.57E-02	1.32E-02	3.70E-02	1.989E+00	1.249E+02	0.963
α_4	8.93E-04	9.92E-03	7.54E-03	2.71E-02	1.287E+00	1.284E+02	0.942
α_5	8.84E-05	5.29E-03	3.07E-03	1.80E-02	6.913E-01	1.300E+02	0.935
α_6	1.32E-08	1.78E-03	2.69E-04	8.81E-03	2.327E-01	1.303E+02	0.936
α_7	1.12E-64	1.65E-04	2.50E-17	4.15E-04	2.112E-02	1.282E+02	0.953

CCCG = 8, Gamma = 0.046

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9326137	0.9596982	0.9614487	0.9808036	1.671E+02	7.016E+00	--
α_2	1.11E-03	8.64E-03	6.93E-03	2.20E-02	1.583E+00	1.817E+02	0.889
α_3	2.07E-03	1.17E-02	9.81E-03	2.76E-02	1.986E+00	1.683E+02	0.957
α_4	1.37E-03	9.82E-03	7.97E-03	2.46E-02	1.672E+00	1.687E+02	0.957
α_5	3.05E-04	5.75E-03	4.02E-03	1.71E-02	1.011E+00	1.747E+02	0.928
α_6	2.49E-05	3.29E-03	1.67E-03	1.20E-02	5.709E-01	1.731E+02	0.939
α_7	2.42E-10	1.06E-03	8.27E-05	5.58E-03	1.809E-01	1.712E+02	0.951
α_8	1.36E-107	9.39E-05	2.84E-27	7.04E-05	1.245E-02	1.326E+02	1.229

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.61E-01	9.48E-01	9.40E-01	9.46E-01	9.51E-01	9.56E-01	9.60E-01
α_2	3.86E-02	3.62E-02	3.72E-02	2.76E-02	1.64E-02	1.15E-02	8.64E-03
α_3		1.61E-02	1.40E-02	1.87E-02	1.94E-02	1.57E-02	1.17E-02
α_4			9.24E-03	6.66E-03	8.96E-03	9.92E-03	9.82E-03
α_5				8.27E-04	3.03E-03	5.29E-03	5.75E-03
α_6					1.19E-03	1.78E-03	3.29E-03
α_7						1.65E-04	1.06E-03
α_8							9.39E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.61E-01	9.48E-01	9.40E-01	9.46E-01	9.51E-01	9.56E-01	9.60E-01
Beta	3.86E-02	5.23E-02	6.04E-02	5.38E-02	4.90E-02	4.43E-02	4.03E-02
Gamma		3.08E-01	3.85E-01	4.87E-01	6.66E-01	7.41E-01	7.86E-01
Delta			3.98E-01	2.86E-01	4.04E-01	5.22E-01	6.32E-01
Epsilon				1.10E-01	3.20E-01	4.22E-01	5.09E-01
Mu					2.83E-01	2.69E-01	4.35E-01
Omega						8.46E-02	2.59E-01
Sigma							8.17E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 8.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9631653	0.9905787	0.9958941	0.9999730	4.948E+01	4.706E-01	--
α_2	2.70E-05	9.42E-03	4.11E-03	3.68E-02	4.706E-01	4.948E+01	0.652

CCCG = 3, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9642657	0.9875781	0.9910021	0.9991876	8.765E+01	1.103E+00	--
α_2	2.62E-04	9.09E-03	5.78E-03	2.92E-02	8.104E-01	8.830E+01	0.790
α_3	2.80E-07	3.33E-03	7.81E-04	1.53E-02	2.921E-01	8.749E+01	0.802

CCCG = 4, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9676064	0.9863643	0.9885555	0.9976283	1.412E+02	1.953E+00	--
α_2	8.47E-04	9.08E-03	6.94E-03	2.46E-02	1.312E+00	1.432E+02	0.848
α_3	5.04E-06	3.00E-03	1.19E-03	1.21E-02	4.307E-01	1.431E+02	0.854
α_4	3.10E-09	1.55E-03	1.84E-04	7.91E-03	2.099E-01	1.348E+02	0.908

CCCG = 5, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9733119	0.9870919	0.9884153	0.9963486	2.376E+02	3.107E+00	--
α_2	9.87E-04	6.99E-03	5.68E-03	1.75E-02	1.684E+00	2.392E+02	0.910
α_3	1.74E-04	3.94E-03	2.67E-03	1.20E-02	9.426E-01	2.384E+02	0.916
α_4	1.19E-06	1.58E-03	5.43E-04	6.67E-03	3.816E-01	2.413E+02	0.908
α_5	1.60E-16	4.01E-04	2.19E-06	2.33E-03	9.865E-02	2.462E+02	0.890

CCCG = 6, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9760880	0.9877601	0.9887856	0.9959287	3.085E+02	3.822E+00	--
α_2	7.78E-04	5.37E-03	4.38E-03	1.34E-02	1.714E+00	3.172E+02	0.903
α_3	2.36E-04	3.60E-03	2.60E-03	1.04E-02	1.108E+00	3.070E+02	0.934
α_4	2.74E-05	2.07E-03	1.16E-03	7.24E-03	6.509E-01	3.133E+02	0.917
α_5	1.57E-08	7.95E-04	1.43E-04	3.83E-03	2.536E-01	3.189E+02	0.902
α_6	6.51E-17	4.01E-04	1.82E-06	2.34E-03	9.572E-02	2.384E+02	1.207

CCCG = 7, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9790842	0.9884252	0.9891427	0.9953156	4.436E+02	5.195E+00	--
α_2	8.65E-04	4.56E-03	3.87E-03	1.06E-02	2.105E+00	4.597E+02	0.906
α_3	2.85E-04	3.04E-03	2.32E-03	8.26E-03	1.320E+00	4.329E+02	0.963
α_4	1.14E-04	2.24E-03	1.56E-03	6.72E-03	9.967E-01	4.431E+02	0.942
α_5	5.93E-06	1.17E-03	5.58E-04	4.43E-03	5.249E-01	4.468E+02	0.935
α_6	3.25E-10	4.38E-04	4.28E-05	2.27E-03	1.956E-01	4.467E+02	0.936
α_7	3.44E-28	1.21E-04	2.73E-09	6.54E-04	5.291E-02	4.390E+02	0.953

CCCG = 8, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9805351	0.9889284	0.9895412	0.9952291	5.209E+02	5.832E+00	--
α_2	8.21E-04	4.05E-03	3.46E-03	9.26E-03	2.229E+00	5.485E+02	0.889
α_3	2.11E-04	2.46E-03	1.85E-03	6.80E-03	1.260E+00	5.105E+02	0.957
α_4	1.16E-04	2.04E-03	1.44E-03	6.01E-03	1.042E+00	5.107E+02	0.957
α_5	3.39E-05	1.44E-03	8.84E-04	4.77E-03	7.626E-01	5.270E+02	0.928
α_6	1.43E-07	6.27E-04	1.75E-04	2.79E-03	3.271E-01	5.214E+02	0.939
α_7	2.53E-13	2.61E-04	6.99E-06	1.47E-03	1.344E-01	5.147E+02	0.951
α_8	1.74E-20	1.93E-04	1.81E-07	1.12E-03	7.682E-02	3.983E+02	1.229

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.88E-01	9.86E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01
α_2	9.42E-03	9.09E-03	9.08E-03	6.99E-03	5.37E-03	4.56E-03	4.05E-03
α_3		3.33E-03	3.00E-03	3.94E-03	3.60E-03	3.04E-03	2.46E-03
α_4			1.55E-03	1.58E-03	2.07E-03	2.24E-03	2.04E-03
α_5				4.01E-04	7.95E-04	1.17E-03	1.44E-03
α_6					4.01E-04	4.38E-04	6.27E-04
α_7						1.21E-04	2.61E-04
α_8							1.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.88E-01	9.86E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01
Beta	9.42E-03	1.24E-02	1.36E-02	1.29E-02	1.22E-02	1.16E-02	1.11E-02
Gamma		2.68E-01	3.34E-01	4.59E-01	5.61E-01	6.06E-01	6.34E-01
Delta			3.41E-01	3.34E-01	4.76E-01	5.67E-01	6.49E-01
Epsilon				2.02E-01	3.66E-01	4.36E-01	5.54E-01
Mu					3.36E-01	3.22E-01	4.28E-01
Omega						2.16E-01	4.20E-01
Sigma							4.25E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.00	8.00	8.00	8.00	8.00	8.00	8.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.051

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9887412	0.9970798	0.9986827	0.9999893	1.684E+02	4.932E-01	--
α_2	1.07E-05	2.92E-03	1.32E-03	1.13E-02	4.932E-01	1.684E+02	0.652

CCCG = 3, Gamma = 0.051

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9901081	0.9966244	0.9976027	0.9998002	3.128E+02	1.059E+00	--
α_2	4.23E-05	2.26E-03	1.33E-03	7.64E-03	7.137E-01	3.147E+02	0.790
α_3	4.00E-07	1.11E-03	3.36E-04	4.86E-03	3.458E-01	3.104E+02	0.802

CCCG = 4, Gamma = 0.051

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9913177	0.9962689	0.9968340	0.9992885	5.646E+02	2.115E+00	--
α_2	3.35E-04	2.70E-03	2.15E-03	6.96E-03	1.549E+00	5.713E+02	0.848
α_3	1.45E-08	4.65E-04	9.09E-05	2.21E-03	2.646E-01	5.689E+02	0.854
α_4	6.21E-08	5.62E-04	1.38E-04	2.57E-03	3.010E-01	5.351E+02	0.908

CCCG = 5, Gamma = 0.051

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9937769	0.9965442	0.9967566	0.9985864	1.535E+03	5.325E+00	--
α_2	7.51E-04	2.35E-03	2.14E-03	4.68E-03	3.632E+00	1.539E+03	0.910
α_3	8.68E-05	8.84E-04	6.78E-04	2.38E-03	1.354E+00	1.531E+03	0.916
α_4	1.82E-08	1.91E-04	4.57E-05	8.79E-04	2.961E-01	1.547E+03	0.908
α_5	8.01E-35	2.69E-05	2.96E-11	1.33E-04	4.243E-02	1.577E+03	0.890

CCCG = 6, Gamma = 0.051

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9934268	0.9964169	0.9966542	0.9985969	1.373E+03	4.936E+00	--
α_2	5.52E-04	2.07E-03	1.84E-03	4.38E-03	2.915E+00	1.403E+03	0.903
α_3	7.90E-05	9.26E-04	6.95E-04	2.56E-03	1.257E+00	1.357E+03	0.934
α_4	1.48E-06	3.64E-04	1.66E-04	1.39E-03	5.031E-01	1.383E+03	0.917
α_5	2.38E-15	8.21E-05	1.08E-06	4.71E-04	1.155E-01	1.406E+03	0.902
α_6	6.46E-13	1.38E-04	5.06E-06	7.65E-04	1.451E-01	1.051E+03	1.207

CCCG = 7, Gamma = 0.051

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9948115	0.9967165	0.9968285	0.9982395	2.931E+03	9.654E+00	--
α_2	6.23E-04	1.61E-03	1.50E-03	2.96E-03	4.851E+00	3.013E+03	0.906
α_3	2.53E-04	9.87E-04	8.72E-04	2.11E-03	2.800E+00	2.835E+03	0.963
α_4	4.87E-05	4.77E-04	3.68E-04	1.28E-03	1.384E+00	2.900E+03	0.942
α_5	5.94E-07	1.68E-04	7.50E-05	6.49E-04	4.902E-01	2.922E+03	0.935
α_6	9.33E-16	3.92E-05	4.97E-07	2.25E-04	1.146E-01	2.920E+03	0.936
α_7	2.68E-93	5.10E-06	5.43E-25	6.06E-06	1.464E-02	2.869E+03	0.953

CCCG = 8, Gamma = 0.051

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9945550	0.9967637	0.9969124	0.9984649	2.202E+03	7.148E+00	--
α_2	3.47E-04	1.28E-03	1.14E-03	2.69E-03	2.980E+00	2.324E+03	0.889
α_3	1.57E-04	9.07E-04	7.58E-04	2.16E-03	1.960E+00	2.160E+03	0.957
α_4	3.94E-05	5.39E-04	3.95E-04	1.53E-03	1.166E+00	2.161E+03	0.957
α_5	1.37E-06	2.41E-04	1.17E-04	9.02E-04	5.375E-01	2.229E+03	0.928
α_6	1.81E-11	8.19E-05	6.35E-06	4.33E-04	1.805E-01	2.204E+03	0.939
α_7	9.84E-36	1.90E-05	1.42E-11	9.30E-05	4.139E-02	2.175E+03	0.951
α_8	1.02E-08	1.68E-04	3.70E-05	7.83E-04	2.827E-01	1.683E+03	1.229

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01
α_2	2.92E-03	2.26E-03	2.70E-03	2.35E-03	2.07E-03	1.61E-03	1.28E-03
α_3		1.11E-03	4.65E-04	8.84E-04	9.26E-04	9.87E-04	9.07E-04
α_4			5.62E-04	1.91E-04	3.64E-04	4.77E-04	5.39E-04
α_5				2.69E-05	8.21E-05	1.68E-04	2.41E-04
α_6					1.38E-04	3.92E-05	8.19E-05
α_7						5.10E-06	1.90E-05
α_8							1.68E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01
Beta	2.92E-03	3.38E-03	3.73E-03	3.46E-03	3.58E-03	3.28E-03	3.24E-03
Gamma		3.30E-01	2.75E-01	3.19E-01	4.21E-01	5.10E-01	6.04E-01
Delta			5.47E-01	1.98E-01	3.87E-01	4.11E-01	5.36E-01
Epsilon				1.23E-01	3.77E-01	3.08E-01	4.86E-01
Mu					6.27E-01	2.09E-01	5.27E-01
Omega						1.15E-01	6.95E-01
Sigma							8.98E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.10	1.10	1.10	1.10	1.10	1.10	1.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.6 High Pressure Safety Injection Motor-Operated Valves

2.3.6.1 HPI-MOV-FTOC: HPSI Motor-Operated Valves Fail to Open/Close

Generic CCF Parameters

System Group: Clean Water
System: Chemical and Volume Control, High Pressure Injection
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Close, Fail to Open, Fail to Open or Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 25.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9620803	0.9903159	0.9957923	0.9999705	1.0000000	4.791E+01	4.685E-01
α_2	2.71E-05	9.68E-03	4.20E-03	3.79E-02	0.00E+00	4.685E-01	4.791E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9619709	0.9866673	0.9902591	0.9990794	1.0000000	8.348E+01	1.128E+00
α_2	3.37E-04	1.01E-02	6.55E-03	3.18E-02	0.00E+00	8.512E-01	8.376E+01
α_3	1.63E-07	3.27E-03	7.00E-04	1.54E-02	0.00E+00	2.768E-01	8.433E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9615712	0.9839618	0.9866069	0.9973174	1.0000000	1.162E+02	1.894E+00
α_2	9.22E-04	1.07E-02	8.06E-03	2.93E-02	0.00E+00	1.260E+00	1.168E+02
α_3	3.70E-06	3.41E-03	1.25E-03	1.41E-02	0.00E+00	4.024E-01	1.177E+02
α_4	1.36E-08	1.96E-03	2.92E-04	9.71E-03	0.00E+00	2.315E-01	1.178E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9686290	0.9843830	0.9858312	0.9952033	1.0000000	2.163E+02	3.432E+00
α_2	1.49E-03	8.76E-03	7.32E-03	2.09E-02	0.00E+00	1.924E+00	2.178E+02
α_3	2.76E-04	4.77E-03	3.38E-03	1.40E-02	0.00E+00	1.049E+00	2.187E+02
α_4	1.32E-06	1.74E-03	5.99E-04	7.34E-03	0.00E+00	3.822E-01	2.194E+02
α_5	3.03E-20	3.49E-04	3.25E-07	2.03E-03	0.00E+00	7.674E-02	2.197E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9706256	0.9849348	0.9861844	0.9949723	1.0000000	2.507E+02	3.835E+00
α_2	9.58E-04	6.68E-03	5.44E-03	1.66E-02	0.00E+00	1.701E+00	2.529E+02

α_3	3.74E-04	4.74E-03	3.52E-03	1.33E-02	0.00E+00	1.207E+00	2.533E+02
α_4	2.15E-05	2.34E-03	1.23E-03	8.44E-03	0.00E+00	5.960E-01	2.540E+02
α_5	3.40E-09	8.69E-04	1.16E-04	4.36E-03	0.00E+00	2.211E-01	2.543E+02
α_6	3.39E-15	4.31E-04	4.37E-06	2.49E-03	0.00E+00	1.098E-01	2.544E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9748660	0.9857402	0.9865341	0.9938966	1.0000000	3.973E+02	5.747E+00
α_2	1.14E-03	5.57E-03	4.77E-03	1.27E-02	0.00E+00	2.243E+00	4.008E+02
α_3	5.42E-04	4.04E-03	3.26E-03	1.02E-02	0.00E+00	1.630E+00	4.014E+02
α_4	1.67E-04	2.69E-03	1.92E-03	7.82E-03	0.00E+00	1.083E+00	4.020E+02
α_5	1.01E-05	1.40E-03	7.07E-04	5.15E-03	0.00E+00	5.654E-01	4.025E+02
α_6	2.61E-10	4.75E-04	4.39E-05	2.48E-03	0.00E+00	1.916E-01	4.029E+02
α_7	5.91E-41	8.63E-05	3.21E-12	3.79E-04	0.00E+00	3.480E-02	4.030E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9760213	0.9864080	0.9871687	0.9941960	1.0000000	4.155E+02	5.726E+00
α_2	8.64E-04	4.79E-03	4.03E-03	1.13E-02	0.00E+00	2.018E+00	4.192E+02
α_3	3.41E-04	3.30E-03	2.56E-03	8.81E-03	0.00E+00	1.391E+00	4.199E+02
α_4	1.50E-04	2.52E-03	1.79E-03	7.39E-03	0.00E+00	1.062E+00	4.202E+02
α_5	2.94E-05	1.67E-03	9.74E-04	5.66E-03	0.00E+00	7.026E-01	4.205E+02
α_6	3.26E-07	8.30E-04	2.55E-04	3.61E-03	0.00E+00	3.497E-01	4.209E+02
α_7	1.25E-15	2.56E-04	2.35E-06	1.48E-03	0.00E+00	1.078E-01	4.211E+02
α_8	2.62E-17	2.25E-04	9.52E-07	1.31E-03	0.00E+00	9.469E-02	4.212E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.87E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
α_2	9.68E-03	1.01E-02	1.07E-02	8.76E-03	6.68E-03	5.57E-03	4.79E-03
α_3		3.27E-03	3.41E-03	4.77E-03	4.74E-03	4.04E-03	3.30E-03
α_4			1.96E-03	1.74E-03	2.34E-03	2.69E-03	2.52E-03
α_5				3.49E-04	8.69E-04	1.40E-03	1.67E-03
α_6					4.31E-04	4.75E-04	8.30E-04
α_7						8.63E-05	2.56E-04
α_8							2.25E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.87E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
Beta	9.68E-03	1.33E-02	1.60E-02	1.56E-02	1.51E-02	1.43E-02	1.36E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	25.50	25.50	25.50	25.50	25.50	25.50	25.50
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 9.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9759642	0.9938017	0.9972426	0.9999795	7.751E+01	4.834E-01	--
α_2	2.05E-05	6.20E-03	2.76E-03	2.40E-02	4.834E-01	7.751E+01	0.684

CCCG = 3, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787552	0.9923571	0.9942830	0.9993765	1.591E+02	1.226E+00	--
α_2	2.97E-04	6.10E-03	4.21E-03	1.84E-02	9.769E-01	1.591E+02	0.874
α_3	2.46E-08	1.54E-03	2.67E-04	7.47E-03	2.487E-01	1.613E+02	0.866

CCCG = 4, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9761332	0.9898031	0.9913711	0.9981113	1.997E+02	2.057E+00	--
α_2	7.80E-04	7.07E-03	5.54E-03	1.86E-02	1.442E+00	2.026E+02	0.946
α_3	2.57E-06	2.05E-03	7.72E-04	8.45E-03	4.114E-01	1.999E+02	0.964
α_4	1.41E-09	1.07E-03	1.17E-04	5.51E-03	2.036E-01	1.894E+02	1.018

CCCG = 5, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9792680	0.9894995	0.9904149	0.9966034	3.471E+02	3.683E+00	--
α_2	1.30E-03	6.35E-03	5.45E-03	1.45E-02	2.243E+00	3.509E+02	1.029
α_3	1.44E-04	2.87E-03	1.99E-03	8.61E-03	9.912E-01	3.443E+02	1.052
α_4	7.34E-07	1.08E-03	3.64E-04	4.56E-03	3.765E-01	3.495E+02	1.038
α_5	1.75E-21	2.02E-04	1.15E-07	1.17E-03	7.237E-02	3.588E+02	1.012

CCCG = 6, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9799408	0.9895207	0.9903353	0.9963182	3.908E+02	4.139E+00	--
α_2	1.01E-03	5.23E-03	4.45E-03	1.21E-02	2.128E+00	4.047E+02	1.016
α_3	2.04E-04	2.96E-03	2.15E-03	8.46E-03	1.134E+00	3.824E+02	1.078
α_4	9.19E-06	1.41E-03	6.98E-04	5.21E-03	5.533E-01	3.927E+02	1.051
α_5	2.16E-09	5.54E-04	7.40E-05	2.78E-03	2.210E-01	3.986E+02	1.037
α_6	4.21E-16	3.31E-04	2.30E-06	1.92E-03	1.027E-01	3.105E+02	1.331

CCCG = 7, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9830462	0.9901399	0.9906363	0.9955384	6.459E+02	6.432E+00	--
α_2	1.10E-03	4.21E-03	3.73E-03	8.97E-03	2.840E+00	6.711E+02	1.034
α_3	4.11E-04	2.77E-03	2.26E-03	6.85E-03	1.746E+00	6.293E+02	1.104
α_4	1.05E-04	1.69E-03	1.21E-03	4.92E-03	1.084E+00	6.400E+02	1.086
α_5	4.79E-06	8.41E-04	4.08E-04	3.15E-03	5.376E-01	6.383E+02	1.090
α_6	2.69E-10	3.06E-04	3.09E-05	1.58E-03	1.979E-01	6.467E+02	1.077
α_7	9.19E-53	4.10E-05	4.11E-15	1.40E-04	2.656E-02	6.476E+02	1.076

CCCG = 8, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9836836	0.9906220	0.9911191	0.9958631	6.457E+02	6.112E+00	--
α_2	7.51E-04	3.47E-03	3.00E-03	7.81E-03	2.364E+00	6.787E+02	1.022
α_3	2.83E-04	2.37E-03	1.88E-03	6.16E-03	1.512E+00	6.356E+02	1.093
α_4	9.75E-05	1.66E-03	1.18E-03	4.88E-03	1.056E+00	6.341E+02	1.096
α_5	1.58E-05	1.04E-03	5.93E-04	3.59E-03	6.745E-01	6.472E+02	1.075
α_6	6.59E-08	4.90E-04	1.25E-04	2.23E-03	3.076E-01	6.269E+02	1.110
α_7	1.18E-15	1.68E-04	1.66E-06	9.72E-04	1.093E-01	6.486E+02	1.073
α_8	2.64E-18	1.71E-04	4.75E-07	9.97E-04	8.885E-02	5.192E+02	1.341

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.92E-01	9.90E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01
α_2	6.20E-03	6.10E-03	7.07E-03	6.35E-03	5.23E-03	4.21E-03	3.47E-03
α_3		1.54E-03	2.05E-03	2.87E-03	2.96E-03	2.77E-03	2.37E-03
α_4			1.07E-03	1.08E-03	1.41E-03	1.69E-03	1.66E-03
α_5				2.02E-04	5.54E-04	8.41E-04	1.04E-03
α_6					3.31E-04	3.06E-04	4.90E-04
α_7						4.10E-05	1.68E-04
α_8							1.71E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.92E-01	9.90E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01
Beta	6.20E-03	7.64E-03	1.02E-02	1.05E-02	1.05E-02	9.86E-03	9.38E-03
Gamma		2.01E-01	3.07E-01	3.95E-01	5.01E-01	5.73E-01	6.30E-01
Delta			3.43E-01	3.08E-01	4.37E-01	5.10E-01	5.98E-01
Epsilon				1.58E-01	3.86E-01	4.13E-01	5.30E-01
Mu					3.74E-01	2.92E-01	4.44E-01
Omega						1.18E-01	4.09E-01
Sigma							5.04E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	9.00	9.00	9.00	9.00	9.00	9.00	9.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9288430	0.9820254	0.9924093	0.9999597	2.457E+01	4.498E-01	--
α_2	4.03E-05	1.80E-02	7.59E-03	7.12E-02	4.498E-01	2.457E+01	0.684

CCCG = 3, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9259472	0.9734656	0.9801903	0.9979694	4.323E+01	1.178E+00	--
α_2	9.43E-04	2.12E-02	1.45E-02	6.42E-02	9.387E-01	4.339E+01	0.874
α_3	5.65E-08	5.36E-03	8.68E-04	2.63E-02	2.396E-01	4.449E+01	0.866

CCCG = 4, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9217150	0.9670502	0.9723033	0.9944001	5.572E+01	1.898E+00	--
α_2	2.00E-03	2.20E-02	1.68E-02	5.98E-02	1.285E+00	5.706E+01	0.946
α_3	6.35E-06	6.86E-03	2.46E-03	2.86E-02	3.927E-01	5.689E+01	0.964
α_4	1.57E-08	4.07E-03	5.47E-04	2.04E-02	2.207E-01	5.401E+01	1.018

CCCG = 5, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9356568	0.9675839	0.9704272	0.9897888	1.046E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.31E-02	1.992E+00	1.070E+02	1.029
α_3	6.27E-04	1.01E-02	7.26E-03	2.94E-02	1.078E+00	1.055E+02	1.052
α_4	1.77E-06	3.36E-03	1.09E-03	1.44E-02	3.632E-01	1.076E+02	1.038
α_5	6.05E-21	6.54E-04	3.79E-07	3.79E-03	7.248E-02	1.107E+02	1.012

CCCG = 6, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9401958	0.9684109	0.9707338	0.9886864	1.287E+02	4.199E+00	--
α_2	2.45E-03	1.42E-02	1.19E-02	3.37E-02	1.941E+00	1.351E+02	1.016
α_3	9.90E-04	1.03E-02	7.91E-03	2.78E-02	1.332E+00	1.279E+02	1.078
α_4	5.01E-05	4.66E-03	2.52E-03	1.66E-02	6.181E-01	1.319E+02	1.051
α_5	1.18E-08	1.72E-03	2.56E-04	8.53E-03	2.313E-01	1.341E+02	1.037
α_6	6.71E-20	7.34E-04	6.93E-07	4.27E-03	7.684E-02	1.046E+02	1.331

CCCG = 7, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9474597	0.9694891	0.9710125	0.9863148	1.977E+02	6.223E+00	--
α_2	3.08E-03	1.26E-02	1.11E-02	2.72E-02	2.654E+00	2.082E+02	1.034
α_3	1.14E-03	8.33E-03	6.74E-03	2.10E-02	1.645E+00	1.958E+02	1.104
α_4	3.70E-04	5.56E-03	4.03E-03	1.60E-02	1.115E+00	1.995E+02	1.086
α_5	2.92E-05	3.02E-03	1.60E-03	1.08E-02	6.034E-01	1.993E+02	1.090
α_6	1.56E-10	8.79E-04	6.56E-05	4.67E-03	1.780E-01	2.022E+02	1.077
α_7	7.35E-51	1.35E-04	2.77E-14	4.77E-04	2.734E-02	2.026E+02	1.076

CCCG = 8, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9491138	0.9704332	0.9719069	0.9867187	2.050E+02	6.246E+00	--
α_2	2.62E-03	1.14E-02	9.91E-03	2.50E-02	2.504E+00	2.180E+02	1.022
α_3	7.38E-04	6.88E-03	5.36E-03	1.82E-02	1.419E+00	2.049E+02	1.093
α_4	2.75E-04	4.99E-03	3.51E-03	1.48E-02	1.027E+00	2.046E+02	1.096
α_5	7.21E-05	3.50E-03	2.10E-03	1.17E-02	7.337E-01	2.091E+02	1.075
α_6	1.95E-06	1.96E-03	7.07E-04	8.14E-03	3.975E-01	2.027E+02	1.110
α_7	3.67E-20	3.67E-04	3.52E-07	2.13E-03	7.703E-02	2.100E+02	1.073
α_8	4.83E-18	5.20E-04	1.30E-06	3.04E-03	8.749E-02	1.681E+02	1.341

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.73E-01	9.67E-01	9.68E-01	9.68E-01	9.69E-01	9.70E-01
α_2	1.80E-02	2.12E-02	2.20E-02	1.83E-02	1.42E-02	1.26E-02	1.14E-02
α_3		5.36E-03	6.86E-03	1.01E-02	1.03E-02	8.33E-03	6.88E-03
α_4			4.07E-03	3.36E-03	4.66E-03	5.56E-03	4.99E-03
α_5				6.54E-04	1.72E-03	3.02E-03	3.50E-03
α_6					7.34E-04	8.79E-04	1.96E-03
α_7						1.35E-04	3.67E-04
α_8							5.20E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.73E-01	9.67E-01	9.68E-01	9.68E-01	9.69E-01	9.70E-01
Beta	1.80E-02	2.65E-02	3.29E-02	3.24E-02	3.16E-02	3.05E-02	2.96E-02
Gamma		2.02E-01	3.32E-01	4.36E-01	5.52E-01	5.87E-01	6.16E-01
Delta			3.72E-01	2.84E-01	4.09E-01	5.35E-01	6.22E-01
Epsilon				1.63E-01	3.45E-01	4.20E-01	5.59E-01
Mu					2.99E-01	2.52E-01	4.49E-01
Omega						1.33E-01	3.12E-01
Sigma							5.87E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.039

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8315742	0.9595451	0.9852171	0.9999682	9.016E+00	3.801E-01	--
α_2	3.18E-05	4.05E-02	1.48E-02	1.68E-01	3.801E-01	9.016E+00	0.684

CCCG = 3, Gamma = 0.039

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8306156	0.9425194	0.9592249	0.9971814	1.574E+01	9.600E-01	--
α_2	6.12E-04	4.01E-02	2.36E-02	1.36E-01	6.673E-01	1.599E+01	0.874
α_3	1.54E-06	1.74E-02	4.23E-03	8.01E-02	2.927E-01	1.651E+01	0.866

CCCG = 4, Gamma = 0.039

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8353949	0.9323617	0.9437878	0.9901305	2.301E+01	1.669E+00	--
α_2	2.43E-03	4.15E-02	3.00E-02	1.20E-01	1.039E+00	2.402E+01	0.946
α_3	1.39E-05	1.58E-02	5.69E-03	6.60E-02	3.887E-01	2.421E+01	0.964
α_4	1.21E-07	1.04E-02	1.73E-03	5.07E-02	2.414E-01	2.305E+01	1.018

CCCG = 5, Gamma = 0.039

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8796437	0.9387875	0.9438762	0.9805161	5.348E+01	3.487E+00	--
α_2	4.89E-03	3.12E-02	2.59E-02	7.55E-02	1.791E+00	5.567E+01	1.029
α_3	1.72E-03	2.15E-02	1.61E-02	5.96E-02	1.207E+00	5.499E+01	1.052
α_4	1.35E-05	7.62E-03	3.06E-03	3.07E-02	4.340E-01	5.650E+01	1.038
α_5	2.09E-26	9.40E-04	3.35E-08	5.19E-03	5.493E-02	5.835E+01	1.012

CCCG = 6, Gamma = 0.039

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8930210	0.9440597	0.9482643	0.9807150	6.589E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.95E-02	1.335E+00	7.106E+01	1.016
α_3	2.77E-03	2.24E-02	1.80E-02	5.74E-02	1.531E+00	6.672E+01	1.078
α_4	1.99E-04	1.03E-02	6.13E-03	3.45E-02	7.191E-01	6.927E+01	1.051
α_5	5.10E-08	3.48E-03	5.96E-04	1.69E-02	2.467E-01	7.072E+01	1.037
α_6	1.45E-20	1.32E-03	7.95E-07	7.65E-03	7.279E-02	5.520E+01	1.331

CCCG = 7, Gamma = 0.039

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9113293	0.9490752	0.9517017	0.9778448	1.075E+02	5.770E+00	--
α_2	1.64E-03	1.31E-02	1.05E-02	3.36E-02	1.549E+00	1.167E+02	1.034
α_3	3.21E-03	1.80E-02	1.52E-02	4.24E-02	1.989E+00	1.087E+02	1.104
α_4	1.03E-03	1.14E-02	8.71E-03	3.12E-02	1.287E+00	1.112E+02	1.086
α_5	1.03E-04	6.17E-03	3.58E-03	2.10E-02	6.913E-01	1.114E+02	1.090
α_6	1.52E-08	2.05E-03	3.09E-04	1.01E-02	2.327E-01	1.132E+02	1.077
α_7	1.26E-64	1.86E-04	2.82E-17	4.69E-04	2.112E-02	1.136E+02	1.076

CCCG = 8, Gamma = 0.039

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9226701	0.9536723	0.9556591	0.9778874	1.444E+02	7.016E+00	--
α_2	1.28E-03	9.93E-03	7.97E-03	2.53E-02	1.583E+00	1.579E+02	1.022
α_3	2.37E-03	1.33E-02	1.12E-02	3.15E-02	1.986E+00	1.472E+02	1.093
α_4	1.58E-03	1.12E-02	9.14E-03	2.81E-02	1.672E+00	1.470E+02	1.096
α_5	3.54E-04	6.66E-03	4.66E-03	1.98E-02	1.011E+00	1.507E+02	1.075
α_6	2.95E-05	3.89E-03	1.98E-03	1.42E-02	5.709E-01	1.463E+02	1.110
α_7	2.74E-10	1.19E-03	9.33E-05	6.30E-03	1.809E-01	1.517E+02	1.073
α_8	1.48E-107	1.02E-04	3.10E-27	7.68E-05	1.245E-02	1.216E+02	1.341

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.60E-01	9.43E-01	9.32E-01	9.39E-01	9.44E-01	9.49E-01	9.54E-01
α_2	4.05E-02	4.01E-02	4.15E-02	3.12E-02	1.84E-02	1.31E-02	9.93E-03
α_3		1.74E-02	1.58E-02	2.15E-02	2.24E-02	1.80E-02	1.33E-02
α_4			1.04E-02	7.62E-03	1.03E-02	1.14E-02	1.12E-02
α_5				9.40E-04	3.48E-03	6.17E-03	6.66E-03
α_6					1.32E-03	2.05E-03	3.89E-03
α_7						1.86E-04	1.19E-03
α_8							1.02E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.60E-01	9.43E-01	9.32E-01	9.39E-01	9.44E-01	9.49E-01	9.54E-01
Beta	4.05E-02	5.75E-02	6.76E-02	6.12E-02	5.59E-02	5.09E-02	4.63E-02
Gamma		3.03E-01	3.87E-01	4.91E-01	6.70E-01	7.43E-01	7.86E-01
Delta			3.96E-01	2.85E-01	4.02E-01	5.25E-01	6.34E-01
Epsilon				1.10E-01	3.18E-01	4.23E-01	5.13E-01
Mu					2.75E-01	2.66E-01	4.37E-01
Omega						8.31E-02	2.50E-01
Sigma							7.92E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 9.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9625179	0.9904124	0.9958207	0.9999725	4.861E+01	4.706E-01	--
α_2	2.75E-05	9.59E-03	4.18E-03	3.75E-02	4.706E-01	4.861E+01	0.684

CCCG = 3, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9612618	0.9865267	0.9902344	0.9991180	8.073E+01	1.103E+00	--
α_2	2.86E-04	9.93E-03	6.31E-03	3.19E-02	8.104E-01	8.082E+01	0.874
α_3	2.98E-07	3.55E-03	8.33E-04	1.64E-02	2.921E-01	8.208E+01	0.866

CCCG = 4, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9640756	0.9848679	0.9872931	0.9973654	1.271E+02	1.953E+00	--
α_2	9.38E-04	1.00E-02	7.68E-03	2.72E-02	1.312E+00	1.293E+02	0.946
α_3	5.65E-06	3.36E-03	1.33E-03	1.36E-02	4.307E-01	1.278E+02	0.964
α_4	3.44E-09	1.73E-03	2.04E-04	8.80E-03	2.099E-01	1.212E+02	1.018

CCCG = 5, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9697979	0.9853827	0.9868766	0.9958614	2.094E+02	3.107E+00	--
α_2	1.11E-03	7.86E-03	6.39E-03	1.96E-02	1.684E+00	2.124E+02	1.029
α_3	1.99E-04	4.50E-03	3.05E-03	1.37E-02	9.426E-01	2.085E+02	1.052
α_4	1.35E-06	1.80E-03	6.19E-04	7.59E-03	3.816E-01	2.118E+02	1.038
α_5	1.81E-16	4.53E-04	2.48E-06	2.64E-03	9.865E-02	2.176E+02	1.012

CCCG = 6, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9728952	0.9861177	0.9872771	0.9953788	2.715E+02	3.822E+00	--
α_2	8.73E-04	6.03E-03	4.92E-03	1.50E-02	1.714E+00	2.826E+02	1.016
α_3	2.71E-04	4.13E-03	2.99E-03	1.19E-02	1.108E+00	2.669E+02	1.078
α_4	3.13E-05	2.37E-03	1.32E-03	8.27E-03	6.509E-01	2.742E+02	1.051
α_5	1.80E-08	9.10E-04	1.64E-04	4.39E-03	2.536E-01	2.784E+02	1.037
α_6	7.15E-17	4.41E-04	2.00E-06	2.57E-03	9.572E-02	2.169E+02	1.331

CCCG = 7, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9760660	0.9867479	0.9875667	0.9946332	3.868E+02	5.195E+00	--
α_2	9.85E-04	5.19E-03	4.40E-03	1.21E-02	2.105E+00	4.035E+02	1.034
α_3	3.26E-04	3.48E-03	2.65E-03	9.44E-03	1.320E+00	3.785E+02	1.104
α_4	1.32E-04	2.58E-03	1.79E-03	7.74E-03	9.967E-01	3.848E+02	1.086
α_5	6.91E-06	1.37E-03	6.49E-04	5.15E-03	5.249E-01	3.840E+02	1.090
α_6	3.73E-10	5.02E-04	4.91E-05	2.60E-03	1.956E-01	3.891E+02	1.077
α_7	3.87E-28	1.36E-04	3.08E-09	7.37E-04	5.291E-02	3.897E+02	1.076

CCCG = 8, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9777004	0.9873098	0.9880100	0.9945284	4.537E+02	5.832E+00	--
α_2	9.42E-04	4.64E-03	3.98E-03	1.06E-02	2.229E+00	4.778E+02	1.022
α_3	2.41E-04	2.81E-03	2.11E-03	7.74E-03	1.260E+00	4.478E+02	1.093
α_4	1.32E-04	2.33E-03	1.64E-03	6.86E-03	1.042E+00	4.466E+02	1.096
α_5	3.92E-05	1.67E-03	1.02E-03	5.51E-03	7.626E-01	4.559E+02	1.075
α_6	1.69E-07	7.40E-04	2.07E-04	3.29E-03	3.271E-01	4.417E+02	1.110
α_7	2.85E-13	2.94E-04	7.88E-06	1.65E-03	1.344E-01	4.571E+02	1.073
α_8	1.89E-20	2.10E-04	1.97E-07	1.22E-03	7.682E-02	3.660E+02	1.341

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.87E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01	9.87E-01
α_2	9.59E-03	9.93E-03	1.00E-02	7.86E-03	6.03E-03	5.19E-03	4.64E-03
α_3		3.55E-03	3.36E-03	4.50E-03	4.13E-03	3.48E-03	2.81E-03
α_4			1.73E-03	1.80E-03	2.37E-03	2.58E-03	2.33E-03
α_5				4.53E-04	9.10E-04	1.37E-03	1.67E-03
α_6					4.41E-04	5.02E-04	7.40E-04
α_7						1.36E-04	2.94E-04
α_8							2.10E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.87E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01	9.87E-01
Beta	9.59E-03	1.35E-02	1.51E-02	1.46E-02	1.39E-02	1.33E-02	1.27E-02
Gamma		2.63E-01	3.36E-01	4.62E-01	5.66E-01	6.08E-01	6.34E-01
Delta			3.40E-01	3.33E-01	4.74E-01	5.69E-01	6.51E-01
Epsilon				2.01E-01	3.63E-01	4.37E-01	5.56E-01
Mu					3.26E-01	3.19E-01	4.27E-01
Omega						2.13E-01	4.05E-01
Sigma							4.17E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	9.00	9.00	9.00	9.00	9.00	9.00	9.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 3.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.137

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9884429	0.9970023	0.9986476	0.9999890	1.640E+02	4.932E-01	--
α_2	1.10E-05	3.00E-03	1.35E-03	1.16E-02	4.932E-01	1.640E+02	0.684

CCCG = 3, Gamma = 0.137

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9892397	0.9963275	0.9973914	0.9997826	2.874E+02	1.059E+00	--
α_2	4.64E-05	2.48E-03	1.46E-03	8.38E-03	7.137E-01	2.869E+02	0.874
α_3	4.28E-07	1.19E-03	3.60E-04	5.20E-03	3.458E-01	2.899E+02	0.866

CCCG = 4, Gamma = 0.137

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9903450	0.9958501	0.9964782	0.9992084	5.074E+02	2.115E+00	--
α_2	3.72E-04	3.00E-03	2.39E-03	7.72E-03	1.549E+00	5.147E+02	0.946
α_3	1.63E-08	5.22E-04	1.02E-04	2.48E-03	2.646E-01	5.065E+02	0.964
α_4	6.93E-08	6.27E-04	1.54E-04	2.87E-03	3.010E-01	4.795E+02	1.018

CCCG = 5, Gamma = 0.137

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9929459	0.9960822	0.9963228	0.9983972	1.354E+03	5.325E+00	--
α_2	8.47E-04	2.66E-03	2.42E-03	5.28E-03	3.632E+00	1.364E+03	1.029
α_3	9.95E-05	1.01E-03	7.77E-04	2.73E-03	1.354E+00	1.336E+03	1.052
α_4	2.07E-08	2.19E-04	5.22E-05	1.00E-03	2.961E-01	1.355E+03	1.038
α_5	9.09E-35	3.05E-05	3.36E-11	1.51E-04	4.243E-02	1.390E+03	1.012

CCCG = 6, Gamma = 0.137

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9925571	0.9959422	0.9962107	0.9984107	1.211E+03	4.936E+00	--
α_2	6.20E-04	2.33E-03	2.07E-03	4.93E-03	2.915E+00	1.248E+03	1.016
α_3	9.09E-05	1.07E-03	8.01E-04	2.95E-03	1.257E+00	1.178E+03	1.078
α_4	1.69E-06	4.16E-04	1.90E-04	1.59E-03	5.031E-01	1.209E+03	1.051
α_5	2.73E-15	9.42E-05	1.24E-06	5.40E-04	1.155E-01	1.226E+03	1.037
α_6	7.11E-13	1.52E-04	5.56E-06	8.42E-04	1.451E-01	9.549E+02	1.331

CCCG = 7, Gamma = 0.137

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9940607	0.9962410	0.9963690	0.9979843	2.559E+03	9.654E+00	--
α_2	7.10E-04	1.83E-03	1.71E-03	3.38E-03	4.851E+00	2.641E+03	1.034
α_3	2.89E-04	1.13E-03	9.99E-04	2.42E-03	2.800E+00	2.475E+03	1.104
α_4	5.62E-05	5.50E-04	4.25E-04	1.47E-03	1.384E+00	2.516E+03	1.086
α_5	6.92E-07	1.95E-04	8.74E-05	7.56E-04	4.902E-01	2.508E+03	1.090
α_6	1.07E-15	4.51E-05	5.72E-07	2.59E-04	1.146E-01	2.540E+03	1.077
α_7	3.03E-93	5.76E-06	6.12E-25	6.84E-06	1.464E-02	2.543E+03	1.076

CCCG = 8, Gamma = 0.137

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9937736	0.9962988	0.9964687	0.9982441	1.924E+03	7.148E+00	--
α_2	3.99E-04	1.47E-03	1.31E-03	3.09E-03	2.980E+00	2.024E+03	1.022
α_3	1.79E-04	1.03E-03	8.65E-04	2.47E-03	1.960E+00	1.894E+03	1.093
α_4	4.51E-05	6.17E-04	4.52E-04	1.75E-03	1.166E+00	1.889E+03	1.096
α_5	1.58E-06	2.79E-04	1.35E-04	1.04E-03	5.375E-01	1.927E+03	1.075
α_6	2.14E-11	9.67E-05	7.50E-06	5.11E-04	1.805E-01	1.866E+03	1.110
α_7	1.11E-35	2.14E-05	1.60E-11	1.05E-04	4.139E-02	1.930E+03	1.073
α_8	1.12E-08	1.83E-04	4.03E-05	8.53E-04	2.827E-01	1.545E+03	1.341

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	3.00E-03	2.48E-03	3.00E-03	2.66E-03	2.33E-03	1.83E-03	1.47E-03
α_3		1.19E-03	5.22E-04	1.01E-03	1.07E-03	1.13E-03	1.03E-03
α_4			6.27E-04	2.19E-04	4.16E-04	5.50E-04	6.17E-04
α_5				3.05E-05	9.42E-05	1.95E-04	2.79E-04
α_6					1.52E-04	4.51E-05	9.67E-05
α_7						5.76E-06	2.14E-05
α_8							1.83E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	3.00E-03	3.67E-03	4.15E-03	3.92E-03	4.06E-03	3.76E-03	3.70E-03
Gamma		3.24E-01	2.77E-01	3.22E-01	4.26E-01	5.12E-01	6.03E-01
Delta			5.46E-01	1.97E-01	3.83E-01	4.13E-01	5.37E-01
Epsilon				1.23E-01	3.72E-01	3.09E-01	4.85E-01
Mu					6.17E-01	2.07E-01	5.19E-01
Omega						1.13E-01	6.79E-01
Sigma							8.95E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.50	3.50	3.50	3.50	3.50	3.50	3.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.6.2 HPI-MOV-CC: HPSI Motor-Operated Valves Fail to Open

Generic CCF Parameters

System Group: Clean Water
System: Chemical and Volume Control, High Pressure Injection
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 13.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9496433	0.9871218	0.9943862	0.9999610	1.0000000	3.591E+01	4.685E-01
α_2	3.62E-05	1.29E-02	5.62E-03	5.04E-02	0.00E+00	4.685E-01	3.591E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9557294	0.9844638	0.9886341	0.9989260	1.0000000	7.148E+01	1.128E+00
α_2	3.93E-04	1.17E-02	7.64E-03	3.70E-02	0.00E+00	8.512E-01	7.176E+01
α_3	1.90E-07	3.81E-03	8.16E-04	1.79E-02	0.00E+00	2.768E-01	7.233E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9572536	0.9821474	0.9850823	0.9970102	1.0000000	1.042E+02	1.894E+00
α_2	1.03E-03	1.19E-02	8.98E-03	3.26E-02	0.00E+00	1.260E+00	1.048E+02
α_3	4.12E-06	3.79E-03	1.39E-03	1.57E-02	0.00E+00	4.024E-01	1.057E+02
α_4	1.51E-08	2.18E-03	3.25E-04	1.08E-02	0.00E+00	2.315E-01	1.058E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9668280	0.9834810	0.9850051	0.9949238	1.0000000	2.043E+02	3.432E+00
α_2	1.58E-03	9.26E-03	7.74E-03	2.21E-02	0.00E+00	1.924E+00	2.058E+02
α_3	2.92E-04	5.05E-03	3.58E-03	1.48E-02	0.00E+00	1.049E+00	2.067E+02
α_4	1.40E-06	1.84E-03	6.34E-04	7.76E-03	0.00E+00	3.822E-01	2.074E+02
α_5	3.21E-20	3.69E-04	3.44E-07	2.15E-03	0.00E+00	7.674E-02	2.077E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9691806	0.9841894	0.9854990	0.9947214	1.0000000	2.387E+02	3.835E+00
α_2	1.01E-03	7.01E-03	5.71E-03	1.75E-02	0.00E+00	1.701E+00	2.409E+02
α_3	3.93E-04	4.98E-03	3.70E-03	1.39E-02	0.00E+00	1.207E+00	2.413E+02
α_4	2.25E-05	2.46E-03	1.29E-03	8.85E-03	0.00E+00	5.960E-01	2.420E+02

α_5	3.57E-09	9.12E-04	1.22E-04	4.57E-03	0.00E+00	2.211E-01	2.423E+02
α_6	3.56E-15	4.53E-04	4.58E-06	2.61E-03	0.00E+00	1.098E-01	2.424E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9741021	0.9853026	0.9861201	0.9937096	1.0000000	3.853E+02	5.747E+00
α_2	1.17E-03	5.74E-03	4.92E-03	1.31E-02	0.00E+00	2.243E+00	3.888E+02
α_3	5.59E-04	4.17E-03	3.36E-03	1.05E-02	0.00E+00	1.630E+00	3.894E+02
α_4	1.72E-04	2.77E-03	1.98E-03	8.06E-03	0.00E+00	1.083E+00	3.900E+02
α_5	1.05E-05	1.45E-03	7.29E-04	5.31E-03	0.00E+00	5.654E-01	3.905E+02
α_6	2.69E-10	4.90E-04	4.53E-05	2.55E-03	0.00E+00	1.916E-01	3.909E+02
α_7	6.10E-41	8.90E-05	3.31E-12	3.90E-04	0.00E+00	3.480E-02	3.910E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9753164	0.9860095	0.9867917	0.9940250	1.0000000	4.035E+02	5.726E+00
α_2	8.89E-04	4.93E-03	4.15E-03	1.16E-02	0.00E+00	2.018E+00	4.072E+02
α_3	3.51E-04	3.40E-03	2.63E-03	9.06E-03	0.00E+00	1.391E+00	4.079E+02
α_4	1.54E-04	2.60E-03	1.84E-03	7.60E-03	0.00E+00	1.062E+00	4.082E+02
α_5	3.03E-05	1.72E-03	1.00E-03	5.83E-03	0.00E+00	7.026E-01	4.085E+02
α_6	3.36E-07	8.55E-04	2.62E-04	3.72E-03	0.00E+00	3.497E-01	4.089E+02
α_7	1.29E-15	2.64E-04	2.42E-06	1.52E-03	0.00E+00	1.078E-01	4.091E+02
α_8	2.69E-17	2.31E-04	9.80E-07	1.35E-03	0.00E+00	9.469E-02	4.092E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.84E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.29E-02	1.17E-02	1.19E-02	9.26E-03	7.01E-03	5.74E-03	4.93E-03
α_3		3.81E-03	3.79E-03	5.05E-03	4.98E-03	4.17E-03	3.40E-03
α_4			2.18E-03	1.84E-03	2.46E-03	2.77E-03	2.60E-03
α_5				3.69E-04	9.12E-04	1.45E-03	1.72E-03
α_6					4.53E-04	4.90E-04	8.55E-04
α_7						8.90E-05	2.64E-04
α_8							2.31E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.84E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.29E-02	1.55E-02	1.79E-02	1.65E-02	1.58E-02	1.47E-02	1.40E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	13.50	13.50	13.50	13.50	13.50	13.50	13.50
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9709458	0.9925033	0.9966592	0.9999751	6.400E+01	4.834E-01	--
α_2	2.49E-05	7.50E-03	3.34E-03	2.91E-02	4.834E-01	6.400E+01	0.749

CCCG = 3, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9780486	0.9921019	0.9940914	0.9993555	1.540E+02	1.226E+00	--
α_2	3.09E-04	6.35E-03	4.38E-03	1.91E-02	9.769E-01	1.529E+02	0.877
α_3	2.48E-08	1.55E-03	2.69E-04	7.51E-03	2.487E-01	1.603E+02	0.841

CCCG = 4, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9763574	0.9898993	0.9914528	0.9981293	2.016E+02	2.057E+00	--
α_2	7.79E-04	7.06E-03	5.53E-03	1.86E-02	1.442E+00	2.027E+02	0.921
α_3	2.53E-06	2.02E-03	7.58E-04	8.30E-03	4.114E-01	2.034E+02	0.922
α_4	1.34E-09	1.02E-03	1.11E-04	5.23E-03	2.036E-01	1.994E+02	0.942

CCCG = 5, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9803463	0.9900476	0.9909161	0.9967815	3.664E+02	3.683E+00	--
α_2	1.24E-03	6.07E-03	5.21E-03	1.39E-02	2.243E+00	3.673E+02	0.970
α_3	1.34E-04	2.66E-03	1.84E-03	7.99E-03	9.912E-01	3.712E+02	0.963
α_4	6.92E-07	1.02E-03	3.43E-04	4.31E-03	3.765E-01	3.704E+02	0.966
α_5	1.76E-21	2.03E-04	1.16E-07	1.18E-03	7.237E-02	3.556E+02	1.007

CCCG = 6, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9809659	0.9900581	0.9908317	0.9965078	4.122E+02	4.139E+00	--
α_2	9.79E-04	5.09E-03	4.32E-03	1.18E-02	2.128E+00	4.161E+02	0.977
α_3	1.86E-04	2.69E-03	1.96E-03	7.71E-03	1.134E+00	4.200E+02	0.970
α_4	8.56E-06	1.31E-03	6.50E-04	4.85E-03	5.533E-01	4.217E+02	0.967
α_5	2.05E-09	5.26E-04	7.02E-05	2.64E-03	2.210E-01	4.201E+02	0.972
α_6	4.13E-16	3.24E-04	2.26E-06	1.88E-03	1.027E-01	3.168E+02	1.289

CCCG = 7, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9841945	0.9908095	0.9912728	0.9958424	6.934E+02	6.432E+00	--
α_2	1.06E-03	4.06E-03	3.60E-03	8.64E-03	2.840E+00	6.967E+02	0.989
α_3	3.71E-04	2.50E-03	2.04E-03	6.18E-03	1.746E+00	6.972E+02	0.989
α_4	9.61E-05	1.54E-03	1.10E-03	4.49E-03	1.084E+00	7.014E+02	0.984
α_5	4.35E-06	7.64E-04	3.70E-04	2.86E-03	5.376E-01	7.027E+02	0.983
α_6	2.49E-10	2.83E-04	2.86E-05	1.46E-03	1.979E-01	6.987E+02	0.990
α_7	9.37E-53	4.18E-05	4.19E-15	1.43E-04	2.656E-02	6.348E+02	1.089

CCCG = 8, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9847491	0.9912360	0.9917011	0.9961348	6.913E+02	6.112E+00	--
α_2	7.28E-04	3.37E-03	2.91E-03	7.57E-03	2.364E+00	7.001E+02	0.984
α_3	2.58E-04	2.17E-03	1.71E-03	5.62E-03	1.512E+00	6.965E+02	0.990
α_4	8.84E-05	1.51E-03	1.07E-03	4.43E-03	1.056E+00	6.995E+02	0.987
α_5	1.45E-05	9.59E-04	5.46E-04	3.31E-03	6.745E-01	7.023E+02	0.983
α_6	5.88E-08	4.37E-04	1.11E-04	1.99E-03	3.076E-01	7.028E+02	0.983
α_7	1.10E-15	1.57E-04	1.55E-06	9.05E-04	1.093E-01	6.965E+02	0.992
α_8	2.64E-18	1.71E-04	4.76E-07	9.99E-04	8.885E-02	5.186E+02	1.333

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.92E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	7.50E-03	6.35E-03	7.06E-03	6.07E-03	5.09E-03	4.06E-03	3.37E-03
α_3		1.55E-03	2.02E-03	2.66E-03	2.69E-03	2.50E-03	2.17E-03
α_4			1.02E-03	1.02E-03	1.31E-03	1.54E-03	1.51E-03
α_5				2.03E-04	5.26E-04	7.64E-04	9.59E-04
α_6					3.24E-04	2.83E-04	4.37E-04
α_7						4.18E-05	1.57E-04
α_8							1.71E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.92E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	7.50E-03	7.90E-03	1.01E-02	9.95E-03	9.94E-03	9.19E-03	8.76E-03
Gamma		1.96E-01	3.01E-01	3.90E-01	4.88E-01	5.58E-01	6.16E-01
Delta			3.36E-01	3.14E-01	4.45E-01	5.13E-01	5.99E-01
Epsilon				1.67E-01	3.93E-01	4.14E-01	5.34E-01
Mu					3.81E-01	2.98E-01	4.44E-01
Omega						1.29E-01	4.29E-01
Sigma							5.22E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.148

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9172760	0.9790759	0.9911262	0.9999529	2.105E+01	4.498E-01	--
α_2	4.71E-05	2.09E-02	8.87E-03	8.27E-02	4.498E-01	2.105E+01	0.749

CCCG = 3, Gamma = 0.148

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9242792	0.9728594	0.9797308	0.9979219	4.224E+01	1.178E+00	--
α_2	9.71E-04	2.18E-02	1.50E-02	6.61E-02	9.387E-01	4.211E+01	0.877
α_3	5.62E-08	5.34E-03	8.64E-04	2.62E-02	2.396E-01	4.467E+01	0.841

CCCG = 4, Gamma = 0.148

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9231256	0.9676530	0.9728158	0.9945048	5.679E+01	1.898E+00	--
α_2	1.98E-03	2.18E-02	1.67E-02	5.93E-02	1.285E+00	5.758E+01	0.921
α_3	6.19E-06	6.68E-03	2.40E-03	2.79E-02	3.927E-01	5.837E+01	0.922
α_4	1.48E-08	3.83E-03	5.15E-04	1.93E-02	2.207E-01	5.733E+01	0.942

CCCG = 5, Gamma = 0.148

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9393376	0.9694596	0.9721483	0.9903887	1.113E+02	3.506E+00	--
α_2	3.11E-03	1.74E-02	1.47E-02	4.10E-02	1.992E+00	1.126E+02	0.970
α_3	5.79E-04	9.34E-03	6.70E-03	2.71E-02	1.078E+00	1.143E+02	0.963
α_4	1.66E-06	3.16E-03	1.02E-03	1.36E-02	3.632E-01	1.146E+02	0.966
α_5	6.08E-21	6.57E-04	3.81E-07	3.81E-03	7.248E-02	1.102E+02	1.007

CCCG = 6, Gamma = 0.148

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9437091	0.9702860	0.9724792	0.9893669	1.371E+02	4.199E+00	--
α_2	2.37E-03	1.37E-02	1.15E-02	3.26E-02	1.941E+00	1.397E+02	0.977
α_3	8.97E-04	9.34E-03	7.17E-03	2.52E-02	1.332E+00	1.413E+02	0.970
α_4	4.64E-05	4.32E-03	2.33E-03	1.54E-02	6.181E-01	1.424E+02	0.967
α_5	1.12E-08	1.63E-03	2.42E-04	8.05E-03	2.313E-01	1.421E+02	0.972
α_6	6.54E-20	7.16E-04	6.76E-07	4.17E-03	7.684E-02	1.072E+02	1.289

CCCG = 7, Gamma = 0.148

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1							

α_1	0.9511627	0.9716576	0.9730790	0.9872975	2.133E+02	6.223E+00	--
α_2	2.96E-03	1.21E-02	1.06E-02	2.62E-02	2.654E+00	2.168E+02	0.989
α_3	1.02E-03	7.50E-03	6.07E-03	1.89E-02	1.645E+00	2.176E+02	0.989
α_4	3.37E-04	5.06E-03	3.66E-03	1.46E-02	1.115E+00	2.192E+02	0.984
α_5	2.65E-05	2.74E-03	1.45E-03	9.81E-03	6.034E-01	2.200E+02	0.983
α_6	1.44E-10	8.12E-04	6.05E-05	4.31E-03	1.780E-01	2.190E+02	0.990
α_7	7.48E-51	1.37E-04	2.82E-14	4.85E-04	2.734E-02	1.991E+02	1.089

CCCG = 8, Gamma = 0.148

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9525256	0.9724318	0.9738115	0.9876255	2.203E+02	6.246E+00	--
α_2	2.54E-03	1.10E-02	9.58E-03	2.42E-02	2.504E+00	2.256E+02	0.984
α_3	6.72E-04	6.26E-03	4.88E-03	1.66E-02	1.419E+00	2.252E+02	0.990
α_4	2.48E-04	4.51E-03	3.17E-03	1.34E-02	1.027E+00	2.264E+02	0.987
α_5	6.63E-05	3.21E-03	1.93E-03	1.07E-02	7.337E-01	2.275E+02	0.983
α_6	1.74E-06	1.74E-03	6.29E-04	7.25E-03	3.975E-01	2.279E+02	0.983
α_7	3.41E-20	3.41E-04	3.27E-07	1.98E-03	7.703E-02	2.261E+02	0.992
α_8	4.83E-18	5.19E-04	1.30E-06	3.03E-03	8.749E-02	1.683E+02	1.333

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.79E-01	9.73E-01	9.68E-01	9.69E-01	9.70E-01	9.72E-01	9.72E-01
α_2	2.09E-02	2.18E-02	2.18E-02	1.74E-02	1.37E-02	1.21E-02	1.10E-02
α_3		5.34E-03	6.68E-03	9.34E-03	9.34E-03	7.50E-03	6.26E-03
α_4			3.83E-03	3.16E-03	4.32E-03	5.06E-03	4.51E-03
α_5				6.57E-04	1.63E-03	2.74E-03	3.21E-03
α_6					7.16E-04	8.12E-04	1.74E-03
α_7						1.37E-04	3.41E-04
α_8							5.19E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.79E-01	9.73E-01	9.68E-01	9.69E-01	9.70E-01	9.72E-01	9.72E-01
Beta	2.09E-02	2.71E-02	3.23E-02	3.05E-02	2.97E-02	2.83E-02	2.76E-02
Gamma		1.97E-01	3.25E-01	4.31E-01	5.39E-01	5.73E-01	6.02E-01
Delta			3.65E-01	2.90E-01	4.16E-01	5.38E-01	6.23E-01
Epsilon				1.72E-01	3.51E-01	4.21E-01	5.63E-01
Mu					3.06E-01	2.58E-01	4.47E-01
Omega						1.45E-01	3.31E-01
Sigma							6.04E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.074

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8157425	0.9556591	0.9836873	0.9999649	8.192E+00	3.801E-01	--
α_2	3.51E-05	4.43E-02	1.63E-02	1.84E-01	3.801E-01	8.192E+00	0.749

CCCG = 3, Gamma = 0.074

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8317401	0.9429141	0.9595160	0.9972019	1.586E+01	9.600E-01	--
α_2	6.14E-04	4.02E-02	2.36E-02	1.36E-01	6.673E-01	1.594E+01	0.877
α_3	1.49E-06	1.69E-02	4.10E-03	7.77E-02	2.927E-01	1.703E+01	0.841

CCCG = 4, Gamma = 0.074

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8414304	0.9349265	0.9459752	0.9905235	2.398E+01	1.669E+00	--
α_2	2.36E-03	4.04E-02	2.91E-02	1.17E-01	1.039E+00	2.471E+01	0.921
α_3	1.32E-05	1.51E-02	5.44E-03	6.31E-02	3.887E-01	2.531E+01	0.922
α_4	1.11E-07	9.59E-03	1.60E-03	4.69E-02	2.414E-01	2.493E+01	0.942

CCCG = 5, Gamma = 0.074

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8876286	0.9429397	0.9477248	0.9818760	5.762E+01	3.487E+00	--
α_2	4.60E-03	2.94E-02	2.44E-02	7.12E-02	1.791E+00	5.918E+01	0.970
α_3	1.57E-03	1.97E-02	1.47E-02	5.46E-02	1.207E+00	6.021E+01	0.963
α_4	1.26E-05	7.09E-03	2.84E-03	2.86E-02	4.340E-01	6.074E+01	0.966
α_5	2.08E-26	9.36E-04	3.34E-08	5.16E-03	5.493E-02	5.863E+01	1.007

CCCG = 6, Gamma = 0.074

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9006141	0.9481070	0.9520407	0.9821447	7.134E+01	3.905E+00	--
α_2	1.72E-03	1.77E-02	1.37E-02	4.76E-02	1.335E+00	7.400E+01	0.977
α_3	2.49E-03	2.02E-02	1.61E-02	5.17E-02	1.531E+00	7.432E+01	0.970
α_4	1.83E-04	9.45E-03	5.64E-03	3.17E-02	7.191E-01	7.534E+01	0.967
α_5	4.78E-08	3.26E-03	5.58E-04	1.58E-02	2.467E-01	7.546E+01	0.972
α_6	1.41E-20	1.28E-03	7.70E-07	7.41E-03	7.279E-02	5.701E+01	1.289

CCCG = 7, Gamma = 0.074

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9186648	0.9533497	0.9557777	0.9797378	1.179E+02	5.770E+00	--
α_2	1.56E-03	1.25E-02	1.00E-02	3.21E-02	1.549E+00	1.220E+02	0.989
α_3	2.87E-03	1.61E-02	1.36E-02	3.80E-02	1.989E+00	1.215E+02	0.989
α_4	9.34E-04	1.04E-02	7.88E-03	2.83E-02	1.287E+00	1.228E+02	0.984
α_5	9.30E-05	5.56E-03	3.23E-03	1.90E-02	6.913E-01	1.235E+02	0.983
α_6	1.39E-08	1.88E-03	2.84E-04	9.32E-03	2.327E-01	1.232E+02	0.990
α_7	1.28E-64	1.88E-04	2.86E-17	4.75E-04	2.112E-02	1.121E+02	1.089

CCCG = 8, Gamma = 0.074

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9290102	0.9575169	0.9593536	0.9797493	1.581E+02	7.016E+00	--
α_2	1.23E-03	9.55E-03	7.67E-03	2.43E-02	1.583E+00	1.641E+02	0.984
α_3	2.14E-03	1.21E-02	1.02E-02	2.85E-02	1.986E+00	1.626E+02	0.990
α_4	1.42E-03	1.01E-02	8.22E-03	2.53E-02	1.672E+00	1.635E+02	0.987
α_5	3.23E-04	6.10E-03	4.26E-03	1.81E-02	1.011E+00	1.648E+02	0.983
α_6	2.61E-05	3.44E-03	1.75E-03	1.26E-02	5.709E-01	1.653E+02	0.983
α_7	2.53E-10	1.10E-03	8.63E-05	5.82E-03	1.809E-01	1.641E+02	0.992
α_8	1.47E-107	1.02E-04	3.08E-27	7.63E-05	1.245E-02	1.223E+02	1.333

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.56E-01	9.43E-01	9.35E-01	9.43E-01	9.48E-01	9.53E-01	9.58E-01
α_2	4.43E-02	4.02E-02	4.04E-02	2.94E-02	1.77E-02	1.25E-02	9.55E-03
α_3		1.69E-02	1.51E-02	1.97E-02	2.02E-02	1.61E-02	1.21E-02
α_4			9.59E-03	7.09E-03	9.45E-03	1.04E-02	1.01E-02
α_5				9.36E-04	3.26E-03	5.56E-03	6.10E-03
α_6					1.28E-03	1.88E-03	3.44E-03
α_7						1.88E-04	1.10E-03
α_8							1.02E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.56E-01	9.43E-01	9.35E-01	9.43E-01	9.48E-01	9.53E-01	9.58E-01
Beta	4.43E-02	5.71E-02	6.51E-02	5.71E-02	5.19E-02	4.67E-02	4.25E-02
Gamma		2.96E-01	3.80E-01	4.85E-01	6.58E-01	7.31E-01	7.75E-01
Delta			3.88E-01	2.90E-01	4.09E-01	5.28E-01	6.34E-01
Epsilon				1.17E-01	3.24E-01	4.24E-01	5.15E-01
Mu					2.81E-01	2.71E-01	4.32E-01
Omega						9.08E-02	2.59E-01
Sigma							8.46E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9517832	0.9876518	0.9945971	0.9999644	3.764E+01	4.706E-01	--
α_2	3.56E-05	1.23E-02	5.40E-03	4.82E-02	4.706E-01	3.764E+01	0.749

CCCG = 3, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9585945	0.9855921	0.9895512	0.9990560	7.542E+01	1.103E+00	--
α_2	3.09E-04	1.07E-02	6.81E-03	3.44E-02	8.104E-01	7.487E+01	0.877
α_3	3.11E-07	3.70E-03	8.70E-04	1.71E-02	2.921E-01	7.865E+01	0.841

CCCG = 4, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9639042	0.9847952	0.9872317	0.9973526	1.265E+02	1.953E+00	--
α_2	9.51E-04	1.02E-02	7.79E-03	2.76E-02	1.312E+00	1.275E+02	0.921
α_3	5.63E-06	3.35E-03	1.33E-03	1.36E-02	4.307E-01	1.281E+02	0.922
α_4	3.32E-09	1.67E-03	1.97E-04	8.48E-03	2.099E-01	1.257E+02	0.942

CCCG = 5, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9711231	0.9860275	0.9874572	0.9960453	2.192E+02	3.107E+00	--
α_2	1.07E-03	7.58E-03	6.17E-03	1.89E-02	1.684E+00	2.204E+02	0.970
α_3	1.86E-04	4.21E-03	2.86E-03	1.29E-02	9.426E-01	2.227E+02	0.963
α_4	1.29E-06	1.71E-03	5.89E-04	7.23E-03	3.816E-01	2.224E+02	0.966
α_5	1.84E-16	4.62E-04	2.53E-06	2.68E-03	9.865E-02	2.136E+02	1.007

CCCG = 6, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9742183	0.9867986	0.9879025	0.9956069	2.857E+02	3.822E+00	--
α_2	8.54E-04	5.90E-03	4.81E-03	1.47E-02	1.714E+00	2.890E+02	0.977
α_3	2.48E-04	3.79E-03	2.73E-03	1.09E-02	1.108E+00	2.916E+02	0.970
α_4	2.93E-05	2.22E-03	1.24E-03	7.74E-03	6.509E-01	2.929E+02	0.967
α_5	1.72E-08	8.68E-04	1.56E-04	4.18E-03	2.536E-01	2.919E+02	0.972
α_6	7.05E-17	4.35E-04	1.97E-06	2.53E-03	9.572E-02	2.202E+02	1.289

CCCG = 7, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9776014	0.9876014	0.9883687	0.9949805	4.138E+02	5.195E+00	--
α_2	9.54E-04	5.02E-03	4.26E-03	1.17E-02	2.105E+00	4.169E+02	0.989
α_3	2.96E-04	3.15E-03	2.41E-03	8.56E-03	1.320E+00	4.173E+02	0.989
α_4	1.21E-04	2.37E-03	1.64E-03	7.10E-03	9.967E-01	4.197E+02	0.984
α_5	6.30E-06	1.25E-03	5.92E-04	4.70E-03	5.249E-01	4.207E+02	0.983
α_6	3.47E-10	4.67E-04	4.57E-05	2.42E-03	1.956E-01	4.184E+02	0.990
α_7	3.97E-28	1.39E-04	3.15E-09	7.55E-04	5.291E-02	3.802E+02	1.089

CCCG = 8, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9790983	0.9881082	0.9887653	0.9948741	4.846E+02	5.832E+00	--
α_2	9.16E-04	4.52E-03	3.87E-03	1.03E-02	2.229E+00	4.914E+02	0.984
α_3	2.20E-04	2.57E-03	1.93E-03	7.09E-03	1.260E+00	4.892E+02	0.990
α_4	1.20E-04	2.12E-03	1.49E-03	6.24E-03	1.042E+00	4.912E+02	0.987
α_5	3.62E-05	1.54E-03	9.45E-04	5.09E-03	7.626E-01	4.933E+02	0.983
α_6	1.51E-07	6.62E-04	1.85E-04	2.94E-03	3.271E-01	4.938E+02	0.983
α_7	2.66E-13	2.75E-04	7.36E-06	1.54E-03	1.344E-01	4.894E+02	0.992
α_8	1.90E-20	2.11E-04	1.98E-07	1.22E-03	7.682E-02	3.644E+02	1.333

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.86E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01	9.88E-01
α_2	1.23E-02	1.07E-02	1.02E-02	7.58E-03	5.90E-03	5.02E-03	4.52E-03
α_3		3.70E-03	3.35E-03	4.21E-03	3.79E-03	3.15E-03	2.57E-03
α_4			1.67E-03	1.71E-03	2.22E-03	2.37E-03	2.12E-03
α_5				4.62E-04	8.68E-04	1.25E-03	1.54E-03
α_6					4.35E-04	4.67E-04	6.62E-04
α_7						1.39E-04	2.75E-04
α_8							2.11E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.86E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01	9.88E-01
Beta	1.23E-02	1.44E-02	1.52E-02	1.40E-02	1.32E-02	1.24E-02	1.19E-02
Gamma		2.57E-01	3.30E-01	4.57E-01	5.53E-01	5.95E-01	6.20E-01
Delta			3.32E-01	3.40E-01	4.82E-01	5.72E-01	6.52E-01
Epsilon				2.12E-01	3.70E-01	4.39E-01	5.60E-01
Mu					3.34E-01	3.27E-01	4.26E-01
Omega						2.29E-01	4.23E-01
Sigma							4.34E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 2.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.185

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9872209	0.9966849	0.9985038	0.9999878	1.483E+02	4.932E-01	--
α_2	1.22E-05	3.32E-03	1.50E-03	1.28E-02	4.932E-01	1.483E+02	0.749

CCCG = 3, Gamma = 0.185

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9892785	0.9963408	0.9974008	0.9997834	2.885E+02	1.059E+00	--
α_2	4.67E-05	2.50E-03	1.47E-03	8.44E-03	7.137E-01	2.849E+02	0.877
α_3	4.17E-07	1.16E-03	3.51E-04	5.07E-03	3.458E-01	2.976E+02	0.841

CCCG = 4, Gamma = 0.185

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9906737	0.9959917	0.9965985	0.9992355	5.254E+02	2.115E+00	--
α_2	3.62E-04	2.93E-03	2.33E-03	7.53E-03	1.549E+00	5.278E+02	0.921
α_3	1.56E-08	5.01E-04	9.79E-05	2.38E-03	2.646E-01	5.281E+02	0.922
α_4	6.43E-08	5.82E-04	1.43E-04	2.66E-03	3.010E-01	5.173E+02	0.942

CCCG = 5, Gamma = 0.185

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9933985	0.9963338	0.9965590	0.9985002	1.447E+03	5.325E+00	--
α_2	7.99E-04	2.51E-03	2.28E-03	4.98E-03	3.632E+00	1.446E+03	0.970
α_3	9.11E-05	9.27E-04	7.12E-04	2.50E-03	1.354E+00	1.459E+03	0.963
α_4	1.93E-08	2.04E-04	4.86E-05	9.35E-04	2.961E-01	1.454E+03	0.966
α_5	9.05E-35	3.04E-05	3.35E-11	1.51E-04	4.243E-02	1.396E+03	1.007

CCCG = 6, Gamma = 0.185

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9929940	0.9961807	0.9964335	0.9985042	1.287E+03	4.936E+00	--
α_2	5.96E-04	2.24E-03	1.99E-03	4.74E-03	2.915E+00	1.298E+03	0.977
α_3	8.19E-05	9.60E-04	7.21E-04	2.65E-03	1.257E+00	1.309E+03	0.970
α_4	1.56E-06	3.83E-04	1.75E-04	1.47E-03	5.031E-01	1.313E+03	0.967
α_5	2.56E-15	8.83E-05	1.17E-06	5.07E-04	1.155E-01	1.307E+03	0.972
α_6	6.88E-13	1.47E-04	5.39E-06	8.16E-04	1.451E-01	9.855E+02	1.289

CCCG = 7, Gamma = 0.185

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944869	0.9965109	0.9966298	0.9981292	2.757E+03	9.654E+00	--
α_2	6.79E-04	1.75E-03	1.64E-03	3.23E-03	4.851E+00	2.761E+03	0.989
α_3	2.60E-04	1.01E-03	8.96E-04	2.17E-03	2.800E+00	2.761E+03	0.989
α_4	5.09E-05	4.98E-04	3.85E-04	1.33E-03	1.384E+00	2.776E+03	0.984
α_5	6.24E-07	1.76E-04	7.88E-05	6.82E-04	4.902E-01	2.780E+03	0.983
α_6	9.86E-16	4.15E-05	5.26E-07	2.38E-04	1.146E-01	2.763E+03	0.990
α_7	3.07E-93	5.83E-06	6.21E-25	6.93E-06	1.464E-02	2.510E+03	1.089

CCCG = 8, Gamma = 0.185

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941928	0.9965483	0.9967068	0.9983626	2.064E+03	7.148E+00	--
α_2	3.84E-04	1.42E-03	1.26E-03	2.98E-03	2.980E+00	2.101E+03	0.984
α_3	1.62E-04	9.37E-04	7.84E-04	2.24E-03	1.960E+00	2.089E+03	0.990
α_4	4.06E-05	5.56E-04	4.07E-04	1.58E-03	1.166E+00	2.097E+03	0.987
α_5	1.45E-06	2.55E-04	1.24E-04	9.55E-04	5.375E-01	2.105E+03	0.983
α_6	1.89E-11	8.57E-05	6.65E-06	4.53E-04	1.805E-01	2.106E+03	0.983
α_7	1.03E-35	1.98E-05	1.48E-11	9.70E-05	4.139E-02	2.087E+03	0.992
α_8	1.11E-08	1.82E-04	4.01E-05	8.48E-04	2.827E-01	1.554E+03	1.333

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
α_2	3.32E-03	2.50E-03	2.93E-03	2.51E-03	2.24E-03	1.75E-03	1.42E-03
α_3		1.16E-03	5.01E-04	9.27E-04	9.60E-04	1.01E-03	9.37E-04
α_4			5.82E-04	2.04E-04	3.83E-04	4.98E-04	5.56E-04
α_5				3.04E-05	8.83E-05	1.76E-04	2.55E-04
α_6					1.47E-04	4.15E-05	8.57E-05
α_7						5.83E-06	1.98E-05
α_8							1.82E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
Beta	3.32E-03	3.66E-03	4.01E-03	3.67E-03	3.82E-03	3.49E-03	3.45E-03
Gamma		3.17E-01	2.70E-01	3.17E-01	4.13E-01	4.97E-01	5.90E-01
Delta			5.37E-01	2.02E-01	3.92E-01	4.16E-01	5.40E-01
Epsilon				1.30E-01	3.81E-01	3.10E-01	4.94E-01
Mu					6.25E-01	2.12E-01	5.30E-01
Omega						1.23E-01	7.02E-01
Sigma							9.02E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.50	2.50	2.50	2.50	2.50	2.50	2.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.6.3 HPI-MOV-OO: HPSI Motor-Operated Valves Fail to Close

Generic CCF Parameters

System Group: Clean Water
System: Chemical and Volume Control, High Pressure Injection
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 9.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9434630	0.9855309	0.9936793	0.9999562	1.0000000	3.191E+01	4.685E-01
α_2	4.08E-05	1.45E-02	6.32E-03	5.65E-02	0.00E+00	4.685E-01	3.191E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9531698	0.9835580	0.9879649	0.9988675	1.0000000	6.748E+01	1.128E+00
α_2	4.16E-04	1.24E-02	8.09E-03	3.91E-02	0.00E+00	8.512E-01	6.776E+01
α_3	2.02E-07	4.03E-03	8.64E-04	1.89E-02	0.00E+00	2.768E-01	6.833E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9555925	0.9814478	0.9844938	0.9968916	1.0000000	1.002E+02	1.894E+00
α_2	1.07E-03	1.23E-02	9.33E-03	3.39E-02	0.00E+00	1.260E+00	1.008E+02
α_3	4.29E-06	3.94E-03	1.45E-03	1.63E-02	0.00E+00	4.024E-01	1.017E+02
α_4	1.57E-08	2.27E-03	3.38E-04	1.12E-02	0.00E+00	2.315E-01	1.018E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9661808	0.9831568	0.9847098	0.9948232	1.0000000	2.003E+02	3.432E+00
α_2	1.61E-03	9.44E-03	7.89E-03	2.26E-02	0.00E+00	1.924E+00	2.018E+02
α_3	2.98E-04	5.15E-03	3.65E-03	1.51E-02	0.00E+00	1.049E+00	2.027E+02
α_4	1.43E-06	1.88E-03	6.47E-04	7.91E-03	0.00E+00	3.822E-01	2.034E+02
α_5	3.27E-20	3.77E-04	3.51E-07	2.19E-03	0.00E+00	7.674E-02	2.037E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9686667	0.9839243	0.9852552	0.9946321	1.0000000	2.347E+02	3.835E+00
α_2	1.02E-03	7.13E-03	5.81E-03	1.78E-02	0.00E+00	1.701E+00	2.369E+02
α_3	3.99E-04	5.06E-03	3.76E-03	1.42E-02	0.00E+00	1.207E+00	2.373E+02
α_4	2.29E-05	2.50E-03	1.31E-03	9.00E-03	0.00E+00	5.960E-01	2.380E+02

α_5	3.63E-09	9.27E-04	1.24E-04	4.65E-03	0.00E+00	2.211E-01	2.383E+02
α_6	3.62E-15	4.60E-04	4.66E-06	2.65E-03	0.00E+00	1.098E-01	2.384E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9738309	0.9851508	0.9859764	0.9936393	1.0000000	3.813E+02	5.747E+00
α_2	1.19E-03	5.80E-03	4.97E-03	1.32E-02	0.00E+00	2.243E+00	3.848E+02
α_3	5.65E-04	4.21E-03	3.39E-03	1.06E-02	0.00E+00	1.630E+00	3.854E+02
α_4	1.74E-04	2.80E-03	2.00E-03	8.14E-03	0.00E+00	1.083E+00	3.860E+02
α_5	1.06E-05	1.46E-03	7.37E-04	5.37E-03	0.00E+00	5.654E-01	3.865E+02
α_6	2.72E-10	4.95E-04	4.57E-05	2.58E-03	0.00E+00	1.916E-01	3.869E+02
α_7	6.16E-41	8.99E-05	3.34E-12	3.94E-04	0.00E+00	3.480E-02	3.870E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9750738	0.9858714	0.9866611	0.9939612	1.0000000	3.995E+02	5.726E+00
α_2	8.98E-04	4.98E-03	4.19E-03	1.18E-02	0.00E+00	2.018E+00	4.032E+02
α_3	3.54E-04	3.43E-03	2.66E-03	9.15E-03	0.00E+00	1.391E+00	4.039E+02
α_4	1.56E-04	2.62E-03	1.86E-03	7.68E-03	0.00E+00	1.062E+00	4.042E+02
α_5	3.06E-05	1.73E-03	1.01E-03	5.89E-03	0.00E+00	7.026E-01	4.045E+02
α_6	3.39E-07	8.63E-04	2.65E-04	3.75E-03	0.00E+00	3.497E-01	4.049E+02
α_7	1.30E-15	2.66E-04	2.44E-06	1.54E-03	0.00E+00	1.078E-01	4.051E+02
α_8	2.72E-17	2.34E-04	9.90E-07	1.36E-03	0.00E+00	9.469E-02	4.052E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.84E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.45E-02	1.24E-02	1.23E-02	9.44E-03	7.13E-03	5.80E-03	4.98E-03
α_3		4.03E-03	3.94E-03	5.15E-03	5.06E-03	4.21E-03	3.43E-03
α_4			2.27E-03	1.88E-03	2.50E-03	2.80E-03	2.62E-03
α_5				3.77E-04	9.27E-04	1.46E-03	1.73E-03
α_6					4.60E-04	4.95E-04	8.63E-04
α_7						8.99E-05	2.66E-04
α_8							2.34E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.84E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.45E-02	1.64E-02	1.86E-02	1.68E-02	1.61E-02	1.48E-02	1.41E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	9.50	9.50	9.50	9.50	9.50	9.50	9.50
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 2.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.263

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9606661	0.9898391	0.9954560	0.9999662	4.709E+01	4.834E-01	--
α_2	3.38E-05	1.02E-02	4.54E-03	3.93E-02	4.834E-01	4.709E+01	0.984

CCCG = 3, Gamma = 0.263

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9717897	0.9898385	0.9923889	0.9991692	1.194E+02	1.226E+00	--
α_2	3.94E-04	8.08E-03	5.58E-03	2.43E-02	9.769E-01	1.200E+02	1.103
α_3	3.34E-08	2.09E-03	3.62E-04	1.01E-02	2.487E-01	1.190E+02	1.119

CCCG = 4, Gamma = 0.263

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9696070	0.9869988	0.9889882	0.9975875	1.562E+02	2.057E+00	--
α_2	9.87E-04	8.93E-03	7.00E-03	2.35E-02	1.442E+00	1.601E+02	1.155
α_3	3.30E-06	2.63E-03	9.88E-04	1.08E-02	4.114E-01	1.562E+02	1.191
α_4	1.90E-09	1.45E-03	1.58E-04	7.42E-03	2.036E-01	1.407E+02	1.324

CCCG = 5, Gamma = 0.263

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9755477	0.9876067	0.9886833	0.9959875	2.935E+02	3.683E+00	--
α_2	1.53E-03	7.49E-03	6.42E-03	1.71E-02	2.243E+00	2.973E+02	1.191
α_3	1.73E-04	3.44E-03	2.38E-03	1.03E-02	9.912E-01	2.871E+02	1.238
α_4	8.57E-07	1.26E-03	4.25E-04	5.33E-03	3.765E-01	2.993E+02	1.191
α_5	1.81E-21	2.09E-04	1.19E-07	1.21E-03	7.237E-02	3.465E+02	1.029

CCCG = 6, Gamma = 0.263

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9766763	0.9878082	0.9887527	0.9957132	3.354E+02	4.139E+00	--
α_2	1.14E-03	5.95E-03	5.05E-03	1.38E-02	2.128E+00	3.558E+02	1.137
α_3	2.49E-04	3.61E-03	2.63E-03	1.03E-02	1.134E+00	3.130E+02	1.296
α_4	1.07E-05	1.64E-03	8.12E-04	6.06E-03	5.533E-01	3.376E+02	1.204
α_5	2.45E-09	6.31E-04	8.42E-05	3.16E-03	2.210E-01	3.503E+02	1.161
α_6	4.71E-16	3.70E-04	2.57E-06	2.14E-03	1.027E-01	2.777E+02	1.465

CCCG = 7, Gamma = 0.263

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9808989	0.9888870	0.9894452	0.9949693	5.724E+02	6.432E+00	--
α_2	1.19E-03	4.56E-03	4.04E-03	9.70E-03	2.840E+00	6.201E+02	1.108
α_3	4.87E-04	3.28E-03	2.68E-03	8.11E-03	1.746E+00	5.308E+02	1.296
α_4	1.20E-04	1.93E-03	1.38E-03	5.62E-03	1.084E+00	5.597E+02	1.231
α_5	5.47E-06	9.62E-04	4.66E-04	3.60E-03	5.376E-01	5.585E+02	1.234
α_6	3.01E-10	3.42E-04	3.46E-05	1.77E-03	1.979E-01	5.778E+02	1.194
α_7	8.51E-53	3.80E-05	3.81E-15	1.30E-04	2.656E-02	6.990E+02	0.987

CCCG = 8, Gamma = 0.263

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9817488	0.9895066	0.9900616	0.9953691	5.764E+02	6.112E+00	--
α_2	7.96E-04	3.68E-03	3.18E-03	8.27E-03	2.364E+00	6.407E+02	1.072
α_3	3.31E-04	2.78E-03	2.20E-03	7.21E-03	1.512E+00	5.427E+02	1.267
α_4	1.14E-04	1.94E-03	1.37E-03	5.68E-03	1.056E+00	5.444E+02	1.264
α_5	1.77E-05	1.17E-03	6.64E-04	4.02E-03	6.745E-01	5.781E+02	1.192
α_6	7.75E-08	5.77E-04	1.47E-04	2.62E-03	3.076E-01	5.331E+02	1.293
α_7	1.31E-15	1.87E-04	1.85E-06	1.08E-03	1.093E-01	5.842E+02	1.180
α_8	2.69E-18	1.74E-04	4.84E-07	1.02E-03	8.885E-02	5.093E+02	1.354

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.90E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01	9.90E-01
α_2	1.02E-02	8.08E-03	8.93E-03	7.49E-03	5.95E-03	4.56E-03	3.68E-03
α_3		2.09E-03	2.63E-03	3.44E-03	3.61E-03	3.28E-03	2.78E-03
α_4			1.45E-03	1.26E-03	1.64E-03	1.93E-03	1.94E-03
α_5				2.09E-04	6.31E-04	9.62E-04	1.17E-03
α_6					3.70E-04	3.42E-04	5.77E-04
α_7						3.80E-05	1.87E-04
α_8							1.74E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.90E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01	9.90E-01
Beta	1.02E-02	1.02E-02	1.30E-02	1.24E-02	1.22E-02	1.11E-02	1.05E-02
Gamma		2.05E-01	3.13E-01	3.96E-01	5.12E-01	5.90E-01	6.50E-01
Delta			3.55E-01	2.99E-01	4.22E-01	5.00E-01	5.92E-01
Epsilon				1.43E-01	3.79E-01	4.10E-01	5.21E-01
Mu					3.70E-01	2.83E-01	4.46E-01
Omega						9.99E-02	3.85E-01
Sigma							4.83E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.50	2.50	2.50	2.50	2.50	2.50	2.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8846204	0.9707014	0.9874233	0.9999331	1.490E+01	4.498E-01	--
α_2	6.69E-05	2.93E-02	1.26E-02	1.15E-01	4.498E-01	1.490E+01	0.984

CCCG = 3, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9014695	0.9645295	0.9733850	0.9972634	3.204E+01	1.178E+00	--
α_2	1.26E-03	2.82E-02	1.94E-02	8.51E-02	9.387E-01	3.238E+01	1.103
α_3	7.73E-08	7.30E-03	1.19E-03	3.58E-02	2.396E-01	3.260E+01	1.119

CCCG = 4, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9002249	0.9578241	0.9644329	0.9927856	4.311E+01	1.898E+00	--
α_2	2.54E-03	2.79E-02	2.14E-02	7.55E-02	1.285E+00	4.478E+01	1.155
α_3	8.17E-06	8.79E-03	3.16E-03	3.67E-02	3.927E-01	4.428E+01	1.191
α_4	2.13E-08	5.49E-03	7.41E-04	2.76E-02	2.207E-01	3.996E+01	1.324

CCCG = 5, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9241895	0.9617228	0.9650412	0.9879072	8.808E+01	3.506E+00	--
α_2	3.86E-03	2.15E-02	1.82E-02	5.07E-02	1.992E+00	9.046E+01	1.191
α_3	7.53E-04	1.21E-02	8.71E-03	3.52E-02	1.078E+00	8.783E+01	1.238
α_4	2.07E-06	3.93E-03	1.27E-03	1.68E-02	3.632E-01	9.212E+01	1.191
α_5	6.27E-21	6.78E-04	3.93E-07	3.92E-03	7.248E-02	1.069E+02	1.029

CCCG = 6, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9303931	0.9631658	0.9658460	0.9867765	1.098E+02	4.199E+00	--
α_2	2.78E-03	1.61E-02	1.35E-02	3.82E-02	1.941E+00	1.188E+02	1.137
α_3	1.21E-03	1.26E-02	9.66E-03	3.39E-02	1.332E+00	1.046E+02	1.296
α_4	5.83E-05	5.42E-03	2.93E-03	1.92E-02	6.181E-01	1.135E+02	1.204
α_5	1.34E-08	1.96E-03	2.91E-04	9.69E-03	2.313E-01	1.180E+02	1.161
α_6	7.49E-20	8.20E-04	7.74E-07	4.77E-03	7.684E-02	9.366E+01	1.465

CCCG = 7, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9408305	0.9655999	0.9673039	0.9845484	1.747E+02	6.223E+00	--
α_2	3.34E-03	1.36E-02	1.20E-02	2.95E-02	2.654E+00	1.923E+02	1.108
α_3	1.35E-03	9.87E-03	7.99E-03	2.48E-02	1.645E+00	1.650E+02	1.296
α_4	4.24E-04	6.35E-03	4.60E-03	1.83E-02	1.115E+00	1.744E+02	1.231
α_5	3.34E-05	3.45E-03	1.83E-03	1.24E-02	6.034E-01	1.743E+02	1.234
α_6	1.75E-10	9.84E-04	7.34E-05	5.22E-03	1.780E-01	1.807E+02	1.194
α_7	6.81E-51	1.25E-04	2.57E-14	4.42E-04	2.734E-02	2.187E+02	0.987

CCCG = 8, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9432153	0.9669723	0.9686069	0.9851454	1.829E+02	6.246E+00	--
α_2	2.78E-03	1.20E-02	1.05E-02	2.65E-02	2.504E+00	2.058E+02	1.072
α_3	8.65E-04	8.05E-03	6.28E-03	2.13E-02	1.419E+00	1.749E+02	1.267
α_4	3.20E-04	5.81E-03	4.09E-03	1.72E-02	1.027E+00	1.757E+02	1.264
α_5	8.08E-05	3.91E-03	2.35E-03	1.31E-02	7.337E-01	1.868E+02	1.192
α_6	2.29E-06	2.30E-03	8.31E-04	9.57E-03	3.975E-01	1.724E+02	1.293
α_7	4.07E-20	4.07E-04	3.91E-07	2.37E-03	7.703E-02	1.892E+02	1.180
α_8	4.93E-18	5.30E-04	1.33E-06	3.09E-03	8.749E-02	1.649E+02	1.354

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.71E-01	9.65E-01	9.58E-01	9.62E-01	9.63E-01	9.66E-01	9.67E-01
α_2	2.93E-02	2.82E-02	2.79E-02	2.15E-02	1.61E-02	1.36E-02	1.20E-02
α_3		7.30E-03	8.79E-03	1.21E-02	1.26E-02	9.87E-03	8.05E-03
α_4			5.49E-03	3.93E-03	5.42E-03	6.35E-03	5.81E-03
α_5				6.78E-04	1.96E-03	3.45E-03	3.91E-03
α_6					8.20E-04	9.84E-04	2.30E-03
α_7						1.25E-04	4.07E-04
α_8							5.30E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.71E-01	9.65E-01	9.58E-01	9.62E-01	9.63E-01	9.66E-01	9.67E-01
Beta	2.93E-02	3.55E-02	4.22E-02	3.83E-02	3.68E-02	3.44E-02	3.30E-02
Gamma		2.06E-01	3.39E-01	4.37E-01	5.64E-01	6.04E-01	6.36E-01
Delta			3.85E-01	2.75E-01	3.95E-01	5.25E-01	6.17E-01
Epsilon				1.47E-01	3.39E-01	4.18E-01	5.52E-01
Mu					2.95E-01	2.43E-01	4.53E-01
Omega						1.13E-01	2.89E-01
Sigma							5.66E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 5.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.526

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9389086	0.9843316	0.9931131	0.9999546	2.956E+01	4.706E-01	--
α_2	4.54E-05	1.57E-02	6.89E-03	6.11E-02	4.706E-01	2.956E+01	0.984

CCCG = 3, Gamma = 0.526

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9480204	0.9818782	0.9868286	0.9988085	5.974E+01	1.103E+00	--
α_2	3.84E-04	1.33E-02	8.46E-03	4.26E-02	8.104E-01	6.026E+01	1.103
α_3	4.10E-07	4.85E-03	1.14E-03	2.24E-02	2.921E-01	5.990E+01	1.119

CCCG = 4, Gamma = 0.526

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9543051	0.9807165	0.9837841	0.9966331	9.930E+01	1.953E+00	--
α_2	1.19E-03	1.27E-02	9.70E-03	3.43E-02	1.312E+00	1.022E+02	1.155
α_3	7.22E-06	4.29E-03	1.70E-03	1.73E-02	4.307E-01	9.997E+01	1.191
α_4	4.64E-09	2.32E-03	2.75E-04	1.18E-02	2.099E-01	9.011E+01	1.324

CCCG = 5, Gamma = 0.526

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9644173	0.9827612	0.9845143	0.9951125	1.771E+02	3.107E+00	--
α_2	1.31E-03	9.27E-03	7.54E-03	2.31E-02	1.684E+00	1.799E+02	1.191
α_3	2.39E-04	5.40E-03	3.66E-03	1.65E-02	9.426E-01	1.737E+02	1.238
α_4	1.58E-06	2.10E-03	7.23E-04	8.86E-03	3.816E-01	1.813E+02	1.191
α_5	1.88E-16	4.69E-04	2.57E-06	2.73E-03	9.865E-02	2.100E+02	1.029

CCCG = 6, Gamma = 0.526

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9684890	0.9838480	0.9851912	0.9946175	2.328E+02	3.822E+00	--
α_2	9.91E-04	6.84E-03	5.58E-03	1.70E-02	1.714E+00	2.489E+02	1.137
α_3	3.31E-04	5.04E-03	3.64E-03	1.45E-02	1.108E+00	2.188E+02	1.296
α_4	3.64E-05	2.75E-03	1.53E-03	9.59E-03	6.509E-01	2.361E+02	1.204
α_5	2.05E-08	1.03E-03	1.86E-04	4.98E-03	2.536E-01	2.452E+02	1.161
α_6	7.98E-17	4.92E-04	2.24E-06	2.87E-03	9.572E-02	1.944E+02	1.465

CCCG = 7, Gamma = 0.526

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9730350	0.9850618	0.9859817	0.9939463	3.426E+02	5.195E+00	--
α_2	1.07E-03	5.62E-03	4.76E-03	1.31E-02	2.105E+00	3.727E+02	1.108
α_3	3.87E-04	4.12E-03	3.15E-03	1.12E-02	1.320E+00	3.191E+02	1.296
α_4	1.51E-04	2.95E-03	2.05E-03	8.85E-03	9.967E-01	3.364E+02	1.231
α_5	7.89E-06	1.56E-03	7.42E-04	5.89E-03	5.249E-01	3.359E+02	1.234
α_6	4.18E-10	5.62E-04	5.50E-05	2.92E-03	1.956E-01	3.476E+02	1.194
α_7	3.59E-28	1.26E-04	2.85E-09	6.82E-04	5.291E-02	4.206E+02	0.987

CCCG = 8, Gamma = 0.526

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9751032	0.9858256	0.9866054	0.9938850	4.056E+02	5.832E+00	--
α_2	9.97E-04	4.91E-03	4.21E-03	1.12E-02	2.229E+00	4.516E+02	1.072
α_3	2.82E-04	3.28E-03	2.47E-03	9.05E-03	1.260E+00	3.828E+02	1.267
α_4	1.54E-04	2.71E-03	1.91E-03	7.98E-03	1.042E+00	3.839E+02	1.264
α_5	4.38E-05	1.87E-03	1.14E-03	6.16E-03	7.626E-01	4.077E+02	1.192
α_6	1.99E-07	8.69E-04	2.43E-04	3.86E-03	3.271E-01	3.761E+02	1.293
α_7	3.16E-13	3.26E-04	8.74E-06	1.83E-03	1.344E-01	4.122E+02	1.180
α_8	1.93E-20	2.14E-04	2.01E-07	1.24E-03	7.682E-02	3.594E+02	1.354

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.57E-02	1.33E-02	1.27E-02	9.27E-03	6.84E-03	5.62E-03	4.91E-03
α_3		4.85E-03	4.29E-03	5.40E-03	5.04E-03	4.12E-03	3.28E-03
α_4			2.32E-03	2.10E-03	2.75E-03	2.95E-03	2.71E-03
α_5				4.69E-04	1.03E-03	1.56E-03	1.87E-03
α_6					4.92E-04	5.62E-04	8.69E-04
α_7						1.26E-04	3.26E-04
α_8							2.14E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.57E-02	1.81E-02	1.93E-02	1.72E-02	1.62E-02	1.49E-02	1.42E-02
Gamma		2.68E-01	3.43E-01	4.62E-01	5.77E-01	6.24E-01	6.54E-01
Delta			3.51E-01	3.23E-01	4.59E-01	5.58E-01	6.46E-01
Epsilon				1.83E-01	3.57E-01	4.32E-01	5.48E-01
Mu					3.23E-01	3.06E-01	4.30E-01
Omega						1.83E-01	3.83E-01
Sigma							3.96E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.00	5.00	5.00	5.00	5.00	5.00	5.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9829962	0.9955869	0.9980054	0.9999838	1.113E+02	4.932E-01	--
α_2	1.62E-05	4.41E-03	1.99E-03	1.70E-02	4.932E-01	1.113E+02	0.984

CCCG = 3, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9861886	0.9952837	0.9966478	0.9997205	2.236E+02	1.059E+00	--
α_2	5.92E-05	3.16E-03	1.87E-03	1.07E-02	7.137E-01	2.250E+02	1.103
α_3	5.59E-07	1.55E-03	4.70E-04	6.78E-03	3.458E-01	2.221E+02	1.119

CCCG = 4, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9880239	0.9948503	0.9956283	0.9990170	4.085E+02	2.115E+00	--
α_2	4.56E-04	3.68E-03	2.93E-03	9.47E-03	1.549E+00	4.192E+02	1.155
α_3	2.03E-08	6.49E-04	1.27E-04	3.09E-03	2.646E-01	4.077E+02	1.191
α_4	9.07E-08	8.20E-04	2.01E-04	3.75E-03	3.010E-01	3.667E+02	1.324

CCCG = 5, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9917975	0.9954435	0.9957229	0.9981354	1.163E+03	5.325E+00	--
α_2	9.83E-04	3.08E-03	2.80E-03	6.12E-03	3.632E+00	1.175E+03	1.191
α_3	1.17E-04	1.19E-03	9.17E-04	3.22E-03	1.354E+00	1.133E+03	1.238
α_4	2.38E-08	2.51E-04	5.99E-05	1.15E-03	2.961E-01	1.179E+03	1.191
α_5	9.26E-35	3.11E-05	3.43E-11	1.54E-04	4.243E-02	1.364E+03	1.029

CCCG = 6, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9914810	0.9953547	0.9956616	0.9981801	1.058E+03	4.936E+00	--
α_2	6.95E-04	2.61E-03	2.32E-03	5.52E-03	2.915E+00	1.113E+03	1.137
α_3	1.10E-04	1.28E-03	9.64E-04	3.55E-03	1.257E+00	9.782E+02	1.296
α_4	1.94E-06	4.77E-04	2.18E-04	1.83E-03	5.031E-01	1.054E+03	1.204
α_5	3.06E-15	1.06E-04	1.39E-06	6.06E-04	1.155E-01	1.093E+03	1.161
α_6	7.83E-13	1.67E-04	6.13E-06	9.28E-04	1.451E-01	8.662E+02	1.465

CCCG = 7, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9933739	0.9958059	0.9959486	0.9977507	2.292E+03	9.654E+00	--
α_2	7.62E-04	1.97E-03	1.83E-03	3.62E-03	4.851E+00	2.462E+03	1.108
α_3	3.40E-04	1.33E-03	1.17E-03	2.84E-03	2.800E+00	2.106E+03	1.296
α_4	6.37E-05	6.23E-04	4.81E-04	1.67E-03	1.384E+00	2.219E+03	1.231
α_5	7.84E-07	2.21E-04	9.90E-05	8.56E-04	4.902E-01	2.213E+03	1.234
α_6	1.19E-15	5.01E-05	6.34E-07	2.87E-04	1.146E-01	2.289E+03	1.194
α_7	2.78E-93	5.29E-06	5.63E-25	6.28E-06	1.464E-02	2.768E+03	0.987

CCCG = 8, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931228	0.9959115	0.9960990	0.9980601	1.741E+03	7.148E+00	--
α_2	4.19E-04	1.54E-03	1.38E-03	3.25E-03	2.980E+00	1.926E+03	1.072
α_3	2.08E-04	1.20E-03	1.00E-03	2.86E-03	1.960E+00	1.631E+03	1.267
α_4	5.21E-05	7.13E-04	5.22E-04	2.02E-03	1.166E+00	1.635E+03	1.264
α_5	1.76E-06	3.10E-04	1.50E-04	1.16E-03	5.375E-01	1.736E+03	1.192
α_6	2.49E-11	1.13E-04	8.75E-06	5.96E-04	1.805E-01	1.600E+03	1.293
α_7	1.22E-35	2.36E-05	1.77E-11	1.15E-04	4.139E-02	1.753E+03	1.180
α_8	1.13E-08	1.85E-04	4.08E-05	8.62E-04	2.827E-01	1.528E+03	1.354

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
α_2	4.41E-03	3.16E-03	3.68E-03	3.08E-03	2.61E-03	1.97E-03	1.54E-03
α_3		1.55E-03	6.49E-04	1.19E-03	1.28E-03	1.33E-03	1.20E-03
α_4			8.20E-04	2.51E-04	4.77E-04	6.23E-04	7.13E-04
α_5				3.11E-05	1.06E-04	2.21E-04	3.10E-04
α_6					1.67E-04	5.01E-05	1.13E-04
α_7						5.29E-06	2.36E-05
α_8							1.85E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
Beta	4.41E-03	4.72E-03	5.15E-03	4.56E-03	4.65E-03	4.19E-03	4.09E-03
Gamma		3.30E-01	2.85E-01	3.24E-01	4.38E-01	5.31E-01	6.22E-01
Delta			5.58E-01	1.91E-01	3.69E-01	4.04E-01	5.28E-01
Epsilon				1.10E-01	3.64E-01	3.08E-01	4.70E-01
Mu					6.13E-01	2.00E-01	5.09E-01
Omega						9.55E-02	6.49E-01
Sigma							8.87E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.7 PWR Residual Heat Removal Motor-Operated Valves

2.3.7.1 PWR-RHR-MOV-FTOC: PWR RHR Motor-Operated Valves Fail to Open/Close

Generic CCF Parameters

Plant Type: PWR
System Group: Clean Water
System: Residual Heat Removal (LCI in BWRs; LPI in PWRs)
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Close, Fail to Open, Fail to Open or Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 51.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9751372	0.9936584	0.9972625	0.9999806	1.0000000	7.341E+01	4.685E-01
α_2	1.77E-05	6.34E-03	2.74E-03	2.49E-02	0.00E+00	4.685E-01	7.341E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9707331	0.9897551	0.9925268	0.9992936	1.0000000	1.090E+02	1.128E+00
α_2	2.58E-04	7.73E-03	5.03E-03	2.44E-02	0.00E+00	8.512E-01	1.093E+02
α_3	1.25E-07	2.51E-03	5.37E-04	1.18E-02	0.00E+00	2.768E-01	1.098E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9683564	0.9868104	0.9889924	0.9977980	1.0000000	1.417E+02	1.894E+00
α_2	7.57E-04	8.77E-03	6.62E-03	2.41E-02	0.00E+00	1.260E+00	1.423E+02
α_3	3.04E-06	2.80E-03	1.03E-03	1.16E-02	0.00E+00	4.024E-01	1.432E+02
α_4	1.12E-08	1.61E-03	2.40E-04	7.98E-03	0.00E+00	2.315E-01	1.433E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9718746	0.9860066	0.9873080	0.9957052	1.0000000	2.418E+02	3.432E+00
α_2	1.33E-03	7.85E-03	6.55E-03	1.88E-02	0.00E+00	1.924E+00	2.433E+02
α_3	2.47E-04	4.28E-03	3.03E-03	1.26E-02	0.00E+00	1.049E+00	2.442E+02
α_4	1.18E-06	1.56E-03	5.37E-04	6.57E-03	0.00E+00	3.822E-01	2.449E+02
α_5	2.72E-20	3.13E-04	2.91E-07	1.82E-03	0.00E+00	7.674E-02	2.452E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9732876	0.9863065	0.9874495	0.9954283	1.0000000	2.762E+02	3.835E+00

α_2	8.70E-04	6.07E-03	4.95E-03	1.51E-02	0.00E+00	1.701E+00	2.784E+02
α_3	3.40E-04	4.31E-03	3.20E-03	1.21E-02	0.00E+00	1.207E+00	2.788E+02
α_4	1.95E-05	2.13E-03	1.12E-03	7.67E-03	0.00E+00	5.960E-01	2.795E+02
α_5	3.09E-09	7.89E-04	1.06E-04	3.96E-03	0.00E+00	2.211E-01	2.798E+02
α_6	3.08E-15	3.92E-04	3.97E-06	2.26E-03	0.00E+00	1.098E-01	2.799E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9763550	0.9865887	0.9873416	0.9942631	1.0000000	4.228E+02	5.747E+00
α_2	1.07E-03	5.23E-03	4.49E-03	1.20E-02	0.00E+00	2.243E+00	4.263E+02
α_3	5.10E-04	3.80E-03	3.06E-03	9.62E-03	0.00E+00	1.630E+00	4.269E+02
α_4	1.57E-04	2.53E-03	1.81E-03	7.35E-03	0.00E+00	1.083E+00	4.275E+02
α_5	9.53E-06	1.32E-03	6.65E-04	4.85E-03	0.00E+00	5.654E-01	4.280E+02
α_6	2.45E-10	4.47E-04	4.13E-05	2.33E-03	0.00E+00	1.916E-01	4.284E+02
α_7	5.56E-41	8.12E-05	3.02E-12	3.56E-04	0.00E+00	3.480E-02	4.285E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9773854	0.9871838	0.9879065	0.9945246	1.0000000	4.410E+02	5.726E+00
α_2	8.14E-04	4.52E-03	3.80E-03	1.07E-02	0.00E+00	2.018E+00	4.447E+02
α_3	3.21E-04	3.11E-03	2.41E-03	8.31E-03	0.00E+00	1.391E+00	4.454E+02
α_4	1.41E-04	2.38E-03	1.69E-03	6.96E-03	0.00E+00	1.062E+00	4.457E+02
α_5	2.78E-05	1.57E-03	9.19E-04	5.34E-03	0.00E+00	7.026E-01	4.460E+02
α_6	3.07E-07	7.83E-04	2.40E-04	3.40E-03	0.00E+00	3.497E-01	4.464E+02
α_7	1.18E-15	2.41E-04	2.21E-06	1.39E-03	0.00E+00	1.078E-01	4.466E+02
α_8	2.47E-17	2.12E-04	8.98E-07	1.23E-03	0.00E+00	9.469E-02	4.467E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.90E-01	9.87E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01
α_2	6.34E-03	7.73E-03	8.77E-03	7.85E-03	6.07E-03	5.23E-03	4.52E-03
α_3		2.51E-03	2.80E-03	4.28E-03	4.31E-03	3.80E-03	3.11E-03
α_4			1.61E-03	1.56E-03	2.13E-03	2.53E-03	2.38E-03
α_5				3.13E-04	7.89E-04	1.32E-03	1.57E-03
α_6					3.92E-04	4.47E-04	7.83E-04
α_7						8.12E-05	2.41E-04
α_8							2.12E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.90E-01	9.87E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01
Beta	6.34E-03	1.02E-02	1.32E-02	1.40E-02	1.37E-02	1.34E-02	1.28E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	51.00	51.00	51.00	51.00	51.00	51.00	51.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 23.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.461

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845844	0.9960284	0.9982383	0.9999869	1.212E+02	4.834E-01	--
α_2	1.31E-05	3.97E-03	1.76E-03	1.54E-02	4.834E-01	1.212E+02	0.557

CCCG = 3, Gamma = 0.461

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9831205	0.9939322	0.9954651	0.9995057	2.008E+02	1.226E+00	--
α_2	2.36E-04	4.86E-03	3.35E-03	1.47E-02	9.769E-01	1.999E+02	0.769
α_3	1.92E-08	1.20E-03	2.09E-04	5.84E-03	2.487E-01	2.061E+02	0.748

CCCG = 4, Gamma = 0.461

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9798874	0.9914131	0.9927373	0.9984112	2.375E+02	2.057E+00	--
α_2	6.57E-04	5.96E-03	4.67E-03	1.57E-02	1.442E+00	2.404E+02	0.858
α_3	2.15E-06	1.72E-03	6.46E-04	7.07E-03	4.114E-01	2.388E+02	0.867
α_4	1.19E-09	9.05E-04	9.86E-05	4.64E-03	2.036E-01	2.249E+02	0.922

CCCG = 5, Gamma = 0.461

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9808497	0.9903034	0.9911500	0.9968646	3.761E+02	3.683E+00	--
α_2	1.20E-03	5.87E-03	5.03E-03	1.34E-02	2.243E+00	3.802E+02	0.988
α_3	1.34E-04	2.66E-03	1.84E-03	7.98E-03	9.912E-01	3.719E+02	1.013
α_4	6.71E-07	9.84E-04	3.32E-04	4.17E-03	3.765E-01	3.823E+02	0.987
α_5	1.64E-21	1.89E-04	1.08E-07	1.09E-03	7.237E-02	3.835E+02	0.985

CCCG = 6, Gamma = 0.461

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9811819	0.9901713	0.9909362	0.9965477	4.170E+02	4.139E+00	--
α_2	9.47E-04	4.93E-03	4.19E-03	1.14E-02	2.128E+00	4.298E+02	0.991
α_3	1.91E-04	2.77E-03	2.01E-03	7.93E-03	1.134E+00	4.083E+02	1.045
α_4	8.58E-06	1.31E-03	6.51E-04	4.86E-03	5.533E-01	4.209E+02	1.015
α_5	2.01E-09	5.16E-04	6.88E-05	2.59E-03	2.210E-01	4.282E+02	0.999
α_6	3.88E-16	3.04E-04	2.12E-06	1.76E-03	1.027E-01	3.374E+02	1.268

CCCG = 7, Gamma = 0.461

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9833790	0.9903340	0.9908209	0.9956266	6.590E+02	6.432E+00	--
α_2	1.09E-03	4.19E-03	3.72E-03	8.92E-03	2.840E+00	6.746E+02	1.050
α_3	3.97E-04	2.67E-03	2.19E-03	6.61E-03	1.746E+00	6.517E+02	1.088
α_4	1.03E-04	1.65E-03	1.18E-03	4.79E-03	1.084E+00	6.576E+02	1.079
α_5	4.68E-06	8.23E-04	3.98E-04	3.08E-03	5.376E-01	6.529E+02	1.088
α_6	2.57E-10	2.93E-04	2.95E-05	1.51E-03	1.979E-01	6.762E+02	1.051
α_7	9.09E-53	4.06E-05	4.06E-15	1.39E-04	2.656E-02	6.547E+02	1.086

CCCG = 8, Gamma = 0.461

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9839115	0.9907534	0.9912437	0.9959212	6.549E+02	6.112E+00	--
α_2	7.58E-04	3.50E-03	3.03E-03	7.88E-03	2.364E+00	6.723E+02	1.053
α_3	2.74E-04	2.30E-03	1.82E-03	5.97E-03	1.512E+00	6.555E+02	1.082
α_4	9.40E-05	1.60E-03	1.14E-03	4.71E-03	1.056E+00	6.573E+02	1.079
α_5	1.54E-05	1.02E-03	5.80E-04	3.51E-03	6.745E-01	6.614E+02	1.073
α_6	6.50E-08	4.84E-04	1.23E-04	2.20E-03	3.076E-01	6.356E+02	1.118
α_7	1.10E-15	1.57E-04	1.55E-06	9.05E-04	1.093E-01	6.966E+02	1.020
α_8	2.75E-18	1.78E-04	4.94E-07	1.04E-03	8.885E-02	4.990E+02	1.424

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.94E-01	9.91E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
α_2	3.97E-03	4.86E-03	5.96E-03	5.87E-03	4.93E-03	4.19E-03	3.50E-03
α_3		1.20E-03	1.72E-03	2.66E-03	2.77E-03	2.67E-03	2.30E-03
α_4			9.05E-04	9.84E-04	1.31E-03	1.65E-03	1.60E-03
α_5				1.89E-04	5.16E-04	8.23E-04	1.02E-03
α_6					3.04E-04	2.93E-04	4.84E-04
α_7						4.06E-05	1.57E-04
α_8							1.78E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.94E-01	9.91E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
Beta	3.97E-03	6.07E-03	8.59E-03	9.70E-03	9.83E-03	9.67E-03	9.25E-03
Gamma		1.99E-01	3.06E-01	3.95E-01	4.99E-01	5.66E-01	6.21E-01
Delta			3.45E-01	3.06E-01	4.35E-01	5.12E-01	5.99E-01
Epsilon				1.61E-01	3.85E-01	4.13E-01	5.34E-01
Mu					3.71E-01	2.88E-01	4.46E-01
Omega						1.22E-01	4.09E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	23.50	23.50	23.50	23.50	23.50	23.50	23.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.059

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9419232	0.9853508	0.9938430	0.9999674	3.025E+01	4.498E-01	--
α_2	3.26E-05	1.46E-02	6.16E-03	5.81E-02	4.498E-01	3.025E+01	0.557

CCCG = 3, Gamma = 0.059

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9350071	0.9767514	0.9826755	0.9982262	4.950E+01	1.178E+00	--
α_2	8.27E-04	1.86E-02	1.27E-02	5.65E-02	9.387E-01	4.947E+01	0.769
α_3	4.87E-08	4.63E-03	7.48E-04	2.27E-02	2.396E-01	5.155E+01	0.748

CCCG = 4, Gamma = 0.059

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9290246	0.9701698	0.9749530	0.9949413	6.174E+01	1.898E+00	--
α_2	1.81E-03	2.00E-02	1.53E-02	5.43E-02	1.285E+00	6.305E+01	0.858
α_3	5.71E-06	6.17E-03	2.21E-03	2.57E-02	3.927E-01	6.325E+01	0.867
α_4	1.42E-08	3.69E-03	4.95E-04	1.85E-02	2.207E-01	5.965E+01	0.922

CCCG = 5, Gamma = 0.059

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9381743	0.9688671	0.9716048	0.9901993	1.091E+02	3.506E+00	--
α_2	3.14E-03	1.76E-02	1.48E-02	4.14E-02	1.992E+00	1.115E+02	0.988
α_3	6.04E-04	9.74E-03	6.99E-03	2.83E-02	1.078E+00	1.096E+02	1.013
α_4	1.68E-06	3.20E-03	1.04E-03	1.37E-02	3.632E-01	1.132E+02	0.987
α_5	5.89E-21	6.37E-04	3.69E-07	3.69E-03	7.248E-02	1.138E+02	0.985

CCCG = 6, Gamma = 0.059

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9419342	0.9693390	0.9715979	0.9890234	1.328E+02	4.199E+00	--
α_2	2.38E-03	1.38E-02	1.16E-02	3.29E-02	1.941E+00	1.387E+02	0.991
α_3	9.60E-04	9.99E-03	7.67E-03	2.70E-02	1.332E+00	1.320E+02	1.045
α_4	4.84E-05	4.51E-03	2.43E-03	1.60E-02	6.181E-01	1.366E+02	1.015
α_5	1.14E-08	1.66E-03	2.47E-04	8.22E-03	2.313E-01	1.392E+02	0.999
α_6	6.39E-20	6.99E-04	6.60E-07	4.07E-03	7.684E-02	1.098E+02	1.268

CCCG = 7, Gamma = 0.059

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9474308	0.9694722	0.9709964	0.9863071	1.976E+02	6.223E+00	--
α_2	3.13E-03	1.28E-02	1.13E-02	2.77E-02	2.654E+00	2.050E+02	1.050
α_3	1.12E-03	8.21E-03	6.64E-03	2.07E-02	1.645E+00	1.986E+02	1.088
α_4	3.68E-04	5.52E-03	4.00E-03	1.59E-02	1.115E+00	2.008E+02	1.079
α_5	2.92E-05	3.01E-03	1.60E-03	1.08E-02	6.034E-01	1.997E+02	1.088
α_6	1.53E-10	8.59E-04	6.40E-05	4.56E-03	1.780E-01	2.071E+02	1.051
α_7	7.42E-51	1.36E-04	2.80E-14	4.81E-04	2.734E-02	2.006E+02	1.086

CCCG = 8, Gamma = 0.059

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9487301	0.9702083	0.9716925	0.9866166	2.034E+02	6.246E+00	--
α_2	2.70E-03	1.17E-02	1.02E-02	2.58E-02	2.504E+00	2.115E+02	1.053
α_3	7.31E-04	6.81E-03	5.31E-03	1.80E-02	1.419E+00	2.070E+02	1.082
α_4	2.71E-04	4.92E-03	3.46E-03	1.46E-02	1.027E+00	2.078E+02	1.079
α_5	7.21E-05	3.49E-03	2.10E-03	1.17E-02	7.337E-01	2.093E+02	1.073
α_6	1.97E-06	1.97E-03	7.12E-04	8.20E-03	3.975E-01	2.013E+02	1.118
α_7	3.49E-20	3.49E-04	3.35E-07	2.03E-03	7.703E-02	2.209E+02	1.020
α_8	5.14E-18	5.53E-04	1.38E-06	3.23E-03	8.749E-02	1.582E+02	1.424

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.77E-01	9.70E-01	9.69E-01	9.69E-01	9.69E-01	9.70E-01
α_2	1.46E-02	1.86E-02	2.00E-02	1.76E-02	1.38E-02	1.28E-02	1.17E-02
α_3		4.63E-03	6.17E-03	9.74E-03	9.99E-03	8.21E-03	6.81E-03
α_4			3.69E-03	3.20E-03	4.51E-03	5.52E-03	4.92E-03
α_5				6.37E-04	1.66E-03	3.01E-03	3.49E-03
α_6					6.99E-04	8.59E-04	1.97E-03
α_7						1.36E-04	3.49E-04
α_8							5.53E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.77E-01	9.70E-01	9.69E-01	9.69E-01	9.69E-01	9.70E-01
Beta	1.46E-02	2.32E-02	2.98E-02	3.11E-02	3.07E-02	3.05E-02	2.98E-02
Gamma		1.99E-01	3.30E-01	4.36E-01	5.50E-01	5.81E-01	6.07E-01
Delta			3.74E-01	2.82E-01	4.07E-01	5.37E-01	6.24E-01
Epsilon				1.66E-01	3.44E-01	4.21E-01	5.64E-01
Mu					2.97E-01	2.48E-01	4.51E-01
Omega						1.37E-01	3.14E-01
Sigma							6.13E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 2.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8880400	0.9732707	0.9904604	0.9999795	1.384E+01	3.801E-01	--
α_2	2.05E-05	2.67E-02	9.54E-03	1.12E-01	3.801E-01	1.384E+01	0.557

CCCG = 3, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8647815	0.9544239	0.9679377	0.9977929	2.010E+01	9.600E-01	--
α_2	4.83E-04	3.19E-02	1.86E-02	1.09E-01	6.673E-01	2.023E+01	0.769
α_3	1.20E-06	1.36E-02	3.28E-03	6.28E-02	2.927E-01	2.117E+01	0.748

CCCG = 4, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8591702	0.9424241	0.9523440	0.9916636	2.732E+01	1.669E+00	--
α_2	2.06E-03	3.54E-02	2.54E-02	1.03E-01	1.039E+00	2.834E+01	0.858
α_3	1.17E-05	1.34E-02	4.79E-03	5.59E-02	3.887E-01	2.867E+01	0.867
α_4	1.02E-07	8.83E-03	1.47E-03	4.32E-02	2.414E-01	2.710E+01	0.922

CCCG = 5, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8871173	0.9426742	0.9474789	0.9817893	5.734E+01	3.487E+00	--
α_2	4.58E-03	2.92E-02	2.42E-02	7.08E-02	1.791E+00	5.957E+01	0.988
α_3	1.61E-03	2.02E-02	1.51E-02	5.60E-02	1.207E+00	5.862E+01	1.013
α_4	1.25E-05	7.07E-03	2.83E-03	2.85E-02	4.340E-01	6.096E+01	0.987
α_5	1.98E-26	8.92E-04	3.18E-08	4.92E-03	5.493E-02	6.150E+01	0.985

CCCG = 6, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8982218	0.9468332	0.9508527	0.9816954	6.954E+01	3.905E+00	--
α_2	1.71E-03	1.76E-02	1.36E-02	4.73E-02	1.335E+00	7.445E+01	0.991
α_3	2.63E-03	2.13E-02	1.71E-02	5.46E-02	1.531E+00	7.030E+01	1.045
α_4	1.88E-04	9.73E-03	5.80E-03	3.26E-02	7.191E-01	7.322E+01	1.015
α_5	4.81E-08	3.28E-03	5.63E-04	1.60E-02	2.467E-01	7.491E+01	0.999
α_6	1.36E-20	1.23E-03	7.42E-07	7.14E-03	7.279E-02	5.914E+01	1.268

CCCG = 7, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9126955	0.9498721	0.9524619	0.9781982	1.093E+02	5.770E+00	--
α_2	1.64E-03	1.31E-02	1.05E-02	3.37E-02	1.549E+00	1.163E+02	1.050
α_3	3.12E-03	1.75E-02	1.48E-02	4.13E-02	1.989E+00	1.117E+02	1.088
α_4	1.01E-03	1.12E-02	8.54E-03	3.07E-02	1.287E+00	1.133E+02	1.079
α_5	1.02E-04	6.08E-03	3.53E-03	2.07E-02	6.913E-01	1.130E+02	1.088
α_6	1.46E-08	1.98E-03	2.98E-04	9.78E-03	2.327E-01	1.174E+02	1.051
α_7	1.26E-64	1.85E-04	2.81E-17	4.67E-04	2.112E-02	1.139E+02	1.086

CCCG = 8, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9234229	0.9541293	0.9560983	0.9781090	1.459E+02	7.016E+00	--
α_2	1.31E-03	1.01E-02	8.13E-03	2.58E-02	1.583E+00	1.546E+02	1.053
α_3	2.32E-03	1.31E-02	1.10E-02	3.09E-02	1.986E+00	1.501E+02	1.082
α_4	1.54E-03	1.10E-02	8.92E-03	2.74E-02	1.672E+00	1.507E+02	1.079
α_5	3.50E-04	6.60E-03	4.61E-03	1.96E-02	1.011E+00	1.523E+02	1.073
α_6	2.94E-05	3.88E-03	1.98E-03	1.42E-02	5.709E-01	1.466E+02	1.118
α_7	2.58E-10	1.12E-03	8.79E-05	5.93E-03	1.809E-01	1.611E+02	1.020
α_8	1.56E-107	1.08E-04	3.26E-27	8.08E-05	1.245E-02	1.155E+02	1.424

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.73E-01	9.54E-01	9.42E-01	9.43E-01	9.47E-01	9.50E-01	9.54E-01
α_2	2.67E-02	3.19E-02	3.54E-02	2.92E-02	1.76E-02	1.31E-02	1.01E-02
α_3		1.36E-02	1.34E-02	2.02E-02	2.13E-02	1.75E-02	1.31E-02
α_4			8.83E-03	7.07E-03	9.73E-03	1.12E-02	1.10E-02
α_5				8.92E-04	3.28E-03	6.08E-03	6.60E-03
α_6					1.23E-03	1.98E-03	3.88E-03
α_7						1.85E-04	1.12E-03
α_8							1.08E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.73E-01	9.54E-01	9.42E-01	9.43E-01	9.47E-01	9.50E-01	9.54E-01
Beta	2.67E-02	4.56E-02	5.76E-02	5.73E-02	5.32E-02	5.01E-02	4.59E-02
Gamma		2.99E-01	3.86E-01	4.91E-01	6.69E-01	7.38E-01	7.79E-01
Delta			3.98E-01	2.83E-01	4.00E-01	5.27E-01	6.35E-01
Epsilon				1.12E-01	3.17E-01	4.23E-01	5.16E-01
Mu					2.72E-01	2.62E-01	4.36E-01
Omega						8.57E-02	2.41E-01
Sigma							8.77E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.50	2.50	2.50	2.50	2.50	2.50	2.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 17.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9752981	0.9936903	0.9972618	0.9999820	7.411E+01	4.706E-01	--
α_2	1.80E-05	6.31E-03	2.74E-03	2.47E-02	4.706E-01	7.411E+01	0.557

CCCG = 3, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9694693	0.9893967	0.9923278	0.9993077	1.029E+02	1.103E+00	--
α_2	2.26E-04	7.85E-03	4.98E-03	2.52E-02	8.104E-01	1.024E+02	0.769
α_3	2.31E-07	2.75E-03	6.46E-04	1.27E-02	2.921E-01	1.058E+02	0.748

CCCG = 4, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9694265	0.9871349	0.9892051	0.9977635	1.498E+02	1.953E+00	--
α_2	7.98E-04	8.56E-03	6.53E-03	2.32E-02	1.312E+00	1.520E+02	0.858
α_3	4.77E-06	2.84E-03	1.12E-03	1.15E-02	4.307E-01	1.513E+02	0.867
α_4	2.93E-09	1.47E-03	1.74E-04	7.49E-03	2.099E-01	1.425E+02	0.922

CCCG = 5, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9720000	0.9864540	0.9878412	0.9961669	2.262E+02	3.107E+00	--
α_2	1.03E-03	7.29E-03	5.92E-03	1.82E-02	1.684E+00	2.294E+02	0.988
α_3	1.85E-04	4.18E-03	2.84E-03	1.28E-02	9.426E-01	2.244E+02	1.013
α_4	1.24E-06	1.65E-03	5.67E-04	6.96E-03	3.816E-01	2.309E+02	0.987
α_5	1.70E-16	4.26E-04	2.33E-06	2.47E-03	9.865E-02	2.317E+02	0.985

CCCG = 6, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9744030	0.9868936	0.9879898	0.9956387	2.878E+02	3.822E+00	--
α_2	8.28E-04	5.72E-03	4.66E-03	1.42E-02	1.714E+00	2.980E+02	0.991
α_3	2.56E-04	3.90E-03	2.82E-03	1.12E-02	1.108E+00	2.830E+02	1.045
α_4	2.94E-05	2.23E-03	1.24E-03	7.77E-03	6.509E-01	2.918E+02	1.015
α_5	1.69E-08	8.53E-04	1.54E-04	4.11E-03	2.536E-01	2.970E+02	0.999
α_6	6.63E-17	4.09E-04	1.86E-06	2.38E-03	9.572E-02	2.341E+02	1.268

CCCG = 7, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9765092	0.9869943	0.9877983	0.9947335	3.943E+02	5.195E+00	--
α_2	9.82E-04	5.17E-03	4.39E-03	1.20E-02	2.105E+00	4.049E+02	1.050
α_3	3.16E-04	3.36E-03	2.57E-03	9.13E-03	1.320E+00	3.913E+02	1.088
α_4	1.28E-04	2.52E-03	1.75E-03	7.54E-03	9.967E-01	3.947E+02	1.079
α_5	6.76E-06	1.34E-03	6.35E-04	5.04E-03	5.249E-01	3.921E+02	1.088
α_6	3.58E-10	4.81E-04	4.71E-05	2.50E-03	1.956E-01	4.062E+02	1.051
α_7	3.84E-28	1.35E-04	3.05E-09	7.30E-04	5.291E-02	3.933E+02	1.086

CCCG = 8, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9779194	0.9874350	0.9881284	0.9945826	4.583E+02	5.832E+00	--
α_2	9.55E-04	4.71E-03	4.03E-03	1.08E-02	2.229E+00	4.712E+02	1.053
α_3	2.35E-04	2.73E-03	2.06E-03	7.54E-03	1.260E+00	4.598E+02	1.082
α_4	1.28E-04	2.26E-03	1.59E-03	6.65E-03	1.042E+00	4.610E+02	1.079
α_5	3.85E-05	1.64E-03	1.00E-03	5.41E-03	7.626E-01	4.639E+02	1.073
α_6	1.68E-07	7.33E-04	2.05E-04	3.26E-03	3.271E-01	4.459E+02	1.118
α_7	2.66E-13	2.75E-04	7.37E-06	1.54E-03	1.344E-01	4.888E+02	1.020
α_8	1.98E-20	2.19E-04	2.06E-07	1.27E-03	7.682E-02	3.502E+02	1.424

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.89E-01	9.87E-01	9.86E-01	9.87E-01	9.87E-01	9.87E-01
α_2	6.31E-03	7.85E-03	8.56E-03	7.29E-03	5.72E-03	5.17E-03	4.71E-03
α_3		2.75E-03	2.84E-03	4.18E-03	3.90E-03	3.36E-03	2.73E-03
α_4			1.47E-03	1.65E-03	2.23E-03	2.52E-03	2.26E-03
α_5				4.26E-04	8.53E-04	1.34E-03	1.64E-03
α_6					4.09E-04	4.81E-04	7.33E-04
α_7						1.35E-04	2.75E-04
α_8							2.19E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.89E-01	9.87E-01	9.86E-01	9.87E-01	9.87E-01	9.87E-01
Beta	6.31E-03	1.06E-02	1.29E-02	1.35E-02	1.31E-02	1.30E-02	1.26E-02
Gamma		2.60E-01	3.35E-01	4.62E-01	5.64E-01	6.02E-01	6.25E-01
Delta			3.41E-01	3.32E-01	4.72E-01	5.71E-01	6.52E-01
Epsilon				2.05E-01	3.62E-01	4.37E-01	5.60E-01
Mu					3.24E-01	3.15E-01	4.28E-01
Omega						2.18E-01	4.03E-01
Sigma							4.44E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	17.00	17.00	17.00	17.00	17.00	17.00	17.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 5.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9907027	0.9975891	0.9989132	0.9999912	2.041E+02	4.932E-01	--
α_2	8.85E-06	2.41E-03	1.09E-03	9.30E-03	4.932E-01	2.041E+02	0.557

CCCG = 3, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9906464	0.9968084	0.9977336	0.9998111	3.309E+02	1.059E+00	--
α_2	4.05E-05	2.17E-03	1.28E-03	7.32E-03	7.137E-01	3.284E+02	0.769
α_3	3.68E-07	1.02E-03	3.09E-04	4.46E-03	3.458E-01	3.377E+02	0.748

CCCG = 4, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9912791	0.9962523	0.9968199	0.9992853	5.621E+02	2.115E+00	--
α_2	3.36E-04	2.71E-03	2.16E-03	6.98E-03	1.549E+00	5.694E+02	0.858
α_3	1.46E-08	4.68E-04	9.16E-05	2.23E-03	2.646E-01	5.646E+02	0.867
α_4	6.26E-08	5.66E-04	1.39E-04	2.59E-03	3.010E-01	5.311E+02	0.922

CCCG = 5, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9932311	0.9962408	0.9964717	0.9984621	1.411E+03	5.325E+00	--
α_2	8.13E-04	2.55E-03	2.32E-03	5.06E-03	3.632E+00	1.422E+03	0.988
α_3	9.57E-05	9.74E-04	7.48E-04	2.63E-03	1.354E+00	1.389E+03	1.013
α_4	1.97E-08	2.08E-04	4.95E-05	9.54E-04	2.961E-01	1.426E+03	0.987
α_5	8.83E-35	2.97E-05	3.27E-11	1.47E-04	4.243E-02	1.430E+03	0.985

CCCG = 6, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9927782	0.9960629	0.9963234	0.9984580	1.249E+03	4.936E+00	--
α_2	6.03E-04	2.27E-03	2.02E-03	4.80E-03	2.915E+00	1.282E+03	0.991
α_3	8.80E-05	1.03E-03	7.75E-04	2.85E-03	1.257E+00	1.217E+03	1.045
α_4	1.63E-06	4.01E-04	1.84E-04	1.54E-03	5.031E-01	1.253E+03	1.015
α_5	2.62E-15	9.06E-05	1.20E-06	5.20E-04	1.155E-01	1.274E+03	0.999
α_6	6.76E-13	1.45E-04	5.29E-06	8.01E-04	1.451E-01	1.004E+03	1.268

CCCG = 7, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9940520	0.9962354	0.9963637	0.9979813	2.555E+03	9.654E+00	--
α_2	7.21E-04	1.86E-03	1.73E-03	3.43E-03	4.851E+00	2.603E+03	1.050
α_3	2.85E-04	1.11E-03	9.84E-04	2.38E-03	2.800E+00	2.512E+03	1.088
α_4	5.58E-05	5.46E-04	4.22E-04	1.46E-03	1.384E+00	2.534E+03	1.079
α_5	6.90E-07	1.95E-04	8.71E-05	7.54E-04	4.902E-01	2.514E+03	1.088
α_6	1.05E-15	4.40E-05	5.58E-07	2.53E-04	1.146E-01	2.603E+03	1.051
α_7	3.06E-93	5.81E-06	6.18E-25	6.90E-06	1.464E-02	2.520E+03	1.086

CCCG = 8, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9937181	0.9962658	0.9964372	0.9982284	1.907E+03	7.148E+00	--
α_2	4.11E-04	1.51E-03	1.35E-03	3.18E-03	2.980E+00	1.965E+03	1.053
α_3	1.77E-04	1.02E-03	8.55E-04	2.44E-03	1.960E+00	1.914E+03	1.082
α_4	4.44E-05	6.07E-04	4.45E-04	1.72E-03	1.166E+00	1.919E+03	1.079
α_5	1.58E-06	2.78E-04	1.35E-04	1.04E-03	5.375E-01	1.931E+03	1.073
α_6	2.15E-11	9.73E-05	7.55E-06	5.14E-04	1.805E-01	1.855E+03	1.118
α_7	1.05E-35	2.04E-05	1.52E-11	9.96E-05	4.139E-02	2.032E+03	1.020
α_8	1.18E-08	1.94E-04	4.28E-05	9.05E-04	2.827E-01	1.456E+03	1.424

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	2.41E-03	2.17E-03	2.71E-03	2.55E-03	2.27E-03	1.86E-03	1.51E-03
α_3		1.02E-03	4.68E-04	9.74E-04	1.03E-03	1.11E-03	1.02E-03
α_4			5.66E-04	2.08E-04	4.01E-04	5.46E-04	6.07E-04
α_5				2.97E-05	9.06E-05	1.95E-04	2.78E-04
α_6					1.45E-04	4.40E-05	9.73E-05
α_7						5.81E-06	2.04E-05
α_8							1.94E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	2.41E-03	3.19E-03	3.75E-03	3.76E-03	3.94E-03	3.76E-03	3.73E-03
Gamma		3.20E-01	2.76E-01	3.22E-01	4.24E-01	5.06E-01	5.95E-01
Delta			5.47E-01	1.96E-01	3.81E-01	4.15E-01	5.39E-01
Epsilon				1.25E-01	3.69E-01	3.10E-01	4.93E-01
Mu					6.15E-01	2.04E-01	5.28E-01
Omega						1.17E-01	6.88E-01
Sigma							9.05E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.00	5.00	5.00	5.00	5.00	5.00	5.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.7.2 PWR-RHR-MOV-CC: PWR RHR Motor-Operated Valves Fail to Open

Generic CCF Parameters

Plant Type: PWR
System Group: Clean Water
System: Residual Heat Removal (LCI in BWRs; LPI in PWRs)
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 30.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9652949	0.9911400	0.9961553	0.9999730	1.0000000	5.241E+01	4.685E-01
α_2	2.48E-05	8.86E-03	3.84E-03	3.47E-02	0.00E+00	4.685E-01	5.241E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9638795	0.9873406	0.9907597	0.9991262	1.0000000	8.798E+01	1.128E+00
α_2	3.19E-04	9.55E-03	6.22E-03	3.02E-02	0.00E+00	8.512E-01	8.826E+01
α_3	1.55E-07	3.11E-03	6.64E-04	1.46E-02	0.00E+00	2.768E-01	8.883E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9629720	0.9845507	0.9871012	0.9974169	1.0000000	1.207E+02	1.894E+00
α_2	8.88E-04	1.03E-02	7.76E-03	2.83E-02	0.00E+00	1.260E+00	1.213E+02
α_3	3.57E-06	3.28E-03	1.21E-03	1.36E-02	0.00E+00	4.024E-01	1.222E+02
α_4	1.31E-08	1.89E-03	2.81E-04	9.35E-03	0.00E+00	2.315E-01	1.223E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9692548	0.9846963	0.9861163	0.9953003	1.0000000	2.208E+02	3.432E+00
α_2	1.46E-03	8.58E-03	7.17E-03	2.05E-02	0.00E+00	1.924E+00	2.223E+02
α_3	2.71E-04	4.68E-03	3.31E-03	1.37E-02	0.00E+00	1.049E+00	2.232E+02
α_4	1.30E-06	1.70E-03	5.87E-04	7.19E-03	0.00E+00	3.822E-01	2.239E+02
α_5	2.97E-20	3.42E-04	3.19E-07	1.99E-03	0.00E+00	7.674E-02	2.242E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9711281	0.9851965	0.9864298	0.9950602	1.0000000	2.552E+02	3.835E+00
α_2	9.41E-04	6.57E-03	5.35E-03	1.64E-02	0.00E+00	1.701E+00	2.574E+02
α_3	3.68E-04	4.66E-03	3.46E-03	1.30E-02	0.00E+00	1.207E+00	2.578E+02

α_4	2.11E-05	2.30E-03	1.21E-03	8.29E-03	0.00E+00	5.960E-01	2.585E+02
α_5	3.34E-09	8.53E-04	1.14E-04	4.28E-03	0.00E+00	2.211E-01	2.588E+02
α_6	3.33E-15	4.24E-04	4.29E-06	2.44E-03	0.00E+00	1.098E-01	2.589E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9751422	0.9858977	0.9866830	0.9939604	1.0000000	4.018E+02	5.747E+00
α_2	1.13E-03	5.50E-03	4.72E-03	1.26E-02	0.00E+00	2.243E+00	4.053E+02
α_3	5.36E-04	4.00E-03	3.22E-03	1.01E-02	0.00E+00	1.630E+00	4.059E+02
α_4	1.65E-04	2.66E-03	1.90E-03	7.73E-03	0.00E+00	1.083E+00	4.065E+02
α_5	1.00E-05	1.39E-03	7.00E-04	5.10E-03	0.00E+00	5.654E-01	4.070E+02
α_6	2.58E-10	4.70E-04	4.34E-05	2.45E-03	0.00E+00	1.916E-01	4.074E+02
α_7	5.85E-41	8.54E-05	3.18E-12	3.75E-04	0.00E+00	3.480E-02	4.075E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9762680	0.9865517	0.9873045	0.9942586	1.0000000	4.200E+02	5.726E+00
α_2	8.54E-04	4.74E-03	3.99E-03	1.12E-02	0.00E+00	2.018E+00	4.237E+02
α_3	3.37E-04	3.27E-03	2.53E-03	8.71E-03	0.00E+00	1.391E+00	4.244E+02
α_4	1.48E-04	2.49E-03	1.77E-03	7.31E-03	0.00E+00	1.062E+00	4.247E+02
α_5	2.91E-05	1.65E-03	9.64E-04	5.61E-03	0.00E+00	7.026E-01	4.250E+02
α_6	3.22E-07	8.21E-04	2.52E-04	3.57E-03	0.00E+00	3.497E-01	4.254E+02
α_7	1.24E-15	2.53E-04	2.32E-06	1.46E-03	0.00E+00	1.078E-01	4.256E+02
α_8	2.59E-17	2.22E-04	9.42E-07	1.30E-03	0.00E+00	9.469E-02	4.257E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.87E-01	9.85E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01
α_2	8.86E-03	9.55E-03	1.03E-02	8.58E-03	6.57E-03	5.50E-03	4.74E-03
α_3		3.11E-03	3.28E-03	4.68E-03	4.66E-03	4.00E-03	3.27E-03
α_4			1.89E-03	1.70E-03	2.30E-03	2.66E-03	2.49E-03
α_5				3.42E-04	8.53E-04	1.39E-03	1.65E-03
α_6					4.24E-04	4.70E-04	8.21E-04
α_7						8.54E-05	2.53E-04
α_8							2.22E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.87E-01	9.85E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01
Beta	8.86E-03	1.27E-02	1.54E-02	1.53E-02	1.48E-02	1.41E-02	1.34E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	30.00	30.00	30.00	30.00	30.00	30.00	30.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 16.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.533

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9797145	0.9947710	0.9976767	0.9999827	9.196E+01	4.834E-01	--
α_2	1.73E-05	5.23E-03	2.32E-03	2.03E-02	4.834E-01	9.196E+01	0.653

CCCG = 3, Gamma = 0.533

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804371	0.9929643	0.9947390	0.9994263	1.730E+02	1.226E+00	--
α_2	2.73E-04	5.61E-03	3.87E-03	1.69E-02	9.769E-01	1.730E+02	0.844
α_3	2.27E-08	1.42E-03	2.46E-04	6.89E-03	2.487E-01	1.748E+02	0.839

CCCG = 4, Gamma = 0.533

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9777940	0.9905156	0.9919760	0.9982441	2.148E+02	2.057E+00	--
α_2	7.27E-04	6.59E-03	5.16E-03	1.73E-02	1.442E+00	2.174E+02	0.914
α_3	2.36E-06	1.88E-03	7.07E-04	7.74E-03	4.114E-01	2.182E+02	0.915
α_4	1.33E-09	1.01E-03	1.10E-04	5.19E-03	2.036E-01	2.011E+02	0.994

CCCG = 5, Gamma = 0.533

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9802801	0.9900139	0.9908853	0.9967706	3.651E+02	3.683E+00	--
α_2	1.24E-03	6.05E-03	5.19E-03	1.38E-02	2.243E+00	3.683E+02	0.999
α_3	1.38E-04	2.74E-03	1.89E-03	8.21E-03	9.912E-01	3.611E+02	1.023
α_4	6.84E-07	1.00E-03	3.39E-04	4.26E-03	3.765E-01	3.747E+02	0.987
α_5	1.66E-21	1.91E-04	1.09E-07	1.11E-03	7.237E-02	3.781E+02	0.979

CCCG = 6, Gamma = 0.533

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9808094	0.9899761	0.9907559	0.9964789	4.088E+02	4.139E+00	--
α_2	9.68E-04	5.03E-03	4.28E-03	1.17E-02	2.128E+00	4.206E+02	0.995
α_3	1.95E-04	2.82E-03	2.05E-03	8.08E-03	1.134E+00	4.004E+02	1.047
α_4	8.72E-06	1.33E-03	6.61E-04	4.94E-03	5.533E-01	4.142E+02	1.014
α_5	2.02E-09	5.19E-04	6.93E-05	2.60E-03	2.210E-01	4.254E+02	0.988
α_6	3.97E-16	3.12E-04	2.17E-06	1.81E-03	1.027E-01	3.291E+02	1.277

CCCG = 7, Gamma = 0.533

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9835496	0.9904335	0.9909154	0.9956717	6.659E+02	6.432E+00	--
α_2	1.08E-03	4.15E-03	3.68E-03	8.84E-03	2.840E+00	6.811E+02	1.029
α_3	3.94E-04	2.65E-03	2.17E-03	6.57E-03	1.746E+00	6.560E+02	1.070
α_4	1.01E-04	1.63E-03	1.16E-03	4.73E-03	1.084E+00	6.657E+02	1.055
α_5	4.60E-06	8.08E-04	3.91E-04	3.02E-03	5.376E-01	6.646E+02	1.058
α_6	2.51E-10	2.86E-04	2.89E-05	1.48E-03	1.979E-01	6.917E+02	1.017
α_7	8.90E-53	3.97E-05	3.98E-15	1.36E-04	2.656E-02	6.687E+02	1.052

CCCG = 8, Gamma = 0.533

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9840819	0.9908516	0.9913367	0.9959647	6.620E+02	6.112E+00	--
α_2	7.49E-04	3.46E-03	2.99E-03	7.78E-03	2.364E+00	6.809E+02	1.029
α_3	2.72E-04	2.29E-03	1.81E-03	5.93E-03	1.512E+00	6.598E+02	1.063
α_4	9.31E-05	1.59E-03	1.13E-03	4.66E-03	1.056E+00	6.637E+02	1.058
α_5	1.52E-05	1.00E-03	5.70E-04	3.45E-03	6.745E-01	6.730E+02	1.044
α_6	6.37E-08	4.74E-04	1.20E-04	2.15E-03	3.076E-01	6.490E+02	1.083
α_7	1.07E-15	1.53E-04	1.51E-06	8.85E-04	1.093E-01	7.124E+02	0.987
α_8	2.86E-18	1.85E-04	5.14E-07	1.08E-03	8.885E-02	4.799E+02	1.465

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.93E-01	9.91E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
α_2	5.23E-03	5.61E-03	6.59E-03	6.05E-03	5.03E-03	4.15E-03	3.46E-03
α_3		1.42E-03	1.88E-03	2.74E-03	2.82E-03	2.65E-03	2.29E-03
α_4			1.01E-03	1.00E-03	1.33E-03	1.63E-03	1.59E-03
α_5				1.91E-04	5.19E-04	8.08E-04	1.00E-03
α_6					3.12E-04	2.86E-04	4.74E-04
α_7						3.97E-05	1.53E-04
α_8							1.85E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.93E-01	9.91E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
Beta	5.23E-03	7.04E-03	9.48E-03	9.99E-03	1.00E-02	9.57E-03	9.15E-03
Gamma		2.02E-01	3.05E-01	3.94E-01	4.98E-01	5.66E-01	6.22E-01
Delta			3.50E-01	3.04E-01	4.34E-01	5.10E-01	5.98E-01
Epsilon				1.60E-01	3.84E-01	4.11E-01	5.33E-01
Mu					3.75E-01	2.87E-01	4.48E-01
Omega						1.22E-01	4.17E-01
Sigma							5.47E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	16.00	16.00	16.00	16.00	16.00	16.00	16.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.067

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9278824	0.9817807	0.9923033	0.9999592	2.424E+01	4.498E-01	--
α_2	4.08E-05	1.82E-02	7.70E-03	7.21E-02	4.498E-01	2.424E+01	0.653

CCCG = 3, Gamma = 0.067

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9265159	0.9736722	0.9803469	0.9979856	4.358E+01	1.178E+00	--
α_2	9.35E-04	2.10E-02	1.44E-02	6.36E-02	9.387E-01	4.376E+01	0.844
α_3	5.62E-08	5.33E-03	8.63E-04	2.61E-02	2.396E-01	4.473E+01	0.839

CCCG = 4, Gamma = 0.067

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9231240	0.9676523	0.9728152	0.9945047	5.679E+01	1.898E+00	--
α_2	1.96E-03	2.17E-02	1.66E-02	5.89E-02	1.285E+00	5.801E+01	0.914
α_3	6.14E-06	6.63E-03	2.38E-03	2.77E-02	3.927E-01	5.884E+01	0.915
α_4	1.56E-08	4.05E-03	5.43E-04	2.03E-02	2.207E-01	5.432E+01	0.994

CCCG = 5, Gamma = 0.067

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9370522	0.9682953	0.9710801	0.9900164	1.071E+02	3.506E+00	--
α_2	3.21E-03	1.79E-02	1.51E-02	4.22E-02	1.992E+00	1.092E+02	0.999
α_3	6.15E-04	9.92E-03	7.12E-03	2.88E-02	1.078E+00	1.076E+02	1.023
α_4	1.70E-06	3.23E-03	1.05E-03	1.38E-02	3.632E-01	1.122E+02	0.987
α_5	5.91E-21	6.39E-04	3.70E-07	3.70E-03	7.248E-02	1.134E+02	0.979

CCCG = 6, Gamma = 0.067

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9414162	0.9690626	0.9713405	0.9889230	1.315E+02	4.199E+00	--
α_2	2.41E-03	1.40E-02	1.17E-02	3.32E-02	1.941E+00	1.371E+02	0.995
α_3	9.69E-04	1.01E-02	7.74E-03	2.72E-02	1.332E+00	1.307E+02	1.047
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.358E+02	1.014
α_5	1.13E-08	1.65E-03	2.46E-04	8.18E-03	2.313E-01	1.398E+02	0.988
α_6	6.48E-20	7.10E-04	6.70E-07	4.13E-03	7.684E-02	1.082E+02	1.277

CCCG = 7, Gamma = 0.067

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9482827	0.9699713	0.9714721	0.9865335	2.010E+02	6.223E+00	--
α_2	3.08E-03	1.26E-02	1.11E-02	2.72E-02	2.654E+00	2.082E+02	1.029
α_3	1.11E-03	8.11E-03	6.56E-03	2.04E-02	1.645E+00	2.012E+02	1.070
α_4	3.61E-04	5.42E-03	3.93E-03	1.56E-02	1.115E+00	2.045E+02	1.055
α_5	2.85E-05	2.94E-03	1.56E-03	1.06E-02	6.034E-01	2.045E+02	1.058
α_6	1.48E-10	8.34E-04	6.22E-05	4.43E-03	1.780E-01	2.131E+02	1.017
α_7	7.22E-51	1.33E-04	2.72E-14	4.68E-04	2.734E-02	2.062E+02	1.052

CCCG = 8, Gamma = 0.067

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9495929	0.9707140	0.9721745	0.9868462	2.070E+02	6.246E+00	--
α_2	2.65E-03	1.15E-02	1.00E-02	2.53E-02	2.504E+00	2.156E+02	1.029
α_3	7.21E-04	6.72E-03	5.24E-03	1.78E-02	1.419E+00	2.097E+02	1.063
α_4	2.66E-04	4.84E-03	3.40E-03	1.43E-02	1.027E+00	2.111E+02	1.058
α_5	7.04E-05	3.41E-03	2.05E-03	1.14E-02	7.337E-01	2.143E+02	1.044
α_6	1.91E-06	1.92E-03	6.93E-04	7.98E-03	3.975E-01	2.068E+02	1.083
α_7	3.39E-20	3.39E-04	3.25E-07	1.97E-03	7.703E-02	2.273E+02	0.987
α_8	5.31E-18	5.71E-04	1.43E-06	3.33E-03	8.749E-02	1.531E+02	1.465

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.74E-01	9.68E-01	9.68E-01	9.69E-01	9.70E-01	9.71E-01
α_2	1.82E-02	2.10E-02	2.17E-02	1.79E-02	1.40E-02	1.26E-02	1.15E-02
α_3		5.33E-03	6.63E-03	9.92E-03	1.01E-02	8.11E-03	6.72E-03
α_4			4.05E-03	3.23E-03	4.53E-03	5.42E-03	4.84E-03
α_5				6.39E-04	1.65E-03	2.94E-03	3.41E-03
α_6					7.10E-04	8.34E-04	1.92E-03
α_7						1.33E-04	3.39E-04
α_8							5.71E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.74E-01	9.68E-01	9.68E-01	9.69E-01	9.70E-01	9.71E-01
Beta	1.82E-02	2.63E-02	3.23E-02	3.17E-02	3.09E-02	3.00E-02	2.93E-02
Gamma		2.02E-01	3.30E-01	4.35E-01	5.49E-01	5.81E-01	6.08E-01
Delta			3.79E-01	2.80E-01	4.06E-01	5.35E-01	6.22E-01
Epsilon				1.65E-01	3.43E-01	4.19E-01	5.63E-01
Mu					3.00E-01	2.47E-01	4.53E-01
Omega						1.37E-01	3.22E-01
Sigma							6.28E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8505464	0.9641791	0.9870149	0.9999721	1.023E+01	3.801E-01	--
α_2	2.79E-05	3.58E-02	1.30E-02	1.49E-01	3.801E-01	1.023E+01	0.653

CCCG = 3, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8413176	0.9462673	0.9619835	0.9973756	1.691E+01	9.600E-01	--
α_2	5.70E-04	3.74E-02	2.19E-02	1.27E-01	6.673E-01	1.717E+01	0.844
α_3	1.44E-06	1.63E-02	3.95E-03	7.50E-02	2.927E-01	1.765E+01	0.839

CCCG = 4, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8443302	0.9361562	0.9470224	0.9907114	2.447E+01	1.669E+00	--
α_2	2.30E-03	3.92E-02	2.83E-02	1.14E-01	1.039E+00	2.544E+01	0.914
α_3	1.29E-05	1.47E-02	5.28E-03	6.14E-02	3.887E-01	2.606E+01	0.915
α_4	1.15E-07	9.91E-03	1.65E-03	4.85E-02	2.414E-01	2.411E+01	0.994

CCCG = 5, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8842524	0.9411857	0.9460998	0.9813023	5.580E+01	3.487E+00	--
α_2	4.71E-03	3.00E-02	2.49E-02	7.28E-02	1.791E+00	5.786E+01	0.999
α_3	1.66E-03	2.07E-02	1.55E-02	5.75E-02	1.207E+00	5.709E+01	1.023
α_4	1.28E-05	7.19E-03	2.88E-03	2.89E-02	4.340E-01	5.995E+01	0.987
α_5	2.01E-26	9.02E-04	3.22E-08	4.98E-03	5.493E-02	6.083E+01	0.979

CCCG = 6, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8967436	0.9460455	0.9501178	0.9814172	6.846E+01	3.905E+00	--
α_2	1.74E-03	1.79E-02	1.38E-02	4.81E-02	1.335E+00	7.314E+01	0.995
α_3	2.67E-03	2.16E-02	1.73E-02	5.54E-02	1.531E+00	6.921E+01	1.047
α_4	1.91E-04	9.84E-03	5.87E-03	3.30E-02	7.191E-01	7.236E+01	1.014
α_5	4.82E-08	3.29E-03	5.64E-04	1.60E-02	2.467E-01	7.474E+01	0.988
α_6	1.38E-20	1.26E-03	7.58E-07	7.29E-03	7.279E-02	5.793E+01	1.277

CCCG = 7, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9138190	0.9505273	0.9530867	0.9784885	1.109E+02	5.770E+00	--
α_2	1.62E-03	1.30E-02	1.04E-02	3.33E-02	1.549E+00	1.177E+02	1.029
α_3	3.10E-03	1.73E-02	1.46E-02	4.09E-02	1.989E+00	1.127E+02	1.070
α_4	9.97E-04	1.11E-02	8.42E-03	3.02E-02	1.287E+00	1.150E+02	1.055
α_5	9.96E-05	5.96E-03	3.46E-03	2.03E-02	6.913E-01	1.153E+02	1.058
α_6	1.43E-08	1.93E-03	2.91E-04	9.54E-03	2.327E-01	1.204E+02	1.017
α_7	1.23E-64	1.81E-04	2.75E-17	4.56E-04	2.112E-02	1.166E+02	1.052

CCCG = 8, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9246351	0.9548648	0.9568053	0.9784654	1.484E+02	7.016E+00	--
α_2	1.28E-03	9.96E-03	8.00E-03	2.54E-02	1.583E+00	1.573E+02	1.029
α_3	2.29E-03	1.29E-02	1.09E-02	3.05E-02	1.986E+00	1.518E+02	1.063
α_4	1.52E-03	1.08E-02	8.79E-03	2.70E-02	1.672E+00	1.529E+02	1.058
α_5	3.42E-04	6.45E-03	4.51E-03	1.92E-02	1.011E+00	1.556E+02	1.044
α_6	2.87E-05	3.78E-03	1.93E-03	1.38E-02	5.709E-01	1.504E+02	1.083
α_7	2.51E-10	1.09E-03	8.55E-05	5.77E-03	1.809E-01	1.655E+02	0.987
α_8	1.61E-107	1.12E-04	3.38E-27	8.37E-05	1.245E-02	1.116E+02	1.465

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.64E-01	9.46E-01	9.36E-01	9.41E-01	9.46E-01	9.51E-01	9.55E-01
α_2	3.58E-02	3.74E-02	3.92E-02	3.00E-02	1.79E-02	1.30E-02	9.96E-03
α_3		1.63E-02	1.47E-02	2.07E-02	2.16E-02	1.73E-02	1.29E-02
α_4			9.91E-03	7.19E-03	9.84E-03	1.11E-02	1.08E-02
α_5				9.02E-04	3.29E-03	5.96E-03	6.45E-03
α_6					1.26E-03	1.93E-03	3.78E-03
α_7						1.81E-04	1.09E-03
α_8							1.12E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.64E-01	9.46E-01	9.36E-01	9.41E-01	9.46E-01	9.51E-01	9.55E-01
Beta	3.58E-02	5.37E-02	6.38E-02	5.88E-02	5.40E-02	4.95E-02	4.51E-02
Gamma		3.04E-01	3.85E-01	4.90E-01	6.68E-01	7.37E-01	7.79E-01
Delta			4.03E-01	2.81E-01	3.99E-01	5.25E-01	6.33E-01
Epsilon				1.12E-01	3.16E-01	4.22E-01	5.14E-01
Mu					2.76E-01	2.61E-01	4.36E-01
Omega						8.58E-02	2.41E-01
Sigma							9.27E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.50	1.50	1.50	1.50	1.50	1.50	1.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 10.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.350

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9657465	0.9912414	0.9961864	0.9999749	5.326E+01	4.706E-01	--
α_2	2.51E-05	8.76E-03	3.81E-03	3.43E-02	4.706E-01	5.326E+01	0.653

CCCG = 3, Gamma = 0.350

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9633061	0.9872423	0.9907571	0.9991654	8.532E+01	1.103E+00	--
α_2	2.71E-04	9.39E-03	5.97E-03	3.02E-02	8.104E-01	8.547E+01	0.844
α_3	2.83E-07	3.37E-03	7.90E-04	1.55E-02	2.921E-01	8.651E+01	0.839

CCCG = 4, Gamma = 0.350

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9657868	0.9855934	0.9879053	0.9974929	1.336E+02	1.953E+00	--
α_2	8.95E-04	9.59E-03	7.33E-03	2.60E-02	1.312E+00	1.355E+02	0.914
α_3	5.30E-06	3.15E-03	1.25E-03	1.27E-02	4.307E-01	1.363E+02	0.915
α_4	3.32E-09	1.67E-03	1.97E-04	8.49E-03	2.099E-01	1.257E+02	0.994

CCCG = 5, Gamma = 0.350

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9709292	0.9859332	0.9873723	0.9960184	2.178E+02	3.107E+00	--
α_2	1.07E-03	7.59E-03	6.17E-03	1.90E-02	1.684E+00	2.203E+02	0.999
α_3	1.92E-04	4.35E-03	2.95E-03	1.33E-02	9.426E-01	2.160E+02	1.023
α_4	1.28E-06	1.70E-03	5.84E-04	7.17E-03	3.816E-01	2.243E+02	0.987
α_5	1.74E-16	4.35E-04	2.39E-06	2.53E-03	9.865E-02	2.264E+02	0.979

CCCG = 6, Gamma = 0.350

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9737922	0.9865794	0.9877012	0.9955334	2.810E+02	3.822E+00	--
α_2	8.50E-04	5.87E-03	4.79E-03	1.46E-02	1.714E+00	2.903E+02	0.995
α_3	2.62E-04	4.00E-03	2.88E-03	1.15E-02	1.108E+00	2.762E+02	1.047
α_4	3.00E-05	2.27E-03	1.27E-03	7.93E-03	6.509E-01	2.859E+02	1.014
α_5	1.71E-08	8.63E-04	1.55E-04	4.16E-03	2.536E-01	2.938E+02	0.988
α_6	6.83E-17	4.21E-04	1.91E-06	2.45E-03	9.572E-02	2.273E+02	1.277

CCCG = 7, Gamma = 0.350

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9766499	0.9870725	0.9878718	0.9947653	3.967E+02	5.195E+00	--
α_2	9.77E-04	5.15E-03	4.37E-03	1.20E-02	2.105E+00	4.069E+02	1.029
α_3	3.15E-04	3.36E-03	2.56E-03	9.11E-03	1.320E+00	3.920E+02	1.070
α_4	1.27E-04	2.50E-03	1.73E-03	7.49E-03	9.967E-01	3.977E+02	1.055
α_5	6.68E-06	1.32E-03	6.27E-04	4.98E-03	5.249E-01	3.972E+02	1.058
α_6	3.51E-10	4.73E-04	4.63E-05	2.45E-03	1.956E-01	4.135E+02	1.017
α_7	3.77E-28	1.32E-04	3.00E-09	7.18E-04	5.291E-02	3.998E+02	1.052

CCCG = 8, Gamma = 0.350

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9781083	0.9875429	0.9882305	0.9946293	4.623E+02	5.832E+00	--
α_2	9.46E-04	4.66E-03	3.99E-03	1.07E-02	2.229E+00	4.760E+02	1.029
α_3	2.34E-04	2.72E-03	2.05E-03	7.51E-03	1.260E+00	4.616E+02	1.063
α_4	1.27E-04	2.24E-03	1.58E-03	6.60E-03	1.042E+00	4.642E+02	1.058
α_5	3.80E-05	1.62E-03	9.90E-04	5.33E-03	7.626E-01	4.708E+02	1.044
α_6	1.65E-07	7.20E-04	2.01E-04	3.20E-03	3.271E-01	4.542E+02	1.083
α_7	2.61E-13	2.69E-04	7.22E-06	1.51E-03	1.344E-01	4.986E+02	0.987
α_8	2.06E-20	2.29E-04	2.15E-07	1.33E-03	7.682E-02	3.359E+02	1.465

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.87E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01	9.88E-01
α_2	8.76E-03	9.39E-03	9.59E-03	7.59E-03	5.87E-03	5.15E-03	4.66E-03
α_3		3.37E-03	3.15E-03	4.35E-03	4.00E-03	3.36E-03	2.72E-03
α_4			1.67E-03	1.70E-03	2.27E-03	2.50E-03	2.24E-03
α_5				4.35E-04	8.63E-04	1.32E-03	1.62E-03
α_6					4.21E-04	4.73E-04	7.20E-04
α_7						1.32E-04	2.69E-04
α_8							2.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.87E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01	9.88E-01
Beta	8.76E-03	1.28E-02	1.44E-02	1.41E-02	1.34E-02	1.29E-02	1.25E-02
Gamma		2.64E-01	3.34E-01	4.61E-01	5.63E-01	6.02E-01	6.26E-01
Delta			3.46E-01	3.29E-01	4.71E-01	5.69E-01	6.51E-01
Epsilon				2.04E-01	3.61E-01	4.35E-01	5.59E-01
Mu					3.28E-01	3.14E-01	4.30E-01
Omega						2.19E-01	4.09E-01
Sigma							4.59E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	10.50	10.50	10.50	10.50	10.50	10.50	10.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.7.3 PWR-RHR-MOV-OO: PWR RHR Motor-Operated Valves Fail to Close

Generic CCF Parameters

Plant Type: PWR
System Group: Clean Water
System: Residual Heat Removal (LCI in BWRs; LPI in PWRs)
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 15.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9522532	0.9877928	0.9946787	0.9999630	1.0000000	3.791E+01	4.685E-01
α_2	3.43E-05	1.22E-02	5.32E-03	4.77E-02	0.00E+00	4.685E-01	3.791E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9569072	0.9848802	0.9889415	0.9989551	1.0000000	7.348E+01	1.128E+00
α_2	3.82E-04	1.14E-02	7.44E-03	3.60E-02	0.00E+00	8.512E-01	7.376E+01
α_3	1.85E-07	3.71E-03	7.94E-04	1.74E-02	0.00E+00	2.768E-01	7.433E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9580384	0.9824778	0.9853600	0.9970662	1.0000000	1.062E+02	1.894E+00
α_2	1.01E-03	1.17E-02	8.81E-03	3.20E-02	0.00E+00	1.260E+00	1.068E+02
α_3	4.05E-06	3.72E-03	1.37E-03	1.54E-02	0.00E+00	4.024E-01	1.077E+02
α_4	1.49E-08	2.14E-03	3.19E-04	1.06E-02	0.00E+00	2.315E-01	1.078E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9671424	0.9836385	0.9851485	0.9949727	1.0000000	2.063E+02	3.432E+00
α_2	1.56E-03	9.17E-03	7.67E-03	2.19E-02	0.00E+00	1.924E+00	2.078E+02
α_3	2.90E-04	5.00E-03	3.54E-03	1.47E-02	0.00E+00	1.049E+00	2.087E+02
α_4	1.39E-06	1.82E-03	6.28E-04	7.69E-03	0.00E+00	3.822E-01	2.094E+02
α_5	3.18E-20	3.66E-04	3.41E-07	2.13E-03	0.00E+00	7.674E-02	2.097E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9694313	0.9843187	0.9856179	0.9947650	1.0000000	2.407E+02	3.835E+00
α_2	9.97E-04	6.96E-03	5.67E-03	1.73E-02	0.00E+00	1.701E+00	2.429E+02
α_3	3.89E-04	4.94E-03	3.67E-03	1.38E-02	0.00E+00	1.207E+00	2.433E+02

α_4	2.23E-05	2.44E-03	1.28E-03	8.78E-03	0.00E+00	5.960E-01	2.440E+02
α_5	3.54E-09	9.04E-04	1.21E-04	4.53E-03	0.00E+00	2.211E-01	2.443E+02
α_6	3.53E-15	4.49E-04	4.54E-06	2.59E-03	0.00E+00	1.098E-01	2.444E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9742294	0.9853774	0.9861908	0.9937416	1.0000000	3.873E+02	5.747E+00
α_2	1.17E-03	5.71E-03	4.89E-03	1.30E-02	0.00E+00	2.243E+00	3.908E+02
α_3	5.56E-04	4.15E-03	3.34E-03	1.05E-02	0.00E+00	1.630E+00	3.914E+02
α_4	1.71E-04	2.76E-03	1.97E-03	8.01E-03	0.00E+00	1.083E+00	3.920E+02
α_5	1.04E-05	1.44E-03	7.25E-04	5.28E-03	0.00E+00	5.654E-01	3.925E+02
α_6	2.68E-10	4.87E-04	4.50E-05	2.54E-03	0.00E+00	1.916E-01	3.929E+02
α_7	6.06E-41	8.85E-05	3.29E-12	3.88E-04	0.00E+00	3.480E-02	3.930E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9754360	0.9860775	0.9868561	0.9940496	1.0000000	4.055E+02	5.726E+00
α_2	8.85E-04	4.91E-03	4.13E-03	1.16E-02	0.00E+00	2.018E+00	4.092E+02
α_3	3.49E-04	3.38E-03	2.62E-03	9.02E-03	0.00E+00	1.391E+00	4.099E+02
α_4	1.54E-04	2.58E-03	1.83E-03	7.56E-03	0.00E+00	1.062E+00	4.102E+02
α_5	3.02E-05	1.71E-03	9.98E-04	5.80E-03	0.00E+00	7.026E-01	4.105E+02
α_6	3.34E-07	8.50E-04	2.61E-04	3.70E-03	0.00E+00	3.497E-01	4.109E+02
α_7	1.28E-15	2.62E-04	2.41E-06	1.51E-03	0.00E+00	1.078E-01	4.111E+02
α_8	2.68E-17	2.30E-04	9.75E-07	1.34E-03	0.00E+00	9.469E-02	4.112E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.85E-01	9.82E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.22E-02	1.14E-02	1.17E-02	9.17E-03	6.96E-03	5.71E-03	4.91E-03
α_3		3.71E-03	3.72E-03	5.00E-03	4.94E-03	4.15E-03	3.38E-03
α_4			2.14E-03	1.82E-03	2.44E-03	2.76E-03	2.58E-03
α_5				3.66E-04	9.04E-04	1.44E-03	1.71E-03
α_6					4.49E-04	4.87E-04	8.50E-04
α_7						8.85E-05	2.62E-04
α_8							2.30E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.85E-01	9.82E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.22E-02	1.51E-02	1.75E-02	1.64E-02	1.57E-02	1.46E-02	1.39E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	15.50	15.50	15.50	15.50	15.50	15.50	15.50
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 5.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.323

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9670877	0.9915042	0.9962090	0.9999718	5.642E+01	4.834E-01	--
α_2	2.82E-05	8.50E-03	3.79E-03	3.29E-02	4.834E-01	5.642E+01	0.867

CCCG = 3, Gamma = 0.323

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9735140	0.9904626	0.9928587	0.9992206	1.273E+02	1.226E+00	--
α_2	3.77E-04	7.73E-03	5.33E-03	2.33E-02	9.769E-01	1.254E+02	1.075
α_3	2.89E-08	1.81E-03	3.14E-04	8.78E-03	2.487E-01	1.371E+02	0.989

CCCG = 4, Gamma = 0.323

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9712140	0.9876900	0.9895759	0.9977168	1.650E+02	2.057E+00	--
α_2	9.47E-04	8.57E-03	6.72E-03	2.25E-02	1.442E+00	1.668E+02	1.123
α_3	3.14E-06	2.51E-03	9.42E-04	1.03E-02	4.114E-01	1.637E+02	1.151
α_4	1.62E-09	1.23E-03	1.35E-04	6.33E-03	2.036E-01	1.650E+02	1.144

CCCG = 5, Gamma = 0.323

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9757814	0.9877257	0.9887922	0.9960263	2.964E+02	3.683E+00	--
α_2	1.51E-03	7.40E-03	6.35E-03	1.69E-02	2.243E+00	3.008E+02	1.185
α_3	1.68E-04	3.33E-03	2.31E-03	1.00E-02	9.912E-01	2.964E+02	1.208
α_4	8.72E-07	1.28E-03	4.32E-04	5.42E-03	3.765E-01	2.941E+02	1.220
α_5	2.28E-21	2.62E-04	1.50E-07	1.52E-03	7.237E-02	2.757E+02	1.303

CCCG = 6, Gamma = 0.323

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9766128	0.9877748	0.9887219	0.9957014	3.344E+02	4.139E+00	--
α_2	1.19E-03	6.17E-03	5.24E-03	1.43E-02	2.128E+00	3.430E+02	1.186
α_3	2.32E-04	3.36E-03	2.45E-03	9.63E-03	1.134E+00	3.359E+02	1.215
α_4	1.07E-05	1.64E-03	8.16E-04	6.09E-03	5.533E-01	3.360E+02	1.217
α_5	2.60E-09	6.68E-04	8.92E-05	3.35E-03	2.210E-01	3.306E+02	1.238
α_6	4.88E-16	3.83E-04	2.67E-06	2.22E-03	1.027E-01	2.679E+02	1.527

CCCG = 7, Gamma = 0.323

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9803590	0.9885719	0.9891456	0.9948261	5.564E+02	6.432E+00	--
α_2	1.31E-03	5.03E-03	4.46E-03	1.07E-02	2.840E+00	5.620E+02	1.226
α_3	4.56E-04	3.07E-03	2.51E-03	7.59E-03	1.746E+00	5.672E+02	1.217
α_4	1.21E-04	1.94E-03	1.39E-03	5.64E-03	1.084E+00	5.582E+02	1.238
α_5	5.57E-06	9.79E-04	4.74E-04	3.66E-03	5.376E-01	5.483E+02	1.262
α_6	3.15E-10	3.59E-04	3.62E-05	1.85E-03	1.979E-01	5.518E+02	1.255
α_7	1.22E-52	5.45E-05	5.46E-15	1.86E-04	2.656E-02	4.872E+02	1.421

CCCG = 8, Gamma = 0.323

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9810004	0.9890749	0.9896523	0.9951779	5.534E+02	6.112E+00	--
α_2	9.18E-04	4.24E-03	3.66E-03	9.53E-03	2.364E+00	5.551E+02	1.242
α_3	3.15E-04	2.65E-03	2.09E-03	6.86E-03	1.512E+00	5.700E+02	1.211
α_4	1.09E-04	1.86E-03	1.32E-03	5.47E-03	1.056E+00	5.663E+02	1.220
α_5	1.85E-05	1.22E-03	6.95E-04	4.21E-03	6.745E-01	5.523E+02	1.252
α_6	7.65E-08	5.69E-04	1.45E-04	2.58E-03	3.076E-01	5.404E+02	1.280
α_7	1.36E-15	1.94E-04	1.91E-06	1.12E-03	1.093E-01	5.641E+02	1.227
α_8	3.02E-18	1.95E-04	5.42E-07	1.14E-03	8.885E-02	4.549E+02	1.521

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.90E-01	9.88E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01
α_2	8.50E-03	7.73E-03	8.57E-03	7.40E-03	6.17E-03	5.03E-03	4.24E-03
α_3		1.81E-03	2.51E-03	3.33E-03	3.36E-03	3.07E-03	2.65E-03
α_4			1.23E-03	1.28E-03	1.64E-03	1.94E-03	1.86E-03
α_5				2.62E-04	6.68E-04	9.79E-04	1.22E-03
α_6					3.83E-04	3.59E-04	5.69E-04
α_7						5.45E-05	1.94E-04
α_8							1.95E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.90E-01	9.88E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01
Beta	8.50E-03	9.54E-03	1.23E-02	1.23E-02	1.22E-02	1.14E-02	1.09E-02
Gamma		1.90E-01	3.04E-01	3.97E-01	4.96E-01	5.60E-01	6.12E-01
Delta			3.30E-01	3.16E-01	4.45E-01	5.20E-01	6.04E-01
Epsilon				1.70E-01	3.90E-01	4.18E-01	5.39E-01
Mu					3.64E-01	2.97E-01	4.40E-01
Omega						1.32E-01	4.06E-01
Sigma							5.02E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.00	5.00	5.00	5.00	5.00	5.00	5.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8982072	0.9741945	0.9889787	0.9999414	1.698E+01	4.498E-01	--
α_2	5.86E-05	2.58E-02	1.10E-02	1.02E-01	4.498E-01	1.698E+01	0.867

CCCG = 3, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9057141	0.9660854	0.9745748	0.9973871	3.356E+01	1.178E+00	--
α_2	1.23E-03	2.75E-02	1.89E-02	8.30E-02	9.387E-01	3.324E+01	1.075
α_3	6.82E-08	6.45E-03	1.05E-03	3.16E-02	2.396E-01	3.690E+01	0.989

CCCG = 4, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9043918	0.9596195	0.9659685	0.9931014	4.511E+01	1.898E+00	--
α_2	2.47E-03	2.71E-02	2.08E-02	7.35E-02	1.285E+00	4.607E+01	1.123
α_3	7.89E-06	8.50E-03	3.06E-03	3.54E-02	3.927E-01	4.581E+01	1.151
α_4	1.84E-08	4.75E-03	6.39E-04	2.38E-02	2.207E-01	4.627E+01	1.144

CCCG = 5, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9244269	0.9618444	0.9651531	0.9879464	8.837E+01	3.506E+00	--
α_2	3.85E-03	2.14E-02	1.81E-02	5.05E-02	1.992E+00	9.089E+01	1.185
α_3	7.34E-04	1.18E-02	8.50E-03	3.43E-02	1.078E+00	9.007E+01	1.208
α_4	2.12E-06	4.02E-03	1.31E-03	1.73E-02	3.632E-01	8.988E+01	1.220
α_5	7.94E-21	8.58E-04	4.98E-07	4.97E-03	7.248E-02	8.444E+01	1.303

CCCG = 6, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9301359	0.9630280	0.9657174	0.9867262	1.094E+02	4.199E+00	--
α_2	2.90E-03	1.68E-02	1.41E-02	3.99E-02	1.941E+00	1.138E+02	1.186
α_3	1.13E-03	1.18E-02	9.05E-03	3.18E-02	1.332E+00	1.117E+02	1.215
α_4	5.89E-05	5.48E-03	2.96E-03	1.94E-02	6.181E-01	1.122E+02	1.217
α_5	1.43E-08	2.09E-03	3.10E-04	1.03E-02	2.313E-01	1.107E+02	1.238
α_6	7.82E-20	8.55E-04	8.07E-07	4.98E-03	7.684E-02	8.981E+01	1.527

CCCG = 7, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9389931	0.9645203	0.9662739	0.9840572	1.692E+02	6.223E+00	--
α_2	3.70E-03	1.51E-02	1.33E-02	3.26E-02	2.654E+00	1.734E+02	1.226
α_3	1.27E-03	9.27E-03	7.51E-03	2.33E-02	1.645E+00	1.757E+02	1.217
α_4	4.26E-04	6.39E-03	4.63E-03	1.84E-02	1.115E+00	1.733E+02	1.238
α_5	3.41E-05	3.53E-03	1.87E-03	1.26E-02	6.034E-01	1.705E+02	1.262
α_6	1.84E-10	1.03E-03	7.72E-05	5.49E-03	1.780E-01	1.719E+02	1.255
α_7	9.81E-51	1.80E-04	3.70E-14	6.36E-04	2.734E-02	1.519E+02	1.421

CCCG = 8, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9405048	0.9653794	0.9670873	0.9844199	1.742E+02	6.246E+00	--
α_2	3.22E-03	1.39E-02	1.22E-02	3.06E-02	2.504E+00	1.774E+02	1.242
α_3	8.26E-04	7.69E-03	6.00E-03	2.03E-02	1.419E+00	1.831E+02	1.211
α_4	3.09E-04	5.61E-03	3.94E-03	1.66E-02	1.027E+00	1.821E+02	1.220
α_5	8.49E-05	4.11E-03	2.47E-03	1.37E-02	7.337E-01	1.778E+02	1.252
α_6	2.27E-06	2.28E-03	8.23E-04	9.48E-03	3.975E-01	1.742E+02	1.280
α_7	4.23E-20	4.23E-04	4.06E-07	2.46E-03	7.703E-02	1.821E+02	1.227
α_8	5.54E-18	5.96E-04	1.49E-06	3.48E-03	8.749E-02	1.468E+02	1.521

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.74E-01	9.66E-01	9.60E-01	9.62E-01	9.63E-01	9.65E-01	9.65E-01
α_2	2.58E-02	2.75E-02	2.71E-02	2.14E-02	1.68E-02	1.51E-02	1.39E-02
α_3		6.45E-03	8.50E-03	1.18E-02	1.18E-02	9.27E-03	7.69E-03
α_4			4.75E-03	4.02E-03	5.48E-03	6.39E-03	5.61E-03
α_5				8.58E-04	2.09E-03	3.53E-03	4.11E-03
α_6					8.55E-04	1.03E-03	2.28E-03
α_7						1.80E-04	4.23E-04
α_8							5.96E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.74E-01	9.66E-01	9.60E-01	9.62E-01	9.63E-01	9.65E-01	9.65E-01
Beta	2.58E-02	3.39E-02	4.04E-02	3.82E-02	3.70E-02	3.55E-02	3.46E-02
Gamma		1.90E-01	3.28E-01	4.38E-01	5.46E-01	5.75E-01	5.98E-01
Delta			3.58E-01	2.92E-01	4.17E-01	5.46E-01	6.29E-01
Epsilon				1.76E-01	3.49E-01	4.26E-01	5.69E-01
Mu					2.91E-01	2.56E-01	4.45E-01
Omega						1.48E-01	3.09E-01
Sigma							5.85E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7876171	0.9487095	0.9808996	0.9999588	7.031E+00	3.801E-01	--
α_2	4.12E-05	5.13E-02	1.91E-02	2.12E-01	3.801E-01	7.031E+00	0.867

CCCG = 3, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7975775	0.9308350	0.9505310	0.9965660	1.292E+01	9.600E-01	--
α_2	7.62E-04	4.93E-02	2.92E-02	1.66E-01	6.673E-01	1.287E+01	1.075
α_3	1.77E-06	1.99E-02	4.86E-03	9.14E-02	2.927E-01	1.442E+01	0.989

CCCG = 4, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8070666	0.9202263	0.9333761	0.9882496	1.925E+01	1.669E+00	--
α_2	2.91E-03	4.92E-02	3.57E-02	1.42E-01	1.039E+00	2.006E+01	1.123
α_3	1.67E-05	1.89E-02	6.83E-03	7.87E-02	3.887E-01	2.020E+01	1.151
α_4	1.36E-07	1.17E-02	1.95E-03	5.71E-02	2.414E-01	2.047E+01	1.144

CCCG = 5, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8614127	0.9292552	0.9350173	0.9773719	4.580E+01	3.487E+00	--
α_2	5.66E-03	3.59E-02	2.99E-02	8.68E-02	1.791E+00	4.808E+01	1.185
α_3	1.98E-03	2.47E-02	1.85E-02	6.83E-02	1.207E+00	4.773E+01	1.208
α_4	1.59E-05	8.96E-03	3.60E-03	3.61E-02	4.340E-01	4.802E+01	1.220
α_5	2.70E-26	1.21E-03	4.33E-08	6.69E-03	5.493E-02	4.532E+01	1.303

CCCG = 6, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8773106	0.9356461	0.9403972	0.9777250	5.677E+01	3.905E+00	--
α_2	2.10E-03	2.15E-02	1.66E-02	5.77E-02	1.335E+00	6.069E+01	1.186
α_3	3.13E-03	2.53E-02	2.03E-02	6.46E-02	1.531E+00	5.904E+01	1.215
α_4	2.31E-04	1.19E-02	7.11E-03	3.98E-02	7.191E-01	5.975E+01	1.217
α_5	6.10E-08	4.15E-03	7.13E-04	2.02E-02	2.467E-01	5.920E+01	1.238
α_6	1.67E-20	1.51E-03	9.14E-07	8.79E-03	7.279E-02	4.809E+01	1.527

CCCG = 7, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.8989165	0.9418153	0.9447698	0.9746153	9.340E+01	5.770E+00	--
α_2	1.94E-03	1.55E-02	1.24E-02	3.98E-02	1.549E+00	9.809E+01	1.226
α_3	3.54E-03	1.98E-02	1.67E-02	4.67E-02	1.989E+00	9.837E+01	1.217
α_4	1.18E-03	1.30E-02	9.93E-03	3.56E-02	1.287E+00	9.737E+01	1.238
α_5	1.20E-04	7.14E-03	4.15E-03	2.43E-02	6.913E-01	9.614E+01	1.262
α_6	1.77E-08	2.39E-03	3.61E-04	1.18E-02	2.327E-01	9.714E+01	1.255
α_7	1.67E-64	2.46E-04	3.73E-17	6.20E-04	2.112E-02	8.594E+01	1.421

CCCG = 8, Gamma = 0.065

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9116156	0.9469483	0.9491909	0.9746189	1.252E+02	7.016E+00	--
α_2	1.56E-03	1.21E-02	9.68E-03	3.07E-02	1.583E+00	1.297E+02	1.242
α_3	2.62E-03	1.48E-02	1.24E-02	3.48E-02	1.986E+00	1.326E+02	1.211
α_4	1.76E-03	1.25E-02	1.02E-02	3.13E-02	1.672E+00	1.319E+02	1.220
α_5	4.12E-04	7.76E-03	5.43E-03	2.31E-02	1.011E+00	1.292E+02	1.252
α_6	3.40E-05	4.48E-03	2.29E-03	1.64E-02	5.709E-01	1.268E+02	1.280
α_7	3.13E-10	1.36E-03	1.07E-04	7.20E-03	1.809E-01	1.327E+02	1.227
α_8	1.68E-107	1.16E-04	3.52E-27	8.72E-05	1.245E-02	1.071E+02	1.521

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.49E-01	9.31E-01	9.20E-01	9.29E-01	9.36E-01	9.42E-01	9.47E-01
α_2	5.13E-02	4.93E-02	4.92E-02	3.59E-02	2.15E-02	1.55E-02	1.21E-02
α_3		1.99E-02	1.89E-02	2.47E-02	2.53E-02	1.98E-02	1.48E-02
α_4			1.17E-02	8.96E-03	1.19E-02	1.30E-02	1.25E-02
α_5				1.21E-03	4.15E-03	7.14E-03	7.76E-03
α_6					1.51E-03	2.39E-03	4.48E-03
α_7						2.46E-04	1.36E-03
α_8							1.16E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.49E-01	9.31E-01	9.20E-01	9.29E-01	9.36E-01	9.42E-01	9.47E-01
Beta	5.13E-02	6.92E-02	7.98E-02	7.07E-02	6.44E-02	5.82E-02	5.31E-02
Gamma		2.88E-01	3.83E-01	4.92E-01	6.66E-01	7.33E-01	7.73E-01
Delta			3.82E-01	2.92E-01	4.10E-01	5.35E-01	6.40E-01
Epsilon				1.19E-01	3.23E-01	4.28E-01	5.23E-01
Mu					2.67E-01	2.70E-01	4.34E-01
Omega						9.32E-02	2.48E-01
Sigma							7.86E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 3.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.226

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9432871	0.9854619	0.9936198	0.9999580	3.190E+01	4.706E-01	--
α_2	4.20E-05	1.45E-02	6.38E-03	5.67E-02	4.706E-01	3.190E+01	0.867

CCCG = 3, Gamma = 0.226

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9494550	0.9823829	0.9871993	0.9988423	6.148E+01	1.103E+00	--
α_2	3.83E-04	1.32E-02	8.43E-03	4.24E-02	8.104E-01	6.045E+01	1.075
α_3	3.70E-07	4.39E-03	1.03E-03	2.02E-02	2.921E-01	6.628E+01	0.989

CCCG = 4, Gamma = 0.226

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9556383	0.9812839	0.9842643	0.9967334	1.024E+02	1.953E+00	--
α_2	1.17E-03	1.25E-02	9.55E-03	3.38E-02	1.312E+00	1.038E+02	1.123
α_3	7.07E-06	4.20E-03	1.66E-03	1.70E-02	4.307E-01	1.021E+02	1.151
α_4	4.06E-09	2.03E-03	2.40E-04	1.04E-02	2.099E-01	1.030E+02	1.144

CCCG = 5, Gamma = 0.226

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9641690	0.9826401	0.9844052	0.9950778	1.759E+02	3.107E+00	--
α_2	1.31E-03	9.29E-03	7.56E-03	2.32E-02	1.684E+00	1.795E+02	1.185
α_3	2.35E-04	5.30E-03	3.60E-03	1.62E-02	9.426E-01	1.769E+02	1.208
α_4	1.63E-06	2.17E-03	7.46E-04	9.15E-03	3.816E-01	1.757E+02	1.220
α_5	2.39E-16	5.98E-04	3.28E-06	3.48E-03	9.865E-02	1.648E+02	1.303

CCCG = 6, Gamma = 0.226

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9681238	0.9836597	0.9850180	0.9945543	2.301E+02	3.822E+00	--
α_2	1.04E-03	7.17E-03	5.85E-03	1.78E-02	1.714E+00	2.372E+02	1.186
α_3	3.12E-04	4.75E-03	3.43E-03	1.37E-02	1.108E+00	2.322E+02	1.215
α_4	3.69E-05	2.79E-03	1.56E-03	9.75E-03	6.509E-01	2.323E+02	1.217
α_5	2.20E-08	1.11E-03	2.00E-04	5.34E-03	2.536E-01	2.287E+02	1.238
α_6	8.37E-17	5.16E-04	2.34E-06	3.01E-03	9.572E-02	1.855E+02	1.527

CCCG = 7, Gamma = 0.226

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9720576	0.9845176	0.9854701	0.9937244	3.304E+02	5.195E+00	--
α_2	1.19E-03	6.24E-03	5.29E-03	1.45E-02	2.105E+00	3.353E+02	1.226
α_3	3.65E-04	3.88E-03	2.96E-03	1.05E-02	1.320E+00	3.385E+02	1.217
α_4	1.52E-04	2.98E-03	2.07E-03	8.93E-03	9.967E-01	3.331E+02	1.238
α_5	8.10E-06	1.60E-03	7.61E-04	6.04E-03	5.249E-01	3.274E+02	1.262
α_6	4.41E-10	5.93E-04	5.81E-05	3.07E-03	1.956E-01	3.295E+02	1.255
α_7	5.19E-28	1.82E-04	4.12E-09	9.87E-04	5.291E-02	2.910E+02	1.421

CCCG = 8, Gamma = 0.226

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738693	0.9851199	0.9859374	0.9935789	3.861E+02	5.832E+00	--
α_2	1.16E-03	5.70E-03	4.89E-03	1.30E-02	2.229E+00	3.886E+02	1.242
α_3	2.70E-04	3.15E-03	2.37E-03	8.68E-03	1.260E+00	3.994E+02	1.211
α_4	1.49E-04	2.62E-03	1.85E-03	7.73E-03	1.042E+00	3.966E+02	1.220
α_5	4.62E-05	1.97E-03	1.20E-03	6.49E-03	7.626E-01	3.869E+02	1.252
α_6	1.97E-07	8.63E-04	2.41E-04	3.84E-03	3.271E-01	3.787E+02	1.280
α_7	3.29E-13	3.40E-04	9.11E-06	1.91E-03	1.344E-01	3.954E+02	1.227
α_8	2.17E-20	2.41E-04	2.26E-07	1.40E-03	7.682E-02	3.188E+02	1.521

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.85E-01
α_2	1.45E-02	1.32E-02	1.25E-02	9.29E-03	7.17E-03	6.24E-03	5.70E-03
α_3		4.39E-03	4.20E-03	5.30E-03	4.75E-03	3.88E-03	3.15E-03
α_4			2.03E-03	2.17E-03	2.79E-03	2.98E-03	2.62E-03
α_5				5.98E-04	1.11E-03	1.60E-03	1.97E-03
α_6					5.16E-04	5.93E-04	8.63E-04
α_7						1.82E-04	3.40E-04
α_8							2.41E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.85E-01
Beta	1.45E-02	1.76E-02	1.87E-02	1.74E-02	1.63E-02	1.55E-02	1.49E-02
Gamma		2.49E-01	3.33E-01	4.65E-01	5.61E-01	5.97E-01	6.17E-01
Delta			3.26E-01	3.43E-01	4.82E-01	5.80E-01	6.57E-01
Epsilon				2.16E-01	3.67E-01	4.43E-01	5.66E-01
Mu					3.18E-01	3.26E-01	4.23E-01
Omega						2.35E-01	4.02E-01
Sigma							4.15E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.50	3.50	3.50	3.50	3.50	3.50	3.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 5.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.323

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9855449	0.9962494	0.9983063	0.9999862	1.310E+02	4.932E-01	--
α_2	1.38E-05	3.75E-03	1.69E-03	1.45E-02	4.932E-01	1.310E+02	0.867

CCCG = 3, Gamma = 0.323

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9871540	0.9956141	0.9968833	0.9997402	2.405E+02	1.059E+00	--
α_2	5.67E-05	3.03E-03	1.79E-03	1.02E-02	7.137E-01	2.346E+02	1.075
α_3	4.86E-07	1.35E-03	4.09E-04	5.90E-03	3.458E-01	2.553E+02	0.989

CCCG = 4, Gamma = 0.323

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9886575	0.9951233	0.9958604	0.9990693	4.315E+02	2.115E+00	--
α_2	4.40E-04	3.55E-03	2.83E-03	9.14E-03	1.549E+00	4.346E+02	1.123
α_3	1.94E-08	6.22E-04	1.22E-04	2.96E-03	2.646E-01	4.252E+02	1.151
α_4	7.77E-08	7.03E-04	1.73E-04	3.21E-03	3.010E-01	4.278E+02	1.144

CCCG = 5, Gamma = 0.323

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9918733	0.9954857	0.9957625	0.9981526	1.174E+03	5.325E+00	--
α_2	9.75E-04	3.06E-03	2.78E-03	6.08E-03	3.632E+00	1.184E+03	1.185
α_3	1.14E-04	1.16E-03	8.92E-04	3.13E-03	1.354E+00	1.165E+03	1.208
α_4	2.43E-08	2.57E-04	6.12E-05	1.18E-03	2.961E-01	1.154E+03	1.220
α_5	1.17E-34	3.93E-05	4.32E-11	1.94E-04	4.243E-02	1.081E+03	1.303

CCCG = 6, Gamma = 0.323

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9914114	0.9953166	0.9956261	0.9981652	1.049E+03	4.936E+00	--
α_2	7.23E-04	2.72E-03	2.41E-03	5.74E-03	2.915E+00	1.070E+03	1.186
α_3	1.02E-04	1.20E-03	9.01E-04	3.32E-03	1.257E+00	1.047E+03	1.215
α_4	1.95E-06	4.81E-04	2.20E-04	1.84E-03	5.031E-01	1.046E+03	1.217
α_5	3.25E-15	1.12E-04	1.48E-06	6.44E-04	1.155E-01	1.028E+03	1.238
α_6	8.14E-13	1.74E-04	6.38E-06	9.65E-04	1.451E-01	8.332E+02	1.527

CCCG = 7, Gamma = 0.323

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9931574	0.9956687	0.9958160	0.9976770	2.219E+03	9.654E+00	--
α_2	8.42E-04	2.17E-03	2.03E-03	4.01E-03	4.851E+00	2.227E+03	1.226
α_3	3.19E-04	1.25E-03	1.10E-03	2.67E-03	2.800E+00	2.245E+03	1.217
α_4	6.40E-05	6.26E-04	4.84E-04	1.68E-03	1.384E+00	2.209E+03	1.238
α_5	8.00E-07	2.26E-04	1.01E-04	8.74E-04	4.902E-01	2.169E+03	1.262
α_6	1.25E-15	5.25E-05	6.66E-07	3.01E-04	1.146E-01	2.181E+03	1.255
α_7	4.00E-93	7.60E-06	8.09E-25	9.03E-06	1.464E-02	1.926E+03	1.421

CCCG = 8, Gamma = 0.323

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9927941	0.9957159	0.9959123	0.9979672	1.661E+03	7.148E+00	--
α_2	4.84E-04	1.78E-03	1.59E-03	3.75E-03	2.980E+00	1.667E+03	1.242
α_3	1.98E-04	1.15E-03	9.58E-04	2.73E-03	1.960E+00	1.710E+03	1.211
α_4	5.02E-05	6.86E-04	5.03E-04	1.95E-03	1.166E+00	1.698E+03	1.220
α_5	1.84E-06	3.25E-04	1.57E-04	1.21E-03	5.375E-01	1.656E+03	1.252
α_6	2.46E-11	1.11E-04	8.65E-06	5.89E-04	1.805E-01	1.619E+03	1.280
α_7	1.27E-35	2.45E-05	1.83E-11	1.20E-04	4.139E-02	1.690E+03	1.227
α_8	1.27E-08	2.07E-04	4.58E-05	9.67E-04	2.827E-01	1.362E+03	1.521

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.96E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
α_2	3.75E-03	3.03E-03	3.55E-03	3.06E-03	2.72E-03	2.17E-03	1.78E-03
α_3		1.35E-03	6.22E-04	1.16E-03	1.20E-03	1.25E-03	1.15E-03
α_4			7.03E-04	2.57E-04	4.81E-04	6.26E-04	6.86E-04
α_5				3.93E-05	1.12E-04	2.26E-04	3.25E-04
α_6					1.74E-04	5.25E-05	1.11E-04
α_7						7.60E-06	2.45E-05
α_8							2.07E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.96E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
Beta	3.75E-03	4.39E-03	4.88E-03	4.51E-03	4.68E-03	4.33E-03	4.28E-03
Gamma		3.08E-01	2.72E-01	3.23E-01	4.20E-01	4.98E-01	5.83E-01
Delta			5.31E-01	2.03E-01	3.90E-01	4.23E-01	5.42E-01
Epsilon				1.33E-01	3.73E-01	3.14E-01	4.93E-01
Mu					6.08E-01	2.10E-01	5.14E-01
Omega						1.26E-01	6.75E-01
Sigma							8.94E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.00	5.00	5.00	5.00	5.00	5.00	5.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.8 High Pressure Coolant Injection and Reactor Core Isolation Cooling Motor-Operated Valves

2.3.8.1 HCI-RCI-MOV-FTOC: HPCI and RCIC Motor-Operated Valves Fail to Open/Close

Generic CCF Parameters

System Group: Clean Water
System: High Pressure Coolant Injection, Reactor Core Isolation
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Close, Fail to Open, Fail to Open or Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 53.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9758181	0.9938336	0.9973389	0.9999811	1.0000000	7.551E+01	4.685E-01
α_2	1.72E-05	6.17E-03	2.66E-03	2.42E-02	0.00E+00	4.685E-01	7.551E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9712780	0.9899468	0.9926677	0.9993069	1.0000000	1.111E+02	1.128E+00
α_2	2.53E-04	7.59E-03	4.93E-03	2.40E-02	0.00E+00	8.512E-01	1.114E+02
α_3	1.23E-07	2.47E-03	5.27E-04	1.16E-02	0.00E+00	2.768E-01	1.119E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9688088	0.9870006	0.9891519	0.9978300	1.0000000	1.438E+02	1.894E+00
α_2	7.46E-04	8.65E-03	6.53E-03	2.38E-02	0.00E+00	1.260E+00	1.444E+02
α_3	3.00E-06	2.76E-03	1.01E-03	1.14E-02	0.00E+00	4.024E-01	1.453E+02
α_4	1.10E-08	1.59E-03	2.37E-04	7.87E-03	0.00E+00	2.315E-01	1.454E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9721113	0.9861254	0.9874160	0.9957419	1.0000000	2.439E+02	3.432E+00
α_2	1.32E-03	7.78E-03	6.50E-03	1.86E-02	0.00E+00	1.924E+00	2.454E+02
α_3	2.45E-04	4.24E-03	3.00E-03	1.25E-02	0.00E+00	1.049E+00	2.463E+02
α_4	1.17E-06	1.55E-03	5.32E-04	6.52E-03	0.00E+00	3.822E-01	2.470E+02
α_5	2.69E-20	3.10E-04	2.89E-07	1.80E-03	0.00E+00	7.674E-02	2.473E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9734866	0.9864084	0.9875431	0.9954627	1.0000000	2.783E+02	3.835E+00

α_2	8.64E-04	6.03E-03	4.91E-03	1.50E-02	0.00E+00	1.701E+00	2.805E+02
α_3	3.37E-04	4.28E-03	3.18E-03	1.20E-02	0.00E+00	1.207E+00	2.809E+02
α_4	1.94E-05	2.11E-03	1.11E-03	7.61E-03	0.00E+00	5.960E-01	2.816E+02
α_5	3.07E-09	7.84E-04	1.05E-04	3.93E-03	0.00E+00	2.211E-01	2.819E+02
α_6	3.06E-15	3.89E-04	3.94E-06	2.24E-03	0.00E+00	1.098E-01	2.820E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9764754	0.9866541	0.9874034	0.9942916	1.0000000	4.249E+02	5.747E+00
α_2	1.06E-03	5.21E-03	4.47E-03	1.19E-02	0.00E+00	2.243E+00	4.284E+02
α_3	5.08E-04	3.78E-03	3.05E-03	9.57E-03	0.00E+00	1.630E+00	4.290E+02
α_4	1.56E-04	2.51E-03	1.80E-03	7.32E-03	0.00E+00	1.083E+00	4.296E+02
α_5	9.49E-06	1.31E-03	6.62E-04	4.82E-03	0.00E+00	5.654E-01	4.301E+02
α_6	2.44E-10	4.45E-04	4.11E-05	2.32E-03	0.00E+00	1.916E-01	4.305E+02
α_7	5.53E-41	8.08E-05	3.01E-12	3.54E-04	0.00E+00	3.480E-02	4.306E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9774906	0.9872438	0.9879631	0.9945503	1.0000000	4.431E+02	5.726E+00
α_2	8.10E-04	4.50E-03	3.78E-03	1.06E-02	0.00E+00	2.018E+00	4.468E+02
α_3	3.20E-04	3.10E-03	2.40E-03	8.27E-03	0.00E+00	1.391E+00	4.475E+02
α_4	1.41E-04	2.37E-03	1.68E-03	6.93E-03	0.00E+00	1.062E+00	4.478E+02
α_5	2.76E-05	1.57E-03	9.14E-04	5.32E-03	0.00E+00	7.026E-01	4.481E+02
α_6	3.06E-07	7.79E-04	2.39E-04	3.39E-03	0.00E+00	3.497E-01	4.485E+02
α_7	1.17E-15	2.40E-04	2.20E-06	1.39E-03	0.00E+00	1.078E-01	4.487E+02
α_8	2.46E-17	2.11E-04	8.94E-07	1.23E-03	0.00E+00	9.469E-02	4.488E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.90E-01	9.87E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01
α_2	6.17E-03	7.59E-03	8.65E-03	7.78E-03	6.03E-03	5.21E-03	4.50E-03
α_3		2.47E-03	2.76E-03	4.24E-03	4.28E-03	3.78E-03	3.10E-03
α_4			1.59E-03	1.55E-03	2.11E-03	2.51E-03	2.37E-03
α_5				3.10E-04	7.84E-04	1.31E-03	1.57E-03
α_6					3.89E-04	4.45E-04	7.79E-04
α_7						8.08E-05	2.40E-04
α_8							2.11E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.90E-01	9.87E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01
Beta	6.17E-03	1.01E-02	1.30E-02	1.39E-02	1.36E-02	1.33E-02	1.28E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	53.10	53.10	53.10	53.10	53.10	53.10	53.10
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 15.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.282

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9818931	0.9953336	0.9979283	0.9999846	1.031E+02	4.834E-01	--
α_2	1.54E-05	4.67E-03	2.07E-03	1.81E-02	4.834E-01	1.031E+02	0.573

CCCG = 3, Gamma = 0.282

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9817741	0.9934467	0.9951010	0.9994659	1.858E+02	1.226E+00	--
α_2	2.54E-04	5.23E-03	3.60E-03	1.58E-02	9.769E-01	1.859E+02	0.781
α_3	2.12E-08	1.33E-03	2.30E-04	6.42E-03	2.487E-01	1.874E+02	0.777

CCCG = 4, Gamma = 0.282

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9784358	0.9907908	0.9922095	0.9982954	2.213E+02	2.057E+00	--
α_2	7.01E-04	6.35E-03	4.97E-03	1.67E-02	1.442E+00	2.255E+02	0.877
α_3	2.34E-06	1.87E-03	7.01E-04	7.67E-03	4.114E-01	2.200E+02	0.903
α_4	1.30E-09	9.90E-04	1.08E-04	5.08E-03	2.036E-01	2.055E+02	0.967

CCCG = 5, Gamma = 0.282

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9798160	0.9897780	0.9906696	0.9966940	3.566E+02	3.683E+00	--
α_2	1.26E-03	6.17E-03	5.29E-03	1.41E-02	2.243E+00	3.611E+02	1.016
α_3	1.42E-04	2.82E-03	1.95E-03	8.45E-03	9.912E-01	3.508E+02	1.050
α_4	7.13E-07	1.05E-03	3.54E-04	4.44E-03	3.765E-01	3.595E+02	1.026
α_5	1.60E-21	1.85E-04	1.05E-07	1.07E-03	7.237E-02	3.914E+02	0.943

CCCG = 6, Gamma = 0.282

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9803399	0.9897300	0.9905286	0.9963920	3.989E+02	4.139E+00	--
α_2	9.74E-04	5.06E-03	4.30E-03	1.18E-02	2.128E+00	4.182E+02	0.998
α_3	2.05E-04	2.97E-03	2.16E-03	8.50E-03	1.134E+00	3.808E+02	1.098
α_4	9.02E-06	1.38E-03	6.85E-04	5.11E-03	5.533E-01	4.001E+02	1.047
α_5	2.10E-09	5.40E-04	7.21E-05	2.71E-03	2.210E-01	4.091E+02	1.025
α_6	4.03E-16	3.17E-04	2.20E-06	1.84E-03	1.027E-01	3.243E+02	1.293

CCCG = 7, Gamma = 0.282

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9828666	0.9900351	0.9905368	0.9954909	6.390E+02	6.432E+00	--
α_2	1.09E-03	4.17E-03	3.70E-03	8.88E-03	2.840E+00	6.777E+02	1.032
α_3	4.25E-04	2.86E-03	2.34E-03	7.08E-03	1.746E+00	6.081E+02	1.152
α_4	1.07E-04	1.72E-03	1.23E-03	5.01E-03	1.084E+00	6.282E+02	1.116
α_5	4.89E-06	8.59E-04	4.16E-04	3.22E-03	5.376E-01	6.251E+02	1.123
α_6	2.72E-10	3.09E-04	3.12E-05	1.60E-03	1.979E-01	6.395E+02	1.098
α_7	8.39E-53	3.74E-05	3.75E-15	1.28E-04	2.656E-02	7.093E+02	0.990

CCCG = 8, Gamma = 0.282

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9835568	0.9905490	0.9910499	0.9958307	6.406E+02	6.112E+00	--
α_2	7.37E-04	3.41E-03	2.94E-03	7.66E-03	2.364E+00	6.916E+02	1.012
α_3	2.91E-04	2.44E-03	1.93E-03	6.34E-03	1.512E+00	6.173E+02	1.135
α_4	1.00E-04	1.71E-03	1.21E-03	5.02E-03	1.056E+00	6.171E+02	1.136
α_5	1.59E-05	1.05E-03	5.99E-04	3.63E-03	6.745E-01	6.404E+02	1.095
α_6	6.85E-08	5.09E-04	1.29E-04	2.31E-03	3.076E-01	6.036E+02	1.163
α_7	1.19E-15	1.69E-04	1.67E-06	9.78E-04	1.093E-01	6.448E+02	1.089
α_8	2.50E-18	1.62E-04	4.49E-07	9.43E-04	8.885E-02	5.491E+02	1.279

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.93E-01	9.91E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
α_2	4.67E-03	5.23E-03	6.35E-03	6.17E-03	5.06E-03	4.17E-03	3.41E-03
α_3		1.33E-03	1.87E-03	2.82E-03	2.97E-03	2.86E-03	2.44E-03
α_4			9.90E-04	1.05E-03	1.38E-03	1.72E-03	1.71E-03
α_5				1.85E-04	5.40E-04	8.59E-04	1.05E-03
α_6					3.17E-04	3.09E-04	5.09E-04
α_7						3.74E-05	1.69E-04
α_8							1.62E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.93E-01	9.91E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
Beta	4.67E-03	6.55E-03	9.21E-03	1.02E-02	1.03E-02	9.96E-03	9.45E-03
Gamma		2.02E-01	3.10E-01	3.96E-01	5.07E-01	5.81E-01	6.40E-01
Delta			3.46E-01	3.04E-01	4.30E-01	5.06E-01	5.96E-01
Epsilon				1.50E-01	3.83E-01	4.12E-01	5.26E-01
Mu					3.70E-01	2.88E-01	4.44E-01
Omega						1.08E-01	3.94E-01
Sigma							4.88E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	15.00	15.00	15.00	15.00	15.00	15.00	15.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 5.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.104

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9478909	0.9868646	0.9944912	0.9999708	3.379E+01	4.498E-01	--
α_2	2.92E-05	1.31E-02	5.51E-03	5.21E-02	4.498E-01	3.379E+01	0.573

CCCG = 3, Gamma = 0.104

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9376588	0.9777109	0.9833994	0.9983009	5.169E+01	1.178E+00	--
α_2	7.89E-04	1.78E-02	1.22E-02	5.40E-02	9.387E-01	5.188E+01	0.781
α_3	4.75E-08	4.52E-03	7.30E-04	2.21E-02	2.396E-01	5.282E+01	0.777

CCCG = 4, Gamma = 0.104

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9301063	0.9706307	0.9753440	0.9950210	6.274E+01	1.898E+00	--
α_2	1.77E-03	1.95E-02	1.49E-02	5.31E-02	1.285E+00	6.453E+01	0.877
α_3	5.68E-06	6.14E-03	2.20E-03	2.56E-02	3.927E-01	6.352E+01	0.903
α_4	1.43E-08	3.70E-03	4.96E-04	1.86E-02	2.207E-01	5.943E+01	0.967

CCCG = 5, Gamma = 0.104

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9376735	0.9686119	0.9713706	0.9901177	1.082E+02	3.506E+00	--
α_2	3.16E-03	1.77E-02	1.49E-02	4.16E-02	1.992E+00	1.108E+02	1.016
α_3	6.12E-04	9.87E-03	7.08E-03	2.87E-02	1.078E+00	1.081E+02	1.050
α_4	1.71E-06	3.25E-03	1.05E-03	1.40E-02	3.632E-01	1.113E+02	1.026
α_5	5.51E-21	5.97E-04	3.45E-07	3.45E-03	7.248E-02	1.214E+02	0.943

CCCG = 6, Gamma = 0.104

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9414621	0.9690870	0.9713633	0.9889319	1.316E+02	4.199E+00	--
α_2	2.36E-03	1.37E-02	1.15E-02	3.25E-02	1.941E+00	1.401E+02	0.998
α_3	9.91E-04	1.03E-02	7.92E-03	2.78E-02	1.332E+00	1.278E+02	1.098
α_4	4.90E-05	4.56E-03	2.46E-03	1.62E-02	6.181E-01	1.348E+02	1.047
α_5	1.15E-08	1.67E-03	2.48E-04	8.28E-03	2.313E-01	1.381E+02	1.025
α_6	6.40E-20	7.01E-04	6.61E-07	4.08E-03	7.684E-02	1.096E+02	1.293

CCCG = 7, Gamma = 0.104

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9470387	0.9692424	0.9707773	0.9862029	1.961E+02	6.223E+00	--
α_2	3.04E-03	1.24E-02	1.09E-02	2.69E-02	2.654E+00	2.109E+02	1.032
α_3	1.17E-03	8.60E-03	6.96E-03	2.16E-02	1.645E+00	1.897E+02	1.152
α_4	3.76E-04	5.65E-03	4.09E-03	1.62E-02	1.115E+00	1.963E+02	1.116
α_5	2.98E-05	3.07E-03	1.63E-03	1.10E-02	6.034E-01	1.957E+02	1.123
α_6	1.58E-10	8.87E-04	6.61E-05	4.71E-03	1.780E-01	2.005E+02	1.098
α_7	6.69E-51	1.23E-04	2.52E-14	4.34E-04	2.734E-02	2.225E+02	0.990

CCCG = 8, Gamma = 0.104

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9488689	0.9702896	0.9717701	0.9866535	2.040E+02	6.246E+00	--
α_2	2.57E-03	1.11E-02	9.71E-03	2.45E-02	2.504E+00	2.228E+02	1.012
α_3	7.58E-04	7.06E-03	5.51E-03	1.87E-02	1.419E+00	1.995E+02	1.135
α_4	2.82E-04	5.12E-03	3.60E-03	1.52E-02	1.027E+00	1.996E+02	1.136
α_5	7.27E-05	3.53E-03	2.12E-03	1.18E-02	7.337E-01	2.074E+02	1.095
α_6	2.02E-06	2.03E-03	7.32E-04	8.44E-03	3.975E-01	1.956E+02	1.163
α_7	3.68E-20	3.68E-04	3.53E-07	2.14E-03	7.703E-02	2.093E+02	1.089
α_8	4.56E-18	4.91E-04	1.23E-06	2.86E-03	8.749E-02	1.782E+02	1.279

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.78E-01	9.71E-01	9.69E-01	9.69E-01	9.69E-01	9.70E-01
α_2	1.31E-02	1.78E-02	1.95E-02	1.77E-02	1.37E-02	1.24E-02	1.11E-02
α_3		4.52E-03	6.14E-03	9.87E-03	1.03E-02	8.60E-03	7.06E-03
α_4			3.70E-03	3.25E-03	4.56E-03	5.65E-03	5.12E-03
α_5				5.97E-04	1.67E-03	3.07E-03	3.53E-03
α_6					7.01E-04	8.87E-04	2.03E-03
α_7						1.23E-04	3.68E-04
α_8							4.91E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.78E-01	9.71E-01	9.69E-01	9.69E-01	9.69E-01	9.70E-01
Beta	1.31E-02	2.23E-02	2.94E-02	3.14E-02	3.09E-02	3.08E-02	2.97E-02
Gamma		2.03E-01	3.35E-01	4.37E-01	5.58E-01	5.96E-01	6.26E-01
Delta			3.76E-01	2.80E-01	4.02E-01	5.31E-01	6.20E-01
Epsilon				1.55E-01	3.42E-01	4.20E-01	5.56E-01
Mu					2.95E-01	2.47E-01	4.50E-01
Omega						1.22E-01	2.98E-01
Sigma							5.71E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.50	5.50	5.50	5.50	5.50	5.50	5.50
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.019

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8585086	0.9661169	0.9877583	0.9999737	1.084E+01	3.801E-01	--
α_2	2.63E-05	3.39E-02	1.22E-02	1.41E-01	3.801E-01	1.084E+01	0.573

CCCG = 3, Gamma = 0.019

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8479399	0.9485776	0.9636769	0.9974945	1.771E+01	9.600E-01	--
α_2	5.44E-04	3.58E-02	2.10E-02	1.22E-01	6.673E-01	1.798E+01	0.781
α_3	1.38E-06	1.56E-02	3.78E-03	7.19E-02	2.927E-01	1.844E+01	0.777

CCCG = 4, Gamma = 0.019

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8461231	0.9369157	0.9476687	0.9908273	2.479E+01	1.669E+00	--
α_2	2.25E-03	3.84E-02	2.77E-02	1.11E-01	1.039E+00	2.600E+01	0.877
α_3	1.30E-05	1.48E-02	5.32E-03	6.18E-02	3.887E-01	2.587E+01	0.903
α_4	1.15E-07	9.85E-03	1.64E-03	4.82E-02	2.414E-01	2.426E+01	0.967

CCCG = 5, Gamma = 0.019

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8807554	0.9393665	0.9444131	0.9807060	5.402E+01	3.487E+00	--
α_2	4.83E-03	3.08E-02	2.56E-02	7.46E-02	1.791E+00	5.637E+01	1.016
α_3	1.72E-03	2.14E-02	1.61E-02	5.95E-02	1.207E+00	5.511E+01	1.050
α_4	1.34E-05	7.53E-03	3.02E-03	3.03E-02	4.340E-01	5.717E+01	1.026
α_5	1.95E-26	8.76E-04	3.12E-08	4.83E-03	5.493E-02	6.262E+01	0.943

CCCG = 6, Gamma = 0.019

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8930793	0.9440909	0.9482934	0.9807260	6.593E+01	3.905E+00	--
α_2	1.76E-03	1.81E-02	1.40E-02	4.86E-02	1.335E+00	7.239E+01	0.998
α_3	2.82E-03	2.29E-02	1.83E-02	5.85E-02	1.531E+00	6.546E+01	1.098
α_4	1.98E-04	1.02E-02	6.11E-03	3.43E-02	7.191E-01	6.957E+01	1.047
α_5	5.04E-08	3.44E-03	5.89E-04	1.67E-02	2.467E-01	7.155E+01	1.025
α_6	1.41E-20	1.28E-03	7.72E-07	7.43E-03	7.279E-02	5.682E+01	1.293

CCCG = 7, Gamma = 0.019

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9091076	0.9477782	0.9504642	0.9772692	1.047E+02	5.770E+00	--
α_2	1.63E-03	1.31E-02	1.05E-02	3.35E-02	1.549E+00	1.168E+02	1.032
α_3	3.35E-03	1.88E-02	1.58E-02	4.42E-02	1.989E+00	1.041E+02	1.152
α_4	1.06E-03	1.18E-02	8.95E-03	3.21E-02	1.287E+00	1.081E+02	1.116
α_5	1.06E-04	6.35E-03	3.69E-03	2.17E-02	6.913E-01	1.081E+02	1.123
α_6	1.55E-08	2.09E-03	3.15E-04	1.03E-02	2.327E-01	1.110E+02	1.098
α_7	1.16E-64	1.71E-04	2.60E-17	4.31E-04	2.112E-02	1.233E+02	0.990

CCCG = 8, Gamma = 0.019

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9207831	0.9525264	0.9545573	0.9773314	1.408E+02	7.016E+00	--
α_2	1.27E-03	9.83E-03	7.88E-03	2.50E-02	1.583E+00	1.595E+02	1.012
α_3	2.46E-03	1.38E-02	1.16E-02	3.27E-02	1.986E+00	1.417E+02	1.135
α_4	1.63E-03	1.17E-02	9.47E-03	2.91E-02	1.672E+00	1.418E+02	1.136
α_5	3.60E-04	6.79E-03	4.75E-03	2.02E-02	1.011E+00	1.478E+02	1.095
α_6	3.09E-05	4.07E-03	2.08E-03	1.49E-02	5.709E-01	1.396E+02	1.163
α_7	2.78E-10	1.21E-03	9.47E-05	6.39E-03	1.809E-01	1.495E+02	1.089
α_8	1.41E-107	9.76E-05	2.96E-27	7.32E-05	1.245E-02	1.275E+02	1.279

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.66E-01	9.49E-01	9.37E-01	9.39E-01	9.44E-01	9.48E-01	9.53E-01
α_2	3.39E-02	3.58E-02	3.84E-02	3.08E-02	1.81E-02	1.31E-02	9.83E-03
α_3		1.56E-02	1.48E-02	2.14E-02	2.29E-02	1.88E-02	1.38E-02
α_4			9.85E-03	7.53E-03	1.02E-02	1.18E-02	1.17E-02
α_5				8.76E-04	3.44E-03	6.35E-03	6.79E-03
α_6					1.28E-03	2.09E-03	4.07E-03
α_7						1.71E-04	1.21E-03
α_8							9.76E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.66E-01	9.49E-01	9.37E-01	9.39E-01	9.44E-01	9.48E-01	9.53E-01
Beta	3.39E-02	5.14E-02	6.31E-02	6.06E-02	5.59E-02	5.22E-02	4.75E-02
Gamma		3.04E-01	3.91E-01	4.92E-01	6.76E-01	7.49E-01	7.93E-01
Delta			4.00E-01	2.82E-01	3.95E-01	5.21E-01	6.33E-01
Epsilon				1.04E-01	3.15E-01	4.23E-01	5.11E-01
Mu					2.71E-01	2.63E-01	4.42E-01
Omega						7.57E-02	2.43E-01
Sigma							7.48E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 23.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.443

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9780412	0.9943926	0.9975689	0.9999840	8.345E+01	4.706E-01	--
α_2	1.60E-05	5.61E-03	2.43E-03	2.20E-02	4.706E-01	8.345E+01	0.573

CCCG = 3, Gamma = 0.443

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9711516	0.9899840	0.9927553	0.9993464	1.090E+02	1.103E+00	--
α_2	2.12E-04	7.37E-03	4.68E-03	2.37E-02	8.104E-01	1.091E+02	0.781
α_3	2.22E-07	2.64E-03	6.20E-04	1.22E-02	2.921E-01	1.101E+02	0.777

CCCG = 4, Gamma = 0.443

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9700131	0.9873832	0.9894143	0.9978070	1.528E+02	1.953E+00	--
α_2	7.77E-04	8.33E-03	6.36E-03	2.26E-02	1.312E+00	1.562E+02	0.877
α_3	4.73E-06	2.82E-03	1.11E-03	1.14E-02	4.307E-01	1.525E+02	0.903
α_4	2.93E-09	1.47E-03	1.74E-04	7.48E-03	2.099E-01	1.425E+02	0.967

CCCG = 5, Gamma = 0.443

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9719565	0.9864329	0.9878222	0.9961609	2.259E+02	3.107E+00	--
α_2	1.03E-03	7.29E-03	5.93E-03	1.82E-02	1.684E+00	2.293E+02	1.016
α_3	1.86E-04	4.21E-03	2.86E-03	1.29E-02	9.426E-01	2.228E+02	1.050
α_4	1.25E-06	1.67E-03	5.73E-04	7.04E-03	3.816E-01	2.284E+02	1.026
α_5	1.58E-16	3.96E-04	2.17E-06	2.30E-03	9.865E-02	2.488E+02	0.943

CCCG = 6, Gamma = 0.443

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9743024	0.9868418	0.9879423	0.9956213	2.867E+02	3.822E+00	--
α_2	8.16E-04	5.64E-03	4.60E-03	1.40E-02	1.714E+00	3.023E+02	0.998
α_3	2.63E-04	4.01E-03	2.90E-03	1.16E-02	1.108E+00	2.752E+02	1.098
α_4	2.97E-05	2.25E-03	1.25E-03	7.84E-03	6.509E-01	2.892E+02	1.047
α_5	1.70E-08	8.56E-04	1.54E-04	4.13E-03	2.536E-01	2.958E+02	1.025
α_6	6.62E-17	4.08E-04	1.85E-06	2.38E-03	9.572E-02	2.346E+02	1.293

CCCG = 7, Gamma = 0.443

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9764159	0.9869425	0.9877496	0.9947124	3.927E+02	5.195E+00	--
α_2	9.51E-04	5.01E-03	4.25E-03	1.17E-02	2.105E+00	4.180E+02	1.032
α_3	3.29E-04	3.51E-03	2.68E-03	9.52E-03	1.320E+00	3.751E+02	1.152
α_4	1.31E-04	2.57E-03	1.78E-03	7.69E-03	9.967E-01	3.875E+02	1.116
α_5	6.87E-06	1.36E-03	6.46E-04	5.13E-03	5.249E-01	3.857E+02	1.123
α_6	3.68E-10	4.95E-04	4.85E-05	2.57E-03	1.956E-01	3.947E+02	1.098
α_7	3.45E-28	1.21E-04	2.74E-09	6.56E-04	5.291E-02	4.378E+02	0.990

CCCG = 8, Gamma = 0.443

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9779851	0.9874725	0.9881639	0.9945988	4.597E+02	5.832E+00	--
α_2	9.06E-04	4.46E-03	3.82E-03	1.02E-02	2.229E+00	4.970E+02	1.012
α_3	2.43E-04	2.83E-03	2.13E-03	7.81E-03	1.260E+00	4.440E+02	1.135
α_4	1.33E-04	2.34E-03	1.65E-03	6.91E-03	1.042E+00	4.437E+02	1.136
α_5	3.88E-05	1.65E-03	1.01E-03	5.45E-03	7.626E-01	4.605E+02	1.095
α_6	1.72E-07	7.53E-04	2.10E-04	3.35E-03	3.271E-01	4.342E+02	1.163
α_7	2.81E-13	2.90E-04	7.76E-06	1.63E-03	1.344E-01	4.638E+02	1.089
α_8	1.75E-20	1.94E-04	1.82E-07	1.13E-03	7.682E-02	3.951E+02	1.279

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.90E-01	9.87E-01	9.86E-01	9.87E-01	9.87E-01	9.87E-01
α_2	5.61E-03	7.37E-03	8.33E-03	7.29E-03	5.64E-03	5.01E-03	4.46E-03
α_3		2.64E-03	2.82E-03	4.21E-03	4.01E-03	3.51E-03	2.83E-03
α_4			1.47E-03	1.67E-03	2.25E-03	2.57E-03	2.34E-03
α_5				3.96E-04	8.56E-04	1.36E-03	1.65E-03
α_6					4.08E-04	4.95E-04	7.53E-04
α_7						1.21E-04	2.90E-04
α_8							1.94E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.90E-01	9.87E-01	9.86E-01	9.87E-01	9.87E-01	9.87E-01
Beta	5.61E-03	1.00E-02	1.26E-02	1.36E-02	1.32E-02	1.31E-02	1.25E-02
Gamma		2.64E-01	3.40E-01	4.63E-01	5.72E-01	6.16E-01	6.44E-01
Delta			3.43E-01	3.29E-01	4.67E-01	5.64E-01	6.49E-01
Epsilon				1.92E-01	3.60E-01	4.35E-01	5.52E-01
Mu					3.23E-01	3.12E-01	4.28E-01
Omega						1.96E-01	3.91E-01
Sigma							4.02E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	23.50	23.50	23.50	23.50	23.50	23.50	23.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 8.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.153

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9906983	0.9975879	0.9989126	0.9999911	2.040E+02	4.932E-01	--
α_2	8.85E-06	2.41E-03	1.09E-03	9.30E-03	4.932E-01	2.040E+02	0.573

CCCG = 3, Gamma = 0.153

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9905438	0.9967733	0.9977087	0.9998091	3.273E+02	1.059E+00	--
α_2	4.07E-05	2.18E-03	1.28E-03	7.35E-03	7.137E-01	3.272E+02	0.781
α_3	3.77E-07	1.05E-03	3.17E-04	4.58E-03	3.458E-01	3.290E+02	0.777

CCCG = 4, Gamma = 0.153

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9910887	0.9961703	0.9967503	0.9992696	5.500E+02	2.115E+00	--
α_2	3.41E-04	2.75E-03	2.19E-03	7.09E-03	1.549E+00	5.608E+02	0.877
α_3	1.51E-08	4.85E-04	9.48E-05	2.31E-03	2.646E-01	5.458E+02	0.903
α_4	6.52E-08	5.91E-04	1.45E-04	2.70E-03	3.010E-01	5.094E+02	0.967

CCCG = 5, Gamma = 0.153

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9930390	0.9961340	0.9963714	0.9984183	1.372E+03	5.325E+00	--
α_2	8.34E-04	2.62E-03	2.38E-03	5.20E-03	3.632E+00	1.385E+03	1.016
α_3	9.89E-05	1.01E-03	7.73E-04	2.71E-03	1.354E+00	1.343E+03	1.050
α_4	2.04E-08	2.15E-04	5.14E-05	9.89E-04	2.961E-01	1.375E+03	1.026
α_5	8.44E-35	2.84E-05	3.12E-11	1.41E-04	4.243E-02	1.496E+03	0.943

CCCG = 6, Gamma = 0.153

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9926369	0.9959858	0.9962513	0.9984277	1.225E+03	4.936E+00	--
α_2	6.06E-04	2.28E-03	2.03E-03	4.82E-03	2.915E+00	1.276E+03	0.998
α_3	9.23E-05	1.08E-03	8.13E-04	2.99E-03	1.257E+00	1.161E+03	1.098
α_4	1.68E-06	4.13E-04	1.89E-04	1.58E-03	5.031E-01	1.218E+03	1.047
α_5	2.69E-15	9.28E-05	1.22E-06	5.32E-04	1.155E-01	1.245E+03	1.025
α_6	6.88E-13	1.47E-04	5.39E-06	8.15E-04	1.451E-01	9.867E+02	1.293

CCCG = 7, Gamma = 0.153

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9939625	0.9961788	0.9963089	0.9979509	2.517E+03	9.654E+00	--
α_2	7.08E-04	1.83E-03	1.70E-03	3.37E-03	4.851E+00	2.649E+03	1.032
α_3	3.02E-04	1.18E-03	1.04E-03	2.52E-03	2.800E+00	2.375E+03	1.152
α_4	5.76E-05	5.64E-04	4.36E-04	1.51E-03	1.384E+00	2.453E+03	1.116
α_5	7.11E-07	2.01E-04	8.98E-05	7.77E-04	4.902E-01	2.439E+03	1.123
α_6	1.09E-15	4.59E-05	5.82E-07	2.64E-04	1.146E-01	2.494E+03	1.098
α_7	2.78E-93	5.29E-06	5.63E-25	6.29E-06	1.464E-02	2.766E+03	0.990

CCCG = 8, Gamma = 0.153

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9937050	0.9962580	0.9964297	0.9982247	1.903E+03	7.148E+00	--
α_2	3.94E-04	1.45E-03	1.29E-03	3.05E-03	2.980E+00	2.049E+03	1.012
α_3	1.86E-04	1.07E-03	8.96E-04	2.56E-03	1.960E+00	1.828E+03	1.135
α_4	4.67E-05	6.38E-04	4.68E-04	1.81E-03	1.166E+00	1.827E+03	1.136
α_5	1.61E-06	2.84E-04	1.37E-04	1.06E-03	5.375E-01	1.895E+03	1.095
α_6	2.23E-11	1.01E-04	7.84E-06	5.34E-04	1.805E-01	1.785E+03	1.163
α_7	1.12E-35	2.17E-05	1.62E-11	1.06E-04	4.139E-02	1.907E+03	1.089
α_8	1.06E-08	1.74E-04	3.84E-05	8.12E-04	2.827E-01	1.624E+03	1.279

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	2.41E-03	2.18E-03	2.75E-03	2.62E-03	2.28E-03	1.83E-03	1.45E-03
α_3		1.05E-03	4.85E-04	1.01E-03	1.08E-03	1.18E-03	1.07E-03
α_4			5.91E-04	2.15E-04	4.13E-04	5.64E-04	6.38E-04
α_5				2.84E-05	9.28E-05	2.01E-04	2.84E-04
α_6					1.47E-04	4.59E-05	1.01E-04
α_7						5.29E-06	2.17E-05
α_8							1.74E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	2.41E-03	3.23E-03	3.83E-03	3.87E-03	4.01E-03	3.82E-03	3.74E-03
Gamma		3.25E-01	2.81E-01	3.23E-01	4.32E-01	5.22E-01	6.12E-01
Delta			5.49E-01	1.95E-01	3.76E-01	4.09E-01	5.32E-01
Epsilon				1.16E-01	3.67E-01	3.09E-01	4.76E-01
Mu					6.13E-01	2.03E-01	5.11E-01
Omega						1.03E-01	6.60E-01
Sigma							8.89E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.10	8.10	8.10	8.10	8.10	8.10	8.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.8.2 HCI-RCI-MOV-CC: HPCI and RCIC Motor-Operated Valves Fail to Open

Generic CCF Parameters

System Group: Clean Water
System: High Pressure Coolant Injection, Reactor Core Isolation
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 34.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9677834	0.9917775	0.9964393	0.9999749	1.0000000	5.651E+01	4.685E-01
α_2	2.30E-05	8.22E-03	3.56E-03	3.22E-02	0.00E+00	4.685E-01	5.651E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9654573	0.9878975	0.9911688	0.9991648	1.0000000	9.208E+01	1.128E+00
α_2	3.05E-04	9.13E-03	5.94E-03	2.88E-02	0.00E+00	8.512E-01	9.236E+01
α_3	1.48E-07	2.97E-03	6.35E-04	1.39E-02	0.00E+00	2.768E-01	9.293E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9641622	0.9850507	0.9875208	0.9975014	1.0000000	1.248E+02	1.894E+00
α_2	8.59E-04	9.94E-03	7.51E-03	2.74E-02	0.00E+00	1.260E+00	1.254E+02
α_3	3.45E-06	3.18E-03	1.17E-03	1.32E-02	0.00E+00	4.024E-01	1.263E+02
α_4	1.27E-08	1.83E-03	2.72E-04	9.05E-03	0.00E+00	2.315E-01	1.264E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9698036	0.9849711	0.9863662	0.9953853	1.0000000	2.249E+02	3.432E+00
α_2	1.43E-03	8.43E-03	7.04E-03	2.02E-02	0.00E+00	1.924E+00	2.264E+02
α_3	2.66E-04	4.59E-03	3.25E-03	1.35E-02	0.00E+00	1.049E+00	2.273E+02
α_4	1.27E-06	1.67E-03	5.77E-04	7.06E-03	0.00E+00	3.822E-01	2.280E+02
α_5	2.92E-20	3.36E-04	3.13E-07	1.95E-03	0.00E+00	7.674E-02	2.283E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9715761	0.9854271	0.9866417	0.9951377	1.0000000	2.593E+02	3.835E+00
α_2	9.26E-04	6.46E-03	5.26E-03	1.61E-02	0.00E+00	1.701E+00	2.615E+02
α_3	3.62E-04	4.59E-03	3.41E-03	1.28E-02	0.00E+00	1.207E+00	2.619E+02
α_4	2.08E-05	2.26E-03	1.19E-03	8.16E-03	0.00E+00	5.960E-01	2.626E+02

α_5	3.29E-09	8.40E-04	1.12E-04	4.21E-03	0.00E+00	2.211E-01	2.629E+02
α_6	3.28E-15	4.17E-04	4.22E-06	2.41E-03	0.00E+00	1.098E-01	2.630E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9753888	0.9860381	0.9868159	0.9940253	1.0000000	4.059E+02	5.747E+00
α_2	1.11E-03	5.45E-03	4.67E-03	1.24E-02	0.00E+00	2.243E+00	4.094E+02
α_3	5.31E-04	3.96E-03	3.19E-03	1.00E-02	0.00E+00	1.630E+00	4.100E+02
α_4	1.64E-04	2.63E-03	1.88E-03	7.65E-03	0.00E+00	1.083E+00	4.106E+02
α_5	9.93E-06	1.37E-03	6.93E-04	5.05E-03	0.00E+00	5.654E-01	4.111E+02
α_6	2.56E-10	4.65E-04	4.30E-05	2.43E-03	0.00E+00	1.916E-01	4.115E+02
α_7	5.79E-41	8.45E-05	3.14E-12	3.71E-04	0.00E+00	3.480E-02	4.116E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9764993	0.9866800	0.9874306	0.9943088	1.0000000	4.241E+02	5.726E+00
α_2	8.46E-04	4.69E-03	3.95E-03	1.11E-02	0.00E+00	2.018E+00	4.278E+02
α_3	3.34E-04	3.23E-03	2.50E-03	8.63E-03	0.00E+00	1.391E+00	4.285E+02
α_4	1.47E-04	2.47E-03	1.76E-03	7.24E-03	0.00E+00	1.062E+00	4.288E+02
α_5	2.88E-05	1.63E-03	9.55E-04	5.55E-03	0.00E+00	7.026E-01	4.291E+02
α_6	3.19E-07	8.14E-04	2.50E-04	3.54E-03	0.00E+00	3.497E-01	4.295E+02
α_7	1.23E-15	2.51E-04	2.30E-06	1.45E-03	0.00E+00	1.078E-01	4.297E+02
α_8	2.56E-17	2.20E-04	9.33E-07	1.28E-03	0.00E+00	9.469E-02	4.298E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.88E-01	9.85E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01
α_2	8.22E-03	9.13E-03	9.94E-03	8.43E-03	6.46E-03	5.45E-03	4.69E-03
α_3		2.97E-03	3.18E-03	4.59E-03	4.59E-03	3.96E-03	3.23E-03
α_4			1.83E-03	1.67E-03	2.26E-03	2.63E-03	2.47E-03
α_5				3.36E-04	8.40E-04	1.37E-03	1.63E-03
α_6					4.17E-04	4.65E-04	8.14E-04
α_7						8.45E-05	2.51E-04
α_8							2.20E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.88E-01	9.85E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01
Beta	8.22E-03	1.21E-02	1.49E-02	1.50E-02	1.46E-02	1.40E-02	1.33E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	34.10	34.10	34.10	34.10	34.10	34.10	34.10
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 10.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.293

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9781946	0.9943782	0.9975010	0.9999814	8.550E+01	4.834E-01	--
α_2	1.86E-05	5.62E-03	2.50E-03	2.18E-02	4.834E-01	8.550E+01	0.632

CCCG = 3, Gamma = 0.293

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9801327	0.9928544	0.9946565	0.9994173	1.703E+02	1.226E+00	--
α_2	2.77E-04	5.71E-03	3.93E-03	1.72E-02	9.769E-01	1.702E+02	0.823
α_3	2.30E-08	1.44E-03	2.50E-04	6.98E-03	2.487E-01	1.725E+02	0.816

CCCG = 4, Gamma = 0.293

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9772474	0.9902811	0.9917769	0.9982004	2.096E+02	2.057E+00	--
α_2	7.43E-04	6.73E-03	5.27E-03	1.77E-02	1.442E+00	2.128E+02	0.905
α_3	2.45E-06	1.95E-03	7.34E-04	8.03E-03	4.114E-01	2.102E+02	0.921
α_4	1.36E-09	1.03E-03	1.13E-04	5.31E-03	2.036E-01	1.966E+02	0.986

CCCG = 5, Gamma = 0.293

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9797668	0.9897530	0.9906467	0.9966858	3.557E+02	3.683E+00	--
α_2	1.27E-03	6.22E-03	5.33E-03	1.42E-02	2.243E+00	3.585E+02	1.010
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.529E+02	1.029
α_4	7.09E-07	1.04E-03	3.52E-04	4.41E-03	3.765E-01	3.614E+02	1.007
α_5	1.63E-21	1.88E-04	1.07E-07	1.08E-03	7.237E-02	3.859E+02	0.944

CCCG = 6, Gamma = 0.293

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9803703	0.9897459	0.9905433	0.9963976	3.995E+02	4.139E+00	--
α_2	9.83E-04	5.11E-03	4.34E-03	1.19E-02	2.128E+00	4.141E+02	0.996
α_3	2.02E-04	2.92E-03	2.12E-03	8.36E-03	1.134E+00	3.872E+02	1.067
α_4	8.93E-06	1.37E-03	6.77E-04	5.06E-03	5.533E-01	4.045E+02	1.023
α_5	2.08E-09	5.35E-04	7.14E-05	2.68E-03	2.210E-01	4.128E+02	1.003
α_6	4.09E-16	3.21E-04	2.23E-06	1.86E-03	1.027E-01	3.202E+02	1.294

CCCG = 7, Gamma = 0.293

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9832855	0.9902794	0.9907690	0.9956018	6.553E+02	6.432E+00	--
α_2	1.07E-03	4.12E-03	3.66E-03	8.78E-03	2.840E+00	6.857E+02	1.013
α_3	4.11E-04	2.77E-03	2.26E-03	6.85E-03	1.746E+00	6.294E+02	1.105
α_4	1.04E-04	1.67E-03	1.19E-03	4.85E-03	1.084E+00	6.496E+02	1.072
α_5	4.70E-06	8.27E-04	4.01E-04	3.09E-03	5.376E-01	6.495E+02	1.073
α_6	2.63E-10	2.99E-04	3.02E-05	1.54E-03	1.979E-01	6.620E+02	1.053
α_7	8.36E-53	3.73E-05	3.74E-15	1.27E-04	2.656E-02	7.117E+02	0.980

CCCG = 8, Gamma = 0.293

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9839444	0.9907723	0.9912616	0.9959296	6.563E+02	6.112E+00	--
α_2	7.29E-04	3.37E-03	2.91E-03	7.58E-03	2.364E+00	6.990E+02	0.994
α_3	2.82E-04	2.37E-03	1.88E-03	6.15E-03	1.512E+00	6.360E+02	1.094
α_4	9.68E-05	1.65E-03	1.17E-03	4.85E-03	1.056E+00	6.387E+02	1.090
α_5	1.54E-05	1.02E-03	5.80E-04	3.51E-03	6.745E-01	6.614E+02	1.053
α_6	6.54E-08	4.86E-04	1.24E-04	2.21E-03	3.076E-01	6.322E+02	1.102
α_7	1.15E-15	1.64E-04	1.62E-06	9.46E-04	1.093E-01	6.664E+02	1.046
α_8	2.56E-18	1.66E-04	4.60E-07	9.66E-04	8.885E-02	5.359E+02	1.301

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.93E-01	9.90E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
α_2	5.62E-03	5.71E-03	6.73E-03	6.22E-03	5.11E-03	4.12E-03	3.37E-03
α_3		1.44E-03	1.95E-03	2.80E-03	2.92E-03	2.77E-03	2.37E-03
α_4			1.03E-03	1.04E-03	1.37E-03	1.67E-03	1.65E-03
α_5				1.88E-04	5.35E-04	8.27E-04	1.02E-03
α_6					3.21E-04	2.99E-04	4.86E-04
α_7						3.73E-05	1.64E-04
α_8							1.66E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.93E-01	9.90E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
Beta	5.62E-03	7.15E-03	9.72E-03	1.02E-02	1.03E-02	9.72E-03	9.23E-03
Gamma		2.02E-01	3.07E-01	3.93E-01	5.01E-01	5.76E-01	6.35E-01
Delta			3.46E-01	3.05E-01	4.32E-01	5.06E-01	5.95E-01
Epsilon				1.53E-01	3.85E-01	4.11E-01	5.26E-01
Mu					3.75E-01	2.89E-01	4.45E-01
Omega						1.11E-01	4.04E-01
Sigma							5.03E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	10.00	10.00	10.00	10.00	10.00	10.00	10.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.117

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9378200	0.9843087	0.9933952	0.9999650	2.822E+01	4.498E-01	--
α_2	3.50E-05	1.57E-02	6.60E-03	6.22E-02	4.498E-01	2.822E+01	0.632

CCCG = 3, Gamma = 0.117

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9319486	0.9756435	0.9818385	0.9981398	4.720E+01	1.178E+00	--
α_2	8.64E-04	1.94E-02	1.33E-02	5.90E-02	9.387E-01	4.735E+01	0.823
α_3	5.18E-08	4.92E-03	7.96E-04	2.41E-02	2.396E-01	4.848E+01	0.816

CCCG = 4, Gamma = 0.117

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9262519	0.9689876	0.9739496	0.9947365	5.932E+01	1.898E+00	--
α_2	1.88E-03	2.07E-02	1.58E-02	5.63E-02	1.285E+00	6.078E+01	0.905
α_3	5.95E-06	6.44E-03	2.31E-03	2.69E-02	3.927E-01	6.063E+01	0.921
α_4	1.49E-08	3.87E-03	5.20E-04	1.94E-02	2.207E-01	5.678E+01	0.986

CCCG = 5, Gamma = 0.117

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9375830	0.9685658	0.9713283	0.9901030	1.080E+02	3.506E+00	--
α_2	3.18E-03	1.78E-02	1.50E-02	4.19E-02	1.992E+00	1.100E+02	1.010
α_3	6.08E-04	9.81E-03	7.04E-03	2.85E-02	1.078E+00	1.088E+02	1.029
α_4	1.70E-06	3.23E-03	1.05E-03	1.39E-02	3.632E-01	1.120E+02	1.007
α_5	5.59E-21	6.05E-04	3.50E-07	3.50E-03	7.248E-02	1.198E+02	0.944

CCCG = 6, Gamma = 0.117

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9417165	0.9692229	0.9714897	0.9889812	1.322E+02	4.199E+00	--
α_2	2.38E-03	1.38E-02	1.15E-02	3.28E-02	1.941E+00	1.390E+02	0.996
α_3	9.73E-04	1.01E-02	7.78E-03	2.73E-02	1.332E+00	1.301E+02	1.067
α_4	4.84E-05	4.51E-03	2.43E-03	1.60E-02	6.181E-01	1.365E+02	1.023
α_5	1.14E-08	1.65E-03	2.46E-04	8.19E-03	2.313E-01	1.396E+02	1.003
α_6	6.47E-20	7.09E-04	6.69E-07	4.12E-03	7.684E-02	1.084E+02	1.294

CCCG = 7, Gamma = 0.117

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9483604	0.9700168	0.9715155	0.9865541	2.013E+02	6.223E+00	--
α_2	3.01E-03	1.23E-02	1.08E-02	2.66E-02	2.654E+00	2.134E+02	1.013
α_3	1.13E-03	8.30E-03	6.72E-03	2.09E-02	1.645E+00	1.964E+02	1.105
α_4	3.64E-04	5.46E-03	3.95E-03	1.57E-02	1.115E+00	2.031E+02	1.072
α_5	2.86E-05	2.96E-03	1.57E-03	1.06E-02	6.034E-01	2.034E+02	1.073
α_6	1.52E-10	8.56E-04	6.39E-05	4.55E-03	1.780E-01	2.076E+02	1.053
α_7	6.67E-51	1.22E-04	2.51E-14	4.32E-04	2.734E-02	2.234E+02	0.980

CCCG = 8, Gamma = 0.117

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9500924	0.9710067	0.9724535	0.9869791	2.092E+02	6.246E+00	--
α_2	2.54E-03	1.10E-02	9.60E-03	2.42E-02	2.504E+00	2.253E+02	0.994
α_3	7.35E-04	6.85E-03	5.34E-03	1.81E-02	1.419E+00	2.056E+02	1.094
α_4	2.72E-04	4.94E-03	3.47E-03	1.46E-02	1.027E+00	2.068E+02	1.090
α_5	7.04E-05	3.41E-03	2.05E-03	1.14E-02	7.337E-01	2.143E+02	1.053
α_6	1.93E-06	1.93E-03	6.99E-04	8.05E-03	3.975E-01	2.050E+02	1.102
α_7	3.56E-20	3.56E-04	3.42E-07	2.07E-03	7.703E-02	2.164E+02	1.046
α_8	4.67E-18	5.03E-04	1.26E-06	2.93E-03	8.749E-02	1.740E+02	1.301

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.76E-01	9.69E-01	9.69E-01	9.69E-01	9.70E-01	9.71E-01
α_2	1.57E-02	1.94E-02	2.07E-02	1.78E-02	1.38E-02	1.23E-02	1.10E-02
α_3		4.92E-03	6.44E-03	9.81E-03	1.01E-02	8.30E-03	6.85E-03
α_4			3.87E-03	3.23E-03	4.51E-03	5.46E-03	4.94E-03
α_5				6.05E-04	1.65E-03	2.96E-03	3.41E-03
α_6					7.09E-04	8.56E-04	1.93E-03
α_7						1.22E-04	3.56E-04
α_8							5.03E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.76E-01	9.69E-01	9.69E-01	9.69E-01	9.70E-01	9.71E-01
Beta	1.57E-02	2.44E-02	3.10E-02	3.14E-02	3.08E-02	3.00E-02	2.90E-02
Gamma		2.02E-01	3.32E-01	4.34E-01	5.52E-01	5.90E-01	6.21E-01
Delta			3.76E-01	2.81E-01	4.04E-01	5.31E-01	6.19E-01
Epsilon				1.58E-01	3.44E-01	4.19E-01	5.57E-01
Mu					3.00E-01	2.49E-01	4.50E-01
Omega						1.25E-01	3.07E-01
Sigma							5.85E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.029

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8441527	0.9626201	0.9864133	0.9999708	9.788E+00	3.801E-01	--
α_2	2.92E-05	3.74E-02	1.36E-02	1.56E-01	3.801E-01	9.788E+00	0.632

CCCG = 3, Gamma = 0.029

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8401931	0.9458743	0.9616949	0.9973553	1.678E+01	9.600E-01	--
α_2	5.75E-04	3.77E-02	2.21E-02	1.28E-01	6.673E-01	1.702E+01	0.823
α_3	1.45E-06	1.64E-02	3.97E-03	7.55E-02	2.927E-01	1.755E+01	0.816

CCCG = 4, Gamma = 0.029

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8419921	0.9351648	0.9461783	0.9905600	2.407E+01	1.669E+00	--
α_2	2.32E-03	3.97E-02	2.86E-02	1.15E-01	1.039E+00	2.514E+01	0.905
α_3	1.32E-05	1.51E-02	5.43E-03	6.30E-02	3.887E-01	2.535E+01	0.921
α_4	1.17E-07	1.00E-02	1.67E-03	4.91E-02	2.414E-01	2.380E+01	0.986

CCCG = 5, Gamma = 0.029

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8822032	0.9401200	0.9451119	0.9809531	5.474E+01	3.487E+00	--
α_2	4.80E-03	3.06E-02	2.54E-02	7.41E-02	1.791E+00	5.675E+01	1.010
α_3	1.68E-03	2.10E-02	1.58E-02	5.83E-02	1.207E+00	5.623E+01	1.029
α_4	1.31E-05	7.39E-03	2.97E-03	2.98E-02	4.340E-01	5.827E+01	1.007
α_5	1.95E-26	8.77E-04	3.13E-08	4.84E-03	5.493E-02	6.258E+01	0.944

CCCG = 6, Gamma = 0.029

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8949359	0.9450816	0.9492183	0.9810765	6.719E+01	3.905E+00	--
α_2	1.75E-03	1.81E-02	1.39E-02	4.85E-02	1.335E+00	7.256E+01	0.996
α_3	2.74E-03	2.22E-02	1.78E-02	5.69E-02	1.531E+00	6.741E+01	1.067
α_4	1.94E-04	1.00E-02	5.97E-03	3.35E-02	7.191E-01	7.119E+01	1.023
α_5	4.93E-08	3.36E-03	5.77E-04	1.64E-02	2.467E-01	7.307E+01	1.003
α_6	1.41E-20	1.28E-03	7.73E-07	7.44E-03	7.279E-02	5.679E+01	1.294

CCCG = 7, Gamma = 0.029

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9122631	0.9496200	0.9522213	0.9780864	1.088E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.03E-02	3.29E-02	1.549E+00	1.190E+02	1.013
α_3	3.21E-03	1.80E-02	1.52E-02	4.24E-02	1.989E+00	1.085E+02	1.105
α_4	1.02E-03	1.13E-02	8.59E-03	3.08E-02	1.287E+00	1.127E+02	1.072
α_5	1.02E-04	6.07E-03	3.53E-03	2.07E-02	6.913E-01	1.132E+02	1.073
α_6	1.48E-08	2.01E-03	3.03E-04	9.92E-03	2.327E-01	1.157E+02	1.053
α_7	1.15E-64	1.69E-04	2.57E-17	4.27E-04	2.112E-02	1.246E+02	0.980

CCCG = 8, Gamma = 0.029

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9235298	0.9541941	0.9561606	0.9781404	1.462E+02	7.016E+00	--
α_2	1.24E-03	9.65E-03	7.74E-03	2.46E-02	1.583E+00	1.624E+02	0.994
α_3	2.37E-03	1.33E-02	1.12E-02	3.15E-02	1.986E+00	1.471E+02	1.094
α_4	1.57E-03	1.12E-02	9.09E-03	2.79E-02	1.672E+00	1.479E+02	1.090
α_5	3.46E-04	6.53E-03	4.57E-03	1.94E-02	1.011E+00	1.538E+02	1.053
α_6	2.93E-05	3.86E-03	1.97E-03	1.41E-02	5.709E-01	1.473E+02	1.102
α_7	2.67E-10	1.16E-03	9.10E-05	6.14E-03	1.809E-01	1.557E+02	1.046
α_8	1.44E-107	9.93E-05	3.01E-27	7.45E-05	1.245E-02	1.253E+02	1.301

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.63E-01	9.46E-01	9.35E-01	9.40E-01	9.45E-01	9.50E-01	9.54E-01
α_2	3.74E-02	3.77E-02	3.97E-02	3.06E-02	1.81E-02	1.28E-02	9.65E-03
α_3		1.64E-02	1.51E-02	2.10E-02	2.22E-02	1.80E-02	1.33E-02
α_4			1.00E-02	7.39E-03	1.00E-02	1.13E-02	1.12E-02
α_5				8.77E-04	3.36E-03	6.07E-03	6.53E-03
α_6					1.28E-03	2.01E-03	3.86E-03
α_7						1.69E-04	1.16E-03
α_8							9.93E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.63E-01	9.46E-01	9.35E-01	9.40E-01	9.45E-01	9.50E-01	9.54E-01
Beta	3.74E-02	5.41E-02	6.48E-02	5.99E-02	5.49E-02	5.04E-02	4.58E-02
Gamma		3.03E-01	3.88E-01	4.89E-01	6.71E-01	7.45E-01	7.89E-01
Delta			3.99E-01	2.82E-01	3.97E-01	5.21E-01	6.31E-01
Epsilon				1.06E-01	3.17E-01	4.22E-01	5.10E-01
Mu					2.76E-01	2.64E-01	4.39E-01
Omega						7.79E-02	2.46E-01
Sigma							7.88E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 15.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.440

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9705936	0.9924848	0.9967333	0.9999785	6.215E+01	4.706E-01	--
α_2	2.15E-05	7.52E-03	3.27E-03	2.94E-02	4.706E-01	6.215E+01	0.632

CCCG = 3, Gamma = 0.440

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9663218	0.9882971	0.9915266	0.9992352	9.311E+01	1.103E+00	--
α_2	2.48E-04	8.62E-03	5.48E-03	2.77E-02	8.104E-01	9.318E+01	0.823
α_3	2.59E-07	3.08E-03	7.23E-04	1.42E-02	2.921E-01	9.452E+01	0.816

CCCG = 4, Gamma = 0.440

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9671546	0.9861730	0.9883941	0.9975947	1.393E+02	1.953E+00	--
α_2	8.55E-04	9.17E-03	7.01E-03	2.49E-02	1.312E+00	1.418E+02	0.905
α_3	5.15E-06	3.06E-03	1.21E-03	1.24E-02	4.307E-01	1.403E+02	0.921
α_4	3.18E-09	1.60E-03	1.89E-04	8.13E-03	2.099E-01	1.312E+02	0.986

CCCG = 5, Gamma = 0.440

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9712489	0.9860887	0.9875124	0.9960628	2.202E+02	3.107E+00	--
α_2	1.06E-03	7.51E-03	6.11E-03	1.88E-02	1.684E+00	2.224E+02	1.010
α_3	1.90E-04	4.29E-03	2.91E-03	1.31E-02	9.426E-01	2.189E+02	1.029
α_4	1.28E-06	1.70E-03	5.84E-04	7.17E-03	3.816E-01	2.243E+02	1.007
α_5	1.64E-16	4.11E-04	2.25E-06	2.39E-03	9.865E-02	2.397E+02	0.944

CCCG = 6, Gamma = 0.440

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9739552	0.9866632	0.9877782	0.9955615	2.828E+02	3.822E+00	--
α_2	8.38E-04	5.79E-03	4.72E-03	1.44E-02	1.714E+00	2.945E+02	0.996
α_3	2.63E-04	4.01E-03	2.89E-03	1.16E-02	1.108E+00	2.752E+02	1.067
α_4	2.98E-05	2.26E-03	1.26E-03	7.88E-03	6.509E-01	2.876E+02	1.023
α_5	1.71E-08	8.63E-04	1.55E-04	4.16E-03	2.536E-01	2.937E+02	1.003
α_6	6.81E-17	4.20E-04	1.91E-06	2.45E-03	9.572E-02	2.278E+02	1.294

CCCG = 7, Gamma = 0.440

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9767157	0.9871091	0.9879062	0.9947802	3.978E+02	5.195E+00	--
α_2	9.52E-04	5.02E-03	4.25E-03	1.17E-02	2.105E+00	4.176E+02	1.013
α_3	3.22E-04	3.43E-03	2.62E-03	9.32E-03	1.320E+00	3.834E+02	1.105
α_4	1.28E-04	2.51E-03	1.74E-03	7.53E-03	9.967E-01	3.957E+02	1.072
α_5	6.70E-06	1.32E-03	6.29E-04	5.00E-03	5.249E-01	3.957E+02	1.073
α_6	3.60E-10	4.85E-04	4.74E-05	2.51E-03	1.956E-01	4.034E+02	1.053
α_7	3.48E-28	1.22E-04	2.76E-09	6.62E-04	5.291E-02	4.338E+02	0.980

CCCG = 8, Gamma = 0.440

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9783001	0.9876524	0.9883341	0.9946767	4.665E+02	5.832E+00	--
α_2	9.05E-04	4.46E-03	3.82E-03	1.02E-02	2.229E+00	4.975E+02	0.994
α_3	2.38E-04	2.77E-03	2.09E-03	7.66E-03	1.260E+00	4.529E+02	1.094
α_4	1.30E-04	2.29E-03	1.61E-03	6.74E-03	1.042E+00	4.548E+02	1.090
α_5	3.80E-05	1.62E-03	9.89E-04	5.33E-03	7.626E-01	4.709E+02	1.053
α_6	1.66E-07	7.26E-04	2.03E-04	3.23E-03	3.271E-01	4.503E+02	1.102
α_7	2.74E-13	2.83E-04	7.58E-06	1.59E-03	1.344E-01	4.747E+02	1.046
α_8	1.81E-20	2.01E-04	1.89E-07	1.17E-03	7.682E-02	3.818E+02	1.301

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.88E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01	9.88E-01
α_2	7.52E-03	8.62E-03	9.17E-03	7.51E-03	5.79E-03	5.02E-03	4.46E-03
α_3		3.08E-03	3.06E-03	4.29E-03	4.01E-03	3.43E-03	2.77E-03
α_4			1.60E-03	1.70E-03	2.26E-03	2.51E-03	2.29E-03
α_5				4.11E-04	8.63E-04	1.32E-03	1.62E-03
α_6					4.20E-04	4.85E-04	7.26E-04
α_7						1.22E-04	2.83E-04
α_8							2.01E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.88E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01	9.88E-01
Beta	7.52E-03	1.17E-02	1.38E-02	1.39E-02	1.33E-02	1.29E-02	1.23E-02
Gamma		2.63E-01	3.37E-01	4.60E-01	5.66E-01	6.11E-01	6.39E-01
Delta			3.43E-01	3.30E-01	4.69E-01	5.64E-01	6.48E-01
Epsilon				1.95E-01	3.62E-01	4.35E-01	5.53E-01
Mu					3.27E-01	3.14E-01	4.28E-01
Omega						2.01E-01	4.00E-01
Sigma							4.15E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	15.00	15.00	15.00	15.00	15.00	15.00	15.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 4.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9893769	0.9972449	0.9987574	0.9999899	1.785E+02	4.932E-01	--
α_2	1.01E-05	2.76E-03	1.24E-03	1.06E-02	4.932E-01	1.785E+02	0.632

CCCG = 3, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898907	0.9965501	0.9975498	0.9997958	3.060E+02	1.059E+00	--
α_2	4.36E-05	2.33E-03	1.37E-03	7.87E-03	7.137E-01	3.055E+02	0.823
α_3	4.02E-07	1.12E-03	3.38E-04	4.89E-03	3.458E-01	3.086E+02	0.816

CCCG = 4, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9907544	0.9960264	0.9966280	0.9992421	5.300E+02	2.115E+00	--
α_2	3.55E-04	2.87E-03	2.28E-03	7.38E-03	1.549E+00	5.385E+02	0.905
α_3	1.56E-08	4.98E-04	9.75E-05	2.37E-03	2.646E-01	5.307E+02	0.921
α_4	6.70E-08	6.07E-04	1.49E-04	2.77E-03	3.010E-01	4.957E+02	0.986

CCCG = 5, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9930919	0.9961634	0.9963990	0.9984304	1.383E+03	5.325E+00	--
α_2	8.31E-04	2.61E-03	2.37E-03	5.18E-03	3.632E+00	1.390E+03	1.010
α_3	9.73E-05	9.90E-04	7.60E-04	2.67E-03	1.354E+00	1.366E+03	1.029
α_4	2.01E-08	2.12E-04	5.06E-05	9.73E-04	2.961E-01	1.397E+03	1.007
α_5	8.47E-35	2.85E-05	3.13E-11	1.41E-04	4.243E-02	1.491E+03	0.944

CCCG = 6, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9927004	0.9960204	0.9962837	0.9984413	1.235E+03	4.936E+00	--
α_2	6.07E-04	2.28E-03	2.03E-03	4.82E-03	2.915E+00	1.275E+03	0.996
α_3	9.00E-05	1.05E-03	7.92E-04	2.92E-03	1.257E+00	1.191E+03	1.067
α_4	1.64E-06	4.05E-04	1.85E-04	1.55E-03	5.031E-01	1.243E+03	1.023
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	1.003
α_6	6.90E-13	1.48E-04	5.41E-06	8.18E-04	1.451E-01	9.830E+02	1.294

CCCG = 7, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9941356	0.9962884	0.9964148	0.9980098	2.592E+03	9.654E+00	--
α_2	6.96E-04	1.80E-03	1.68E-03	3.31E-03	4.851E+00	2.695E+03	1.013
α_3	2.90E-04	1.13E-03	1.00E-03	2.42E-03	2.800E+00	2.472E+03	1.105
α_4	5.54E-05	5.42E-04	4.19E-04	1.45E-03	1.384E+00	2.551E+03	1.072
α_5	6.81E-07	1.92E-04	8.60E-05	7.44E-04	4.902E-01	2.549E+03	1.073
α_6	1.05E-15	4.41E-05	5.59E-07	2.53E-04	1.146E-01	2.597E+03	1.053
α_7	2.76E-93	5.24E-06	5.58E-25	6.23E-06	1.464E-02	2.792E+03	0.980

CCCG = 8, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9938687	0.9963554	0.9965227	0.9982710	1.954E+03	7.148E+00	--
α_2	3.88E-04	1.43E-03	1.27E-03	3.00E-03	2.980E+00	2.082E+03	0.994
α_3	1.79E-04	1.03E-03	8.65E-04	2.47E-03	1.960E+00	1.893E+03	1.094
α_4	4.48E-05	6.13E-04	4.50E-04	1.74E-03	1.166E+00	1.900E+03	1.090
α_5	1.55E-06	2.73E-04	1.32E-04	1.02E-03	5.375E-01	1.967E+03	1.053
α_6	2.12E-11	9.60E-05	7.45E-06	5.08E-04	1.805E-01	1.880E+03	1.102
α_7	1.08E-35	2.09E-05	1.56E-11	1.02E-04	4.139E-02	1.981E+03	1.046
α_8	1.08E-08	1.77E-04	3.91E-05	8.27E-04	2.827E-01	1.593E+03	1.301

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	2.76E-03	2.33E-03	2.87E-03	2.61E-03	2.28E-03	1.80E-03	1.43E-03
α_3		1.12E-03	4.98E-04	9.90E-04	1.05E-03	1.13E-03	1.03E-03
α_4			6.07E-04	2.12E-04	4.05E-04	5.42E-04	6.13E-04
α_5				2.85E-05	9.11E-05	1.92E-04	2.73E-04
α_6					1.48E-04	4.41E-05	9.60E-05
α_7						5.24E-06	2.09E-05
α_8							1.77E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	2.76E-03	3.45E-03	3.97E-03	3.84E-03	3.98E-03	3.71E-03	3.64E-03
Gamma		3.24E-01	2.78E-01	3.21E-01	4.27E-01	5.16E-01	6.08E-01
Delta			5.49E-01	1.95E-01	3.79E-01	4.09E-01	5.33E-01
Epsilon				1.18E-01	3.71E-01	3.08E-01	4.81E-01
Mu					6.18E-01	2.04E-01	5.19E-01
Omega						1.06E-01	6.74E-01
Sigma							8.95E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.10	4.10	4.10	4.10	4.10	4.10	4.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.3.8.3 HCI-RCI-MOV-OO: HPCI and RCIC Motor-Operated Valves Fail to Close

Generic CCF Parameters

System Group: Clean Water
System: High Pressure Coolant Injection, Reactor Core Isolation
Component Group: Valve
Component Type: Motor Operated Valve
Failure Mode: Fail to Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 16.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9528639	0.9879498	0.9947483	0.9999634	1.0000000	3.841E+01	4.685E-01
α_2	3.38E-05	1.21E-02	5.25E-03	4.71E-02	0.00E+00	4.685E-01	3.841E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9571920	0.9849809	0.9890158	0.9989621	1.0000000	7.398E+01	1.128E+00
α_2	3.80E-04	1.13E-02	7.39E-03	3.57E-02	0.00E+00	8.512E-01	7.426E+01
α_3	1.84E-07	3.69E-03	7.89E-04	1.73E-02	0.00E+00	2.768E-01	7.483E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9582301	0.9825585	0.9854279	0.9970799	1.0000000	1.067E+02	1.894E+00
α_2	1.00E-03	1.16E-02	8.77E-03	3.19E-02	0.00E+00	1.260E+00	1.073E+02
α_3	4.03E-06	3.71E-03	1.36E-03	1.53E-02	0.00E+00	4.024E-01	1.082E+02
α_4	1.48E-08	2.13E-03	3.18E-04	1.06E-02	0.00E+00	2.315E-01	1.083E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9672200	0.9836774	0.9851839	0.9949847	1.0000000	2.068E+02	3.432E+00
α_2	1.56E-03	9.15E-03	7.65E-03	2.19E-02	0.00E+00	1.924E+00	2.083E+02
α_3	2.89E-04	4.99E-03	3.53E-03	1.47E-02	0.00E+00	1.049E+00	2.092E+02
α_4	1.38E-06	1.82E-03	6.27E-04	7.67E-03	0.00E+00	3.822E-01	2.099E+02
α_5	3.17E-20	3.65E-04	3.40E-07	2.12E-03	0.00E+00	7.674E-02	2.102E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9694933	0.9843507	0.9856473	0.9947758	1.0000000	2.412E+02	3.835E+00
α_2	9.95E-04	6.94E-03	5.65E-03	1.73E-02	0.00E+00	1.701E+00	2.434E+02
α_3	3.89E-04	4.93E-03	3.66E-03	1.38E-02	0.00E+00	1.207E+00	2.438E+02
α_4	2.23E-05	2.43E-03	1.28E-03	8.76E-03	0.00E+00	5.960E-01	2.445E+02

α_5	3.53E-09	9.02E-04	1.21E-04	4.53E-03	0.00E+00	2.211E-01	2.448E+02
α_6	3.52E-15	4.48E-04	4.54E-06	2.58E-03	0.00E+00	1.098E-01	2.449E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9742614	0.9853960	0.9862084	0.9937495	1.0000000	3.878E+02	5.747E+00
α_2	1.17E-03	5.70E-03	4.89E-03	1.30E-02	0.00E+00	2.243E+00	3.913E+02
α_3	5.56E-04	4.14E-03	3.34E-03	1.05E-02	0.00E+00	1.630E+00	3.919E+02
α_4	1.71E-04	2.75E-03	1.97E-03	8.00E-03	0.00E+00	1.083E+00	3.925E+02
α_5	1.04E-05	1.44E-03	7.25E-04	5.28E-03	0.00E+00	5.654E-01	3.930E+02
α_6	2.67E-10	4.87E-04	4.50E-05	2.54E-03	0.00E+00	1.916E-01	3.934E+02
α_7	6.06E-41	8.84E-05	3.29E-12	3.88E-04	0.00E+00	3.480E-02	3.935E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9754657	0.9860944	0.9868721	0.9940574	1.0000000	4.060E+02	5.726E+00
α_2	8.84E-04	4.90E-03	4.13E-03	1.16E-02	0.00E+00	2.018E+00	4.097E+02
α_3	3.49E-04	3.38E-03	2.62E-03	9.01E-03	0.00E+00	1.391E+00	4.104E+02
α_4	1.53E-04	2.58E-03	1.83E-03	7.56E-03	0.00E+00	1.062E+00	4.107E+02
α_5	3.01E-05	1.71E-03	9.97E-04	5.80E-03	0.00E+00	7.026E-01	4.110E+02
α_6	3.33E-07	8.49E-04	2.61E-04	3.69E-03	0.00E+00	3.497E-01	4.114E+02
α_7	1.28E-15	2.62E-04	2.40E-06	1.51E-03	0.00E+00	1.078E-01	4.116E+02
α_8	2.68E-17	2.30E-04	9.74E-07	1.34E-03	0.00E+00	9.469E-02	4.117E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.85E-01	9.83E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.21E-02	1.13E-02	1.16E-02	9.15E-03	6.94E-03	5.70E-03	4.90E-03
α_3		3.69E-03	3.71E-03	4.99E-03	4.93E-03	4.14E-03	3.38E-03
α_4			2.13E-03	1.82E-03	2.43E-03	2.75E-03	2.58E-03
α_5				3.65E-04	9.02E-04	1.44E-03	1.71E-03
α_6					4.48E-04	4.87E-04	8.49E-04
α_7						8.84E-05	2.62E-04
α_8							2.30E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.85E-01	9.83E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.21E-02	1.50E-02	1.74E-02	1.63E-02	1.56E-02	1.46E-02	1.39E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	16.00	16.00	16.00	16.00	16.00	16.00	16.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9621416	0.9902219	0.9956294	0.9999674	4.895E+01	4.834E-01	--
α_2	3.26E-05	9.78E-03	4.37E-03	3.79E-02	4.834E-01	4.895E+01	0.957

CCCG = 3, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9709264	0.9895259	0.9921534	0.9991434	1.158E+02	1.226E+00	--
α_2	4.08E-04	8.37E-03	5.78E-03	2.52E-02	9.769E-01	1.157E+02	1.148
α_3	3.37E-08	2.10E-03	3.65E-04	1.02E-02	2.487E-01	1.180E+02	1.133

CCCG = 4, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9679317	0.9862778	0.9883748	0.9974525	1.478E+02	2.057E+00	--
α_2	1.04E-03	9.40E-03	7.37E-03	2.47E-02	1.442E+00	1.520E+02	1.219
α_3	3.54E-06	2.82E-03	1.06E-03	1.16E-02	4.114E-01	1.452E+02	1.284
α_4	1.97E-09	1.50E-03	1.64E-04	7.69E-03	2.036E-01	1.357E+02	1.376

CCCG = 5, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9734877	0.9865576	0.9877229	0.9956457	2.703E+02	3.683E+00	--
α_2	1.65E-03	8.07E-03	6.92E-03	1.84E-02	2.243E+00	2.757E+02	1.286
α_3	1.89E-04	3.75E-03	2.59E-03	1.12E-02	9.912E-01	2.635E+02	1.351
α_4	9.50E-07	1.39E-03	4.71E-04	5.91E-03	3.765E-01	2.700E+02	1.322
α_5	2.01E-21	2.32E-04	1.32E-07	1.34E-03	7.237E-02	3.115E+02	1.147

CCCG = 6, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9746923	0.9867664	0.9877896	0.9953447	3.086E+02	4.139E+00	--
α_2	1.23E-03	6.40E-03	5.44E-03	1.48E-02	2.128E+00	3.306E+02	1.225
α_3	2.72E-04	3.94E-03	2.87E-03	1.13E-02	1.134E+00	2.869E+02	1.414
α_4	1.18E-05	1.80E-03	8.93E-04	6.66E-03	5.533E-01	3.070E+02	1.325
α_5	2.74E-09	7.04E-04	9.40E-05	3.53E-03	2.210E-01	3.138E+02	1.297
α_6	5.07E-16	3.97E-04	2.77E-06	2.30E-03	1.027E-01	2.583E+02	1.576

CCCG = 7, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9790714	0.9878201	0.9884306	0.9944842	5.217E+02	6.432E+00	--
α_2	1.29E-03	4.96E-03	4.40E-03	1.06E-02	2.840E+00	5.698E+02	1.206
α_3	5.32E-04	3.58E-03	2.93E-03	8.86E-03	1.746E+00	4.859E+02	1.416
α_4	1.33E-04	2.14E-03	1.53E-03	6.21E-03	1.084E+00	5.064E+02	1.361
α_5	6.11E-06	1.07E-03	5.20E-04	4.02E-03	5.376E-01	4.999E+02	1.380
α_6	3.40E-10	3.87E-04	3.90E-05	2.00E-03	1.979E-01	5.116E+02	1.349
α_7	9.55E-53	4.26E-05	4.27E-15	1.46E-04	2.656E-02	6.229E+02	1.109

CCCG = 8, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9800213	0.9885100	0.9891166	0.9949275	5.259E+02	6.112E+00	--
α_2	8.68E-04	4.01E-03	3.47E-03	9.02E-03	2.364E+00	5.871E+02	1.171
α_3	3.60E-04	3.02E-03	2.39E-03	7.84E-03	1.512E+00	4.989E+02	1.379
α_4	1.25E-04	2.13E-03	1.51E-03	6.24E-03	1.056E+00	4.955E+02	1.390
α_5	1.97E-05	1.30E-03	7.39E-04	4.47E-03	6.745E-01	5.195E+02	1.327
α_6	8.70E-08	6.47E-04	1.64E-04	2.94E-03	3.076E-01	4.752E+02	1.452
α_7	1.48E-15	2.12E-04	2.09E-06	1.22E-03	1.093E-01	5.156E+02	1.338
α_8	2.71E-18	1.76E-04	4.88E-07	1.02E-03	8.885E-02	5.056E+02	1.365

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.90E-01	9.86E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01
α_2	9.78E-03	8.37E-03	9.40E-03	8.07E-03	6.40E-03	4.96E-03	4.01E-03
α_3		2.10E-03	2.82E-03	3.75E-03	3.94E-03	3.58E-03	3.02E-03
α_4			1.50E-03	1.39E-03	1.80E-03	2.14E-03	2.13E-03
α_5				2.32E-04	7.04E-04	1.07E-03	1.30E-03
α_6					3.97E-04	3.87E-04	6.47E-04
α_7						4.26E-05	2.12E-04
α_8							1.76E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.90E-01	9.86E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01
Beta	9.78E-03	1.05E-02	1.37E-02	1.34E-02	1.32E-02	1.22E-02	1.15E-02
Gamma		2.01E-01	3.15E-01	4.00E-01	5.17E-01	5.93E-01	6.51E-01
Delta			3.47E-01	3.02E-01	4.24E-01	5.04E-01	5.96E-01
Epsilon				1.43E-01	3.80E-01	4.13E-01	5.23E-01
Mu					3.61E-01	2.86E-01	4.44E-01
Omega						9.93E-02	3.75E-01
Sigma							4.53E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8912866	0.9724168	0.9881891	0.9999372	1.586E+01	4.498E-01	--
α_2	6.28E-05	2.76E-02	1.18E-02	1.09E-01	4.498E-01	1.586E+01	0.957

CCCG = 3, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8994662	0.9637943	0.9728221	0.9972048	3.137E+01	1.178E+00	--
α_2	1.30E-03	2.89E-02	1.99E-02	8.73E-02	9.387E-01	3.152E+01	1.148
α_3	7.72E-08	7.29E-03	1.19E-03	3.57E-02	2.396E-01	3.265E+01	1.133

CCCG = 4, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8955086	0.9557882	0.9626893	0.9924265	4.104E+01	1.898E+00	--
α_2	2.66E-03	2.92E-02	2.24E-02	7.89E-02	1.285E+00	4.277E+01	1.219
α_3	8.73E-06	9.39E-03	3.38E-03	3.91E-02	3.927E-01	4.143E+01	1.284
α_4	2.19E-08	5.66E-03	7.63E-04	2.84E-02	2.207E-01	3.880E+01	1.376

CCCG = 5, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9180873	0.9585930	0.9621602	0.9868979	8.116E+01	3.506E+00	--
α_2	4.16E-03	2.32E-02	1.96E-02	5.44E-02	1.992E+00	8.405E+01	1.286
α_3	8.19E-04	1.32E-02	9.46E-03	3.82E-02	1.078E+00	8.082E+01	1.351
α_4	2.29E-06	4.34E-03	1.41E-03	1.86E-02	3.632E-01	8.333E+01	1.322
α_5	6.95E-21	7.51E-04	4.36E-07	4.35E-03	7.248E-02	9.639E+01	1.147

CCCG = 6, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9246369	0.9600767	0.9629634	0.9856474	1.010E+02	4.199E+00	--
α_2	2.98E-03	1.73E-02	1.45E-02	4.10E-02	1.941E+00	1.106E+02	1.225
α_3	1.32E-03	1.37E-02	1.05E-02	3.68E-02	1.332E+00	9.609E+01	1.414
α_4	6.39E-05	5.94E-03	3.21E-03	2.11E-02	6.181E-01	1.034E+02	1.325
α_5	1.50E-08	2.18E-03	3.24E-04	1.08E-02	2.313E-01	1.060E+02	1.297
α_6	8.04E-20	8.79E-04	8.30E-07	5.12E-03	7.684E-02	8.733E+01	1.576

CCCG = 7, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9352876	0.9623410	0.9641939	0.9830644	1.590E+02	6.223E+00	--
α_2	3.63E-03	1.48E-02	1.30E-02	3.20E-02	2.654E+00	1.768E+02	1.206
α_3	1.47E-03	1.08E-02	8.72E-03	2.71E-02	1.645E+00	1.512E+02	1.416
α_4	4.68E-04	7.01E-03	5.08E-03	2.01E-02	1.115E+00	1.579E+02	1.361
α_5	3.73E-05	3.85E-03	2.04E-03	1.38E-02	6.034E-01	1.563E+02	1.380
α_6	1.97E-10	1.11E-03	8.28E-05	5.89E-03	1.780E-01	1.602E+02	1.349
α_7	7.63E-51	1.40E-04	2.88E-14	4.95E-04	2.734E-02	1.952E+02	1.109

CCCG = 8, Gamma = 0.094

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9379481	0.9638757	0.9656522	0.9837342	1.666E+02	6.246E+00	--
α_2	3.03E-03	1.31E-02	1.14E-02	2.88E-02	2.504E+00	1.887E+02	1.171
α_3	9.39E-04	8.74E-03	6.82E-03	2.31E-02	1.419E+00	1.609E+02	1.379
α_4	3.51E-04	6.37E-03	4.48E-03	1.89E-02	1.027E+00	1.601E+02	1.390
α_5	8.98E-05	4.35E-03	2.61E-03	1.45E-02	7.337E-01	1.680E+02	1.327
α_6	2.57E-06	2.58E-03	9.32E-04	1.07E-02	3.975E-01	1.539E+02	1.452
α_7	4.61E-20	4.60E-04	4.42E-07	2.68E-03	7.703E-02	1.673E+02	1.338
α_8	4.96E-18	5.33E-04	1.33E-06	3.11E-03	8.749E-02	1.640E+02	1.365

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.72E-01	9.64E-01	9.56E-01	9.59E-01	9.60E-01	9.62E-01	9.64E-01
α_2	2.76E-02	2.89E-02	2.92E-02	2.32E-02	1.73E-02	1.48E-02	1.31E-02
α_3		7.29E-03	9.39E-03	1.32E-02	1.37E-02	1.08E-02	8.74E-03
α_4			5.66E-03	4.34E-03	5.94E-03	7.01E-03	6.37E-03
α_5				7.51E-04	2.18E-03	3.85E-03	4.35E-03
α_6					8.79E-04	1.11E-03	2.58E-03
α_7						1.40E-04	4.60E-04
α_8							5.33E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.72E-01	9.64E-01	9.56E-01	9.59E-01	9.60E-01	9.62E-01	9.64E-01
Beta	2.76E-02	3.62E-02	4.42E-02	4.14E-02	3.99E-02	3.77E-02	3.61E-02
Gamma		2.01E-01	3.40E-01	4.41E-01	5.68E-01	6.07E-01	6.38E-01
Delta			3.76E-01	2.79E-01	3.97E-01	5.29E-01	6.21E-01
Epsilon				1.48E-01	3.40E-01	4.21E-01	5.54E-01
Mu					2.88E-01	2.45E-01	4.51E-01
Omega						1.12E-01	2.78E-01
Sigma							5.37E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.50	1.50	1.50	1.50	1.50	1.50	1.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 7.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.469

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9451759	0.9859492	0.9938377	0.9999594	3.302E+01	4.706E-01	--
α_2	4.06E-05	1.41E-02	6.16E-03	5.48E-02	4.706E-01	3.302E+01	0.957

CCCG = 3, Gamma = 0.469

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9482322	0.9819527	0.9868833	0.9988135	5.999E+01	1.103E+00	--
α_2	3.85E-04	1.33E-02	8.49E-03	4.27E-02	8.104E-01	6.007E+01	1.148
α_3	4.00E-07	4.74E-03	1.12E-03	2.18E-02	2.921E-01	6.139E+01	1.133

CCCG = 4, Gamma = 0.469

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9526336	0.9800047	0.9831814	0.9965071	9.570E+01	1.953E+00	--
α_2	1.23E-03	1.31E-02	1.00E-02	3.55E-02	1.312E+00	9.884E+01	1.219
α_3	7.63E-06	4.53E-03	1.79E-03	1.83E-02	4.307E-01	9.466E+01	1.284
α_4	4.72E-09	2.37E-03	2.80E-04	1.20E-02	2.099E-01	8.850E+01	1.376

CCCG = 5, Gamma = 0.469

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9617630	0.9814661	0.9833463	0.9947417	1.645E+02	3.107E+00	--
α_2	1.40E-03	9.89E-03	8.05E-03	2.47E-02	1.684E+00	1.685E+02	1.286
α_3	2.58E-04	5.82E-03	3.95E-03	1.77E-02	9.426E-01	1.611E+02	1.351
α_4	1.73E-06	2.30E-03	7.93E-04	9.73E-03	3.816E-01	1.652E+02	1.322
α_5	2.07E-16	5.17E-04	2.83E-06	3.01E-03	9.865E-02	1.907E+02	1.147

CCCG = 6, Gamma = 0.469

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9660184	0.9825737	0.9840193	0.9941894	2.155E+02	3.822E+00	--
α_2	1.06E-03	7.30E-03	5.96E-03	1.81E-02	1.714E+00	2.330E+02	1.225
α_3	3.58E-04	5.45E-03	3.94E-03	1.57E-02	1.108E+00	2.021E+02	1.414
α_4	3.97E-05	3.00E-03	1.67E-03	1.05E-02	6.509E-01	2.163E+02	1.325
α_5	2.27E-08	1.14E-03	2.06E-04	5.52E-03	2.536E-01	2.213E+02	1.297
α_6	8.52E-17	5.25E-04	2.39E-06	3.06E-03	9.572E-02	1.822E+02	1.576

CCCG = 7, Gamma = 0.469

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9705795	0.9836944	0.9846959	0.9933886	3.134E+02	5.195E+00	--
α_2	1.15E-03	6.08E-03	5.16E-03	1.41E-02	2.105E+00	3.442E+02	1.206
α_3	4.21E-04	4.48E-03	3.42E-03	1.21E-02	1.320E+00	2.936E+02	1.416
α_4	1.66E-04	3.25E-03	2.25E-03	9.72E-03	9.967E-01	3.060E+02	1.361
α_5	8.77E-06	1.73E-03	8.24E-04	6.54E-03	5.249E-01	3.022E+02	1.380
α_6	4.70E-10	6.32E-04	6.18E-05	3.28E-03	1.956E-01	3.094E+02	1.349
α_7	4.01E-28	1.40E-04	3.18E-09	7.62E-04	5.291E-02	3.767E+02	1.109

CCCG = 8, Gamma = 0.469

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9728404	0.9845313	0.9853801	0.9933234	3.712E+02	5.832E+00	--
α_2	1.08E-03	5.34E-03	4.57E-03	1.22E-02	2.229E+00	4.156E+02	1.171
α_3	3.05E-04	3.55E-03	2.67E-03	9.80E-03	1.260E+00	3.534E+02	1.379
α_4	1.68E-04	2.96E-03	2.09E-03	8.73E-03	1.042E+00	3.509E+02	1.390
α_5	4.86E-05	2.07E-03	1.27E-03	6.82E-03	7.626E-01	3.679E+02	1.327
α_6	2.22E-07	9.71E-04	2.71E-04	4.32E-03	3.271E-01	3.367E+02	1.452
α_7	3.56E-13	3.68E-04	9.86E-06	2.06E-03	1.344E-01	3.654E+02	1.338
α_8	1.93E-20	2.14E-04	2.01E-07	1.24E-03	7.682E-02	3.583E+02	1.365

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.82E-01	9.80E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01
α_2	1.41E-02	1.33E-02	1.31E-02	9.89E-03	7.30E-03	6.08E-03	5.34E-03
α_3		4.74E-03	4.53E-03	5.82E-03	5.45E-03	4.48E-03	3.55E-03
α_4			2.37E-03	2.30E-03	3.00E-03	3.25E-03	2.96E-03
α_5				5.17E-04	1.14E-03	1.73E-03	2.07E-03
α_6					5.25E-04	6.32E-04	9.71E-04
α_7						1.40E-04	3.68E-04
α_8							2.14E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.82E-01	9.80E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01
Beta	1.41E-02	1.80E-02	2.00E-02	1.85E-02	1.74E-02	1.63E-02	1.55E-02
Gamma		2.62E-01	3.45E-01	4.66E-01	5.81E-01	6.27E-01	6.55E-01
Delta			3.43E-01	3.27E-01	4.61E-01	5.62E-01	6.49E-01
Epsilon				1.83E-01	3.58E-01	4.36E-01	5.50E-01
Mu					3.14E-01	3.08E-01	4.29E-01
Omega						1.82E-01	3.75E-01
Sigma							3.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.50	7.50	7.50	7.50	7.50	7.50	7.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9838995	0.9958218	0.9981121	0.9999846	1.175E+02	4.932E-01	--
α_2	1.54E-05	4.18E-03	1.89E-03	1.61E-02	4.932E-01	1.175E+02	0.957

CCCG = 3, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9859294	0.9951950	0.9965845	0.9997152	2.194E+02	1.059E+00	--
α_2	6.08E-05	3.25E-03	1.92E-03	1.10E-02	7.137E-01	2.188E+02	1.148
α_3	5.59E-07	1.55E-03	4.70E-04	6.78E-03	3.458E-01	2.221E+02	1.133

CCCG = 4, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874345	0.9945962	0.9954123	0.9989684	3.892E+02	2.115E+00	--
α_2	4.79E-04	3.86E-03	3.07E-03	9.93E-03	1.549E+00	3.996E+02	1.219
α_3	2.17E-08	6.95E-04	1.36E-04	3.31E-03	2.646E-01	3.806E+02	1.284
α_4	9.37E-08	8.47E-04	2.08E-04	3.87E-03	3.010E-01	3.550E+02	1.376

CCCG = 5, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9911266	0.9950702	0.9953723	0.9979823	1.075E+03	5.325E+00	--
α_2	1.06E-03	3.32E-03	3.02E-03	6.59E-03	3.632E+00	1.091E+03	1.286
α_3	1.28E-04	1.30E-03	9.98E-04	3.50E-03	1.354E+00	1.041E+03	1.351
α_4	2.64E-08	2.78E-04	6.64E-05	1.28E-03	2.961E-01	1.065E+03	1.322
α_5	1.03E-34	3.46E-05	3.81E-11	1.71E-04	4.243E-02	1.227E+03	1.147

CCCG = 6, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9907834	0.9949737	0.9953056	0.9980305	9.770E+02	4.936E+00	--
α_2	7.47E-04	2.81E-03	2.49E-03	5.93E-03	2.915E+00	1.036E+03	1.225
α_3	1.19E-04	1.40E-03	1.05E-03	3.86E-03	1.257E+00	8.980E+02	1.414
α_4	2.13E-06	5.24E-04	2.40E-04	2.01E-03	5.031E-01	9.595E+02	1.325
α_5	3.41E-15	1.18E-04	1.55E-06	6.76E-04	1.155E-01	9.802E+02	1.297
α_6	8.41E-13	1.80E-04	6.59E-06	9.96E-04	1.451E-01	8.067E+02	1.576

CCCG = 7, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9927556	0.9954140	0.9955700	0.9975403	2.096E+03	9.654E+00	--
α_2	8.28E-04	2.14E-03	1.99E-03	3.94E-03	4.851E+00	2.264E+03	1.206
α_3	3.71E-04	1.45E-03	1.28E-03	3.10E-03	2.800E+00	1.929E+03	1.416
α_4	7.03E-05	6.88E-04	5.32E-04	1.84E-03	1.384E+00	2.009E+03	1.361
α_5	8.75E-07	2.47E-04	1.11E-04	9.56E-04	4.902E-01	1.982E+03	1.380
α_6	1.34E-15	5.65E-05	7.16E-07	3.24E-04	1.146E-01	2.027E+03	1.349
α_7	3.12E-93	5.93E-06	6.31E-25	7.05E-06	1.464E-02	2.468E+03	1.109

CCCG = 8, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9925081	0.9955457	0.9957498	0.9978863	1.598E+03	7.148E+00	--
α_2	4.57E-04	1.68E-03	1.50E-03	3.54E-03	2.980E+00	1.767E+03	1.171
α_3	2.26E-04	1.30E-03	1.09E-03	3.11E-03	1.960E+00	1.500E+03	1.379
α_4	5.72E-05	7.82E-04	5.74E-04	2.22E-03	1.166E+00	1.490E+03	1.390
α_5	1.95E-06	3.44E-04	1.67E-04	1.29E-03	5.375E-01	1.561E+03	1.327
α_6	2.80E-11	1.26E-04	9.81E-06	6.69E-04	1.805E-01	1.427E+03	1.452
α_7	1.38E-35	2.67E-05	2.00E-11	1.31E-04	4.139E-02	1.548E+03	1.338
α_8	1.14E-08	1.86E-04	4.11E-05	8.68E-04	2.827E-01	1.518E+03	1.365

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01
α_2	4.18E-03	3.25E-03	3.86E-03	3.32E-03	2.81E-03	2.14E-03	1.68E-03
α_3		1.55E-03	6.95E-04	1.30E-03	1.40E-03	1.45E-03	1.30E-03
α_4			8.47E-04	2.78E-04	5.24E-04	6.88E-04	7.82E-04
α_5				3.46E-05	1.18E-04	2.47E-04	3.44E-04
α_6					1.80E-04	5.65E-05	1.26E-04
α_7						5.93E-06	2.67E-05
α_8							1.86E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01
Beta	4.18E-03	4.81E-03	5.40E-03	4.93E-03	5.03E-03	4.59E-03	4.45E-03
Gamma		3.23E-01	2.85E-01	3.27E-01	4.42E-01	5.34E-01	6.22E-01
Delta			5.49E-01	1.94E-01	3.70E-01	4.08E-01	5.29E-01
Epsilon				1.11E-01	3.62E-01	3.10E-01	4.66E-01
Mu					6.04E-01	2.02E-01	4.96E-01
Omega						9.50E-02	6.27E-01
Sigma							8.74E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.4 Air-Operated Valves

2.4.1 Pooled Air-Operated Valves

2.4.1.1 ALL-AOV-FTOC: All Systems Air-Operated Valves Fail to Open/Close

Generic CCF Parameters

Component Group: Valve
Component Type: Air Operated Valve
Failure Mode: Fail to Close, Fail to Open, Fail to Open or Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 144.2

Total Number of Common-Cause Failure Events: 7

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9360427	0.9707572	0.9743515	0.9931812	0.9675561	8.304E+01	2.502E+00
α_2	6.82E-03	2.92E-02	2.57E-02	6.40E-02	3.24E-02	2.502E+00	8.304E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9444540	0.9701143	0.9721643	0.9887748	0.9631974	1.469E+02	4.525E+00
α_2	6.86E-03	2.24E-02	2.04E-02	4.51E-02	2.76E-02	3.397E+00	1.480E+02
α_3	5.10E-04	7.45E-03	5.42E-03	2.13E-02	9.22E-03	1.128E+00	1.503E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9516595	0.9722370	0.9736964	0.9878410	0.9666796	2.083E+02	5.949E+00
α_2	4.65E-03	1.55E-02	1.40E-02	3.15E-02	1.70E-02	3.327E+00	2.110E+02
α_3	1.52E-03	8.95E-03	7.48E-03	2.14E-02	1.25E-02	1.918E+00	2.124E+02
α_4	5.84E-05	3.28E-03	1.92E-03	1.11E-02	3.88E-03	7.037E-01	2.136E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9622299	0.9768909	0.9778089	0.9884327	0.9698892	3.373E+02	7.979E+00
α_2	3.47E-03	1.07E-02	9.77E-03	2.11E-02	1.17E-02	3.695E+00	3.416E+02
α_3	1.74E-03	7.40E-03	6.48E-03	1.62E-02	9.98E-03	2.557E+00	3.427E+02
α_4	4.05E-04	3.99E-03	3.08E-03	1.07E-02	6.59E-03	1.378E+00	3.439E+02
α_5	3.99E-07	1.01E-03	3.11E-04	4.41E-03	1.81E-03	3.499E-01	3.449E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9655128	0.9784737	0.9792470	0.9887879	0.9723931	4.005E+02	8.810E+00
α_2	2.41E-03	8.09E-03	7.31E-03	1.65E-02	8.94E-03	3.313E+00	4.059E+02
α_3	1.52E-03	6.36E-03	5.58E-03	1.39E-02	7.75E-03	2.604E+00	4.067E+02

α_4	6.20E-04	4.23E-03	3.45E-03	1.05E-02	6.29E-03	1.730E+00	4.075E+02
α_5	8.29E-05	2.18E-03	1.44E-03	6.79E-03	3.73E-03	8.924E-01	4.084E+02
α_6	2.65E-08	6.62E-04	1.36E-04	3.13E-03	8.95E-04	2.710E-01	4.090E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9710731	0.9811395	0.9816811	0.9893452	0.9745794	5.758E+02	1.107E+01
α_2	2.01E-03	6.25E-03	5.70E-03	1.24E-02	6.80E-03	3.668E+00	5.832E+02
α_3	1.45E-03	5.21E-03	4.66E-03	1.08E-02	6.81E-03	3.055E+00	5.838E+02
α_4	6.75E-04	3.57E-03	3.03E-03	8.34E-03	4.85E-03	2.098E+00	5.848E+02
α_5	2.88E-04	2.51E-03	1.98E-03	6.58E-03	4.35E-03	1.476E+00	5.854E+02
α_6	1.35E-05	1.09E-03	6.02E-04	3.83E-03	2.15E-03	6.408E-01	5.863E+02
α_7	1.45E-13	2.25E-04	5.55E-06	1.27E-03	4.64E-04	1.319E-01	5.868E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9728071	0.9822086	0.9827104	0.9898879	0.9766928	6.229E+02	1.128E+01
α_2	1.38E-03	4.90E-03	4.39E-03	1.02E-02	4.56E-03	3.106E+00	6.311E+02
α_3	1.33E-03	4.81E-03	4.30E-03	1.00E-02	6.95E-03	3.048E+00	6.312E+02
α_4	4.84E-04	2.96E-03	2.45E-03	7.15E-03	3.41E-03	1.875E+00	6.323E+02
α_5	3.52E-04	2.59E-03	2.09E-03	6.54E-03	3.95E-03	1.643E+00	6.326E+02
α_6	9.52E-05	1.65E-03	1.17E-03	4.87E-03	2.93E-03	1.048E+00	6.332E+02
α_7	7.68E-07	6.44E-04	2.39E-04	2.66E-03	1.26E-03	4.084E-01	6.338E+02
α_8	3.65E-12	2.43E-04	1.12E-05	1.33E-03	2.50E-04	1.542E-01	6.341E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.71E-01	9.70E-01	9.72E-01	9.77E-01	9.78E-01	9.81E-01	9.82E-01
α_2	2.92E-02	2.24E-02	1.55E-02	1.07E-02	8.09E-03	6.25E-03	4.90E-03
α_3		7.45E-03	8.95E-03	7.40E-03	6.36E-03	5.21E-03	4.81E-03
α_4			3.28E-03	3.99E-03	4.23E-03	3.57E-03	2.96E-03
α_5				1.01E-03	2.18E-03	2.51E-03	2.59E-03
α_6					6.62E-04	1.09E-03	1.65E-03
α_7						2.25E-04	6.44E-04
α_8							2.43E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.71E-01	9.70E-01	9.72E-01	9.77E-01	9.78E-01	9.81E-01	9.82E-01
Beta	2.92E-02	2.99E-02	2.78E-02	2.31E-02	2.15E-02	1.89E-02	1.78E-02
Gamma		2.49E-01	4.41E-01	5.37E-01	6.24E-01	6.69E-01	7.25E-01
Delta			2.68E-01	4.03E-01	5.26E-01	5.87E-01	6.27E-01
Epsilon				2.03E-01	4.02E-01	5.17E-01	6.34E-01
Mu					2.33E-01	3.44E-01	4.95E-01
Omega						1.71E-01	3.49E-01
Sigma							2.74E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	57.68	86.52	115.36	144.20	173.04	201.88	230.72
N₁	2.9506	2.3803	2.2954	2.2551	2.1924	2.1530	2.1907
N₂	2.0331	2.5456	2.0674	1.7707	1.6116	1.4245	1.0883
N₃		0.8512	1.5159	1.5076	1.3966	1.4257	1.6573
N₄			0.4722	0.9954	1.1343	1.0150	0.8133
N₅				0.2731	0.6713	0.9105	0.9408
N₆					0.1613	0.4492	0.6983
N₇						0.0971	0.3006
N₈							0.0595

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 43.2

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.290

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9642347	0.9902181	0.9950106	0.9999277	5.737E+01	5.667E-01	--
α_2	7.23E-05	9.78E-03	4.99E-03	3.58E-02	5.667E-01	5.737E+01	1.079

CCCG = 3, Gamma = 0.294

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9723375	0.9893854	0.9916239	0.9987785	1.375E+02	1.476E+00	--
α_2	7.23E-04	8.83E-03	6.61E-03	2.45E-02	1.227E+00	1.377E+02	1.138
α_3	2.86E-08	1.79E-03	3.10E-04	8.66E-03	2.487E-01	1.390E+02	1.135

CCCG = 4, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9727439	0.9875433	0.9890889	0.9970587	2.027E+02	2.557E+00	--
α_2	1.57E-03	9.09E-03	7.61E-03	2.17E-02	1.942E+00	2.117E+02	1.030
α_3	2.95E-06	2.35E-03	8.83E-04	9.66E-03	4.114E-01	1.747E+02	1.257
α_4	1.34E-09	1.02E-03	1.11E-04	5.22E-03	2.036E-01	1.999E+02	1.099

CCCG = 5, Gamma = 0.297

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9781620	0.9884396	0.9892935	0.9958003	3.719E+02	4.350E+00	--
α_2	1.85E-03	7.13E-03	6.32E-03	1.52E-02	2.826E+00	3.935E+02	1.007
α_3	1.81E-04	2.96E-03	2.11E-03	8.62E-03	1.075E+00	3.625E+02	1.098
α_4	8.29E-07	1.22E-03	4.11E-04	5.15E-03	3.765E-01	3.094E+02	1.289
α_5	2.24E-21	2.58E-04	1.47E-07	1.49E-03	7.237E-02	2.805E+02	1.423

CCCG = 6, Gamma = 0.298

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787945	0.9883859	0.9891366	0.9954133	4.237E+02	4.979E+00	--
α_2	1.58E-03	6.19E-03	5.47E-03	1.32E-02	2.788E+00	4.478E+02	1.017
α_3	2.73E-04	2.99E-03	2.27E-03	8.17E-03	1.301E+00	4.335E+02	1.054
α_4	1.08E-05	1.48E-03	7.46E-04	5.42E-03	5.672E-01	3.838E+02	1.192
α_5	2.57E-09	6.59E-04	8.80E-05	3.31E-03	2.210E-01	3.350E+02	1.367
α_6	3.83E-16	3.01E-04	2.09E-06	1.74E-03	1.027E-01	3.413E+02	1.342

CCCG = 7, Gamma = 0.299

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9827268	0.9896217	0.9900733	0.9949752	7.100E+02	7.446E+00	--
α_2	1.47E-03	4.67E-03	4.25E-03	9.32E-03	3.563E+00	7.594E+02	0.983
α_3	5.06E-04	2.85E-03	2.39E-03	6.76E-03	1.995E+00	6.980E+02	1.071
α_4	1.06E-04	1.58E-03	1.14E-03	4.53E-03	1.123E+00	7.117E+02	1.052
α_5	5.06E-06	8.72E-04	4.24E-04	3.26E-03	5.399E-01	6.188E+02	1.211
α_6	3.15E-10	3.58E-04	3.61E-05	1.85E-03	1.979E-01	5.525E+02	1.357
α_7	1.17E-52	5.22E-05	5.24E-15	1.79E-04	2.656E-02	5.084E+02	1.475

CCCG = 8, Gamma = 0.299

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9833425	0.9900371	0.9904798	0.9952203	7.249E+02	7.295E+00	--
α_2	1.07E-03	3.79E-03	3.40E-03	7.84E-03	3.136E+00	8.245E+02	0.916
α_3	4.51E-04	2.83E-03	2.34E-03	6.88E-03	1.840E+00	6.488E+02	1.166
α_4	1.01E-04	1.48E-03	1.07E-03	4.23E-03	1.130E+00	7.644E+02	0.991
α_5	1.61E-05	1.02E-03	5.83E-04	3.49E-03	6.830E-01	6.715E+02	1.128
α_6	6.97E-08	5.13E-04	1.31E-04	2.33E-03	3.080E-01	5.999E+02	1.264
α_7	1.43E-15	2.04E-04	2.01E-06	1.18E-03	1.093E-01	5.361E+02	1.415
α_8	2.11E-18	1.37E-04	3.80E-07	7.98E-04	8.885E-02	6.492E+02	1.168

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.89E-01	9.88E-01	9.88E-01	9.88E-01	9.90E-01	9.90E-01
α_2	9.78E-03	8.83E-03	9.09E-03	7.13E-03	6.19E-03	4.67E-03	3.79E-03
α_3		1.79E-03	2.35E-03	2.96E-03	2.99E-03	2.85E-03	2.83E-03
α_4			1.02E-03	1.22E-03	1.48E-03	1.58E-03	1.48E-03
α_5				2.58E-04	6.59E-04	8.72E-04	1.02E-03
α_6					3.01E-04	3.58E-04	5.13E-04
α_7						5.22E-05	2.04E-04
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.89E-01	9.88E-01	9.88E-01	9.88E-01	9.90E-01	9.90E-01
Beta	9.78E-03	1.06E-02	1.25E-02	1.16E-02	1.16E-02	1.04E-02	9.96E-03
Gamma		1.68E-01	2.70E-01	3.83E-01	4.67E-01	5.50E-01	6.20E-01
Delta			3.02E-01	3.33E-01	4.49E-01	5.01E-01	5.42E-01
Epsilon				1.75E-01	3.94E-01	4.49E-01	5.59E-01
Mu					3.13E-01	3.20E-01	4.57E-01
Omega						1.27E-01	3.99E-01
Sigma							4.02E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	17.28	25.92	34.56	43.20	51.84	60.48	69.12
N_1	0.8333	1.0000	1.0000	1.0417	1.0417	1.0127	0.9645
N_2	0.0833	0.2500	0.5000	0.5833	0.6597	0.7234	0.7716
N_3		0.0000	0.0000	0.0833	0.1667	0.2488	0.3279

N₄			0.0000	0.0000	0.0139	0.0394	0.0743
N₅				0.0000	0.0000	0.0023	0.0085
N₆					0.0000	0.0000	0.0004
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 29.1

Total Number of Common-Cause Failure Events: 3

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.223

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8674022	0.9503905	0.9614829	0.9953537	2.473E+01	1.291E+00	--
α_2	4.65E-03	4.96E-02	3.85E-02	1.33E-01	1.291E+00	2.473E+01	1.079

CCCG = 3, Gamma = 0.217

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8736883	0.9381258	0.9440181	0.9823890	4.601E+01	3.034E+00	--
α_2	1.17E-02	5.02E-02	4.42E-02	1.09E-01	2.461E+00	4.656E+01	1.138
α_3	9.09E-05	1.17E-02	6.01E-03	4.24E-02	5.729E-01	4.855E+01	1.135

CCCG = 4, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8927945	0.9437906	0.9479714	0.9804848	6.622E+01	3.944E+00	--
α_2	5.67E-03	2.85E-02	2.45E-02	6.51E-02	2.164E+00	7.378E+01	1.030
α_3	2.10E-03	2.15E-02	1.66E-02	5.76E-02	1.337E+00	6.089E+01	1.257
α_4	1.25E-05	6.23E-03	2.55E-03	2.49E-02	4.429E-01	7.069E+01	1.099

CCCG = 5, Gamma = 0.212

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9224467	0.9557579	0.9581187	0.9810017	1.222E+02	5.656E+00	--
α_2	4.14E-03	1.79E-02	1.56E-02	3.93E-02	2.503E+00	1.376E+02	1.007
α_3	2.63E-03	1.52E-02	1.27E-02	3.60E-02	1.948E+00	1.265E+02	1.098
α_4	4.46E-04	8.98E-03	6.22E-03	2.70E-02	9.836E-01	1.085E+02	1.289
α_5	8.51E-09	2.23E-03	2.97E-04	1.12E-02	2.206E-01	9.894E+01	1.423

CCCG = 6, Gamma = 0.210

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9303074	0.9591218	0.9610593	0.9813168	1.506E+02	6.418E+00	--
α_2	2.76E-03	1.33E-02	1.14E-02	3.01E-02	2.272E+00	1.691E+02	1.017
α_3	2.05E-03	1.18E-02	9.91E-03	2.81E-02	1.954E+00	1.634E+02	1.054
α_4	9.35E-04	9.33E-03	7.21E-03	2.50E-02	1.363E+00	1.448E+02	1.192
α_5	6.86E-05	5.12E-03	2.87E-03	1.78E-02	6.526E-01	1.268E+02	1.367
α_6	1.94E-10	1.35E-03	9.69E-05	7.20E-03	1.756E-01	1.296E+02	1.342

CCCG = 7, Gamma = 0.210

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9431168	0.9646292	0.9659119	0.9817611	2.318E+02	8.499E+00	--
α_2	2.97E-03	1.11E-02	9.88E-03	2.34E-02	2.919E+00	2.603E+02	0.983
α_3	1.55E-03	8.44E-03	7.13E-03	1.98E-02	2.039E+00	2.395E+02	1.071
α_4	1.10E-03	7.23E-03	5.94E-03	1.77E-02	1.778E+00	2.442E+02	1.052
α_5	4.37E-04	5.61E-03	4.16E-03	1.57E-02	1.199E+00	2.125E+02	1.211
α_6	7.03E-06	2.47E-03	1.07E-03	9.68E-03	4.710E-01	1.902E+02	1.357
α_7	3.77E-17	5.31E-04	2.03E-06	3.10E-03	9.318E-02	1.753E+02	1.475

CCCG = 8, Gamma = 0.209

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9460353	0.9663947	0.9676065	0.9826163	2.467E+02	8.580E+00	--
α_2	2.37E-03	9.31E-03	8.24E-03	1.99E-02	2.767E+00	2.943E+02	0.916
α_3	9.71E-04	7.07E-03	5.73E-03	1.78E-02	1.652E+00	2.319E+02	1.166
α_4	6.79E-04	5.57E-03	4.43E-03	1.44E-02	1.532E+00	2.732E+02	0.991
α_5	5.53E-04	5.61E-03	4.32E-03	1.51E-02	1.353E+00	2.399E+02	1.128
α_6	1.37E-04	4.00E-03	2.60E-03	1.26E-02	8.610E-01	2.146E+02	1.264
α_7	9.39E-08	1.47E-03	3.29E-04	6.87E-03	2.839E-01	1.922E+02	1.415
α_8	3.35E-13	5.64E-04	1.37E-05	3.18E-03	1.314E-01	2.329E+02	1.168

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.50E-01	9.38E-01	9.44E-01	9.56E-01	9.59E-01	9.65E-01	9.66E-01
α_2	4.96E-02	5.02E-02	2.85E-02	1.79E-02	1.33E-02	1.11E-02	9.31E-03
α_3		1.17E-02	2.15E-02	1.52E-02	1.18E-02	8.44E-03	7.07E-03
α_4			6.23E-03	8.98E-03	9.33E-03	7.23E-03	5.57E-03
α_5				2.23E-03	5.12E-03	5.61E-03	5.61E-03
α_6					1.35E-03	2.47E-03	4.00E-03
α_7						5.31E-04	1.47E-03
α_8							5.64E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.50E-01	9.38E-01	9.44E-01	9.56E-01	9.59E-01	9.65E-01	9.66E-01
Beta	4.96E-02	6.19E-02	5.62E-02	4.42E-02	4.09E-02	3.54E-02	3.36E-02
Gamma		1.88E-01	4.93E-01	5.96E-01	6.76E-01	6.87E-01	7.23E-01
Delta			2.25E-01	4.25E-01	5.72E-01	6.52E-01	7.09E-01
Epsilon				1.98E-01	4.10E-01	5.44E-01	6.76E-01
Mu					2.09E-01	3.48E-01	5.18E-01
Omega						1.77E-01	3.38E-01
Sigma							2.77E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	11.64	17.46	23.28	29.10	34.92	40.74	46.56
N_1	1.4848	0.7045	0.6869	0.7281	0.7912	0.8557	0.9118
N_2	0.8409	1.5227	0.8788	0.5109	0.3312	0.2648	0.2626
N_3		0.3333	0.9444	0.8704	0.6219	0.3940	0.2331

N₄			0.2222	0.6204	0.7454	0.6631	0.5045
N₅				0.1481	0.4213	0.5957	0.6198
N₆					0.0988	0.2930	0.4635
N₇						0.0658	0.2068
N₈							0.0439

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 9.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.057

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8112267	0.9545474	0.9832458	0.9999639	7.982E+00	3.801E-01	--
α_2	3.61E-05	4.55E-02	1.68E-02	1.89E-01	3.801E-01	7.982E+00	1.079

CCCG = 3, Gamma = 0.059

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8303753	0.9424351	0.9591626	0.9971770	1.572E+01	9.600E-01	--
α_2	6.12E-04	4.00E-02	2.35E-02	1.36E-01	6.673E-01	1.600E+01	1.138
α_3	1.55E-06	1.75E-02	4.26E-03	8.06E-02	2.927E-01	1.641E+01	1.135

CCCG = 4, Gamma = 0.059

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8510524	0.9390007	0.9494408	0.9911446	2.569E+01	1.669E+00	--
α_2	2.09E-03	3.58E-02	2.58E-02	1.04E-01	1.039E+00	2.800E+01	1.030
α_3	1.43E-05	1.63E-02	5.88E-03	6.82E-02	3.887E-01	2.340E+01	1.257
α_4	1.03E-07	8.88E-03	1.47E-03	4.34E-02	2.414E-01	2.696E+01	1.099

CCCG = 5, Gamma = 0.060

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8894376	0.9438784	0.9485941	0.9821827	5.864E+01	3.487E+00	--
α_2	4.21E-03	2.69E-02	2.23E-02	6.52E-02	1.791E+00	6.484E+01	1.007
α_3	1.58E-03	1.97E-02	1.48E-02	5.48E-02	1.207E+00	5.992E+01	1.098
α_4	1.48E-05	8.33E-03	3.35E-03	3.35E-02	4.340E-01	5.165E+01	1.289
α_5	2.60E-26	1.16E-03	4.16E-08	6.43E-03	5.493E-02	4.712E+01	1.423

CCCG = 6, Gamma = 0.060

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9020541	0.9488731	0.9527549	0.9824148	7.247E+01	3.905E+00	--
α_2	1.58E-03	1.63E-02	1.25E-02	4.38E-02	1.335E+00	8.066E+01	1.017
α_3	2.38E-03	1.93E-02	1.55E-02	4.96E-02	1.531E+00	7.760E+01	1.054
α_4	1.99E-04	1.03E-02	6.14E-03	3.45E-02	7.191E-01	6.922E+01	1.192
α_5	5.94E-08	4.04E-03	6.94E-04	1.97E-02	2.467E-01	6.076E+01	1.367
α_6	1.29E-20	1.17E-03	7.07E-07	6.80E-03	7.279E-02	6.205E+01	1.342

CCCG = 7, Gamma = 0.060

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9192838	0.9537099	0.9561209	0.9798970	1.189E+02	5.770E+00	--
α_2	1.42E-03	1.14E-02	9.09E-03	2.92E-02	1.549E+00	1.345E+02	0.983
α_3	2.84E-03	1.59E-02	1.34E-02	3.76E-02	1.989E+00	1.229E+02	1.071
α_4	9.11E-04	1.01E-02	7.69E-03	2.76E-02	1.287E+00	1.259E+02	1.052
α_5	1.05E-04	6.26E-03	3.64E-03	2.13E-02	6.913E-01	1.098E+02	1.211
α_6	1.75E-08	2.36E-03	3.56E-04	1.17E-02	2.327E-01	9.834E+01	1.357
α_7	1.58E-64	2.33E-04	3.54E-17	5.88E-04	2.112E-02	9.066E+01	1.475

CCCG = 8, Gamma = 0.060

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9284438	0.9571738	0.9590240	0.9795834	1.568E+02	7.016E+00	--
α_2	1.06E-03	8.22E-03	6.59E-03	2.10E-02	1.583E+00	1.909E+02	0.916
α_3	2.33E-03	1.31E-02	1.10E-02	3.10E-02	1.986E+00	1.493E+02	1.166
α_4	1.31E-03	9.39E-03	7.63E-03	2.35E-02	1.672E+00	1.764E+02	0.991
α_5	3.43E-04	6.47E-03	4.52E-03	1.92E-02	1.011E+00	1.553E+02	1.128
α_6	3.10E-05	4.09E-03	2.08E-03	1.50E-02	5.709E-01	1.390E+02	1.264
α_7	3.33E-10	1.45E-03	1.14E-04	7.67E-03	1.809E-01	1.245E+02	1.415
α_8	1.19E-107	8.24E-05	2.49E-27	6.18E-05	1.245E-02	1.510E+02	1.168

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.55E-01	9.42E-01	9.39E-01	9.44E-01	9.49E-01	9.54E-01	9.57E-01
α_2	4.55E-02	4.00E-02	3.58E-02	2.69E-02	1.63E-02	1.14E-02	8.22E-03
α_3		1.75E-02	1.63E-02	1.97E-02	1.93E-02	1.59E-02	1.31E-02
α_4			8.88E-03	8.33E-03	1.03E-02	1.01E-02	9.39E-03
α_5				1.16E-03	4.04E-03	6.26E-03	6.47E-03
α_6					1.17E-03	2.36E-03	4.09E-03
α_7						2.33E-04	1.45E-03
α_8							8.24E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.55E-01	9.42E-01	9.39E-01	9.44E-01	9.49E-01	9.54E-01	9.57E-01
Beta	4.55E-02	5.76E-02	6.10E-02	5.61E-02	5.11E-02	4.63E-02	4.28E-02
Gamma		3.04E-01	4.13E-01	5.21E-01	6.82E-01	7.54E-01	8.08E-01
Delta			3.52E-01	3.25E-01	4.45E-01	5.44E-01	6.21E-01
Epsilon				1.23E-01	3.37E-01	4.67E-01	5.63E-01
Mu					2.25E-01	2.93E-01	4.65E-01
Omega						8.98E-02	2.73E-01
Sigma							5.38E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.60	5.40	7.20	9.00	10.80	12.60	14.40
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 46.2

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.321

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9041654	0.9618974	0.9690848	0.9950085	3.983E+01	1.578E+00	--
α_2	4.99E-03	3.81E-02	3.09E-02	9.58E-02	1.578E+00	3.983E+01	1.079

CCCG = 3, Gamma = 0.320

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9345003	0.9704586	0.9742531	0.9934331	7.845E+01	2.388E+00	--
α_2	2.52E-03	1.95E-02	1.57E-02	4.96E-02	1.578E+00	7.921E+01	1.138
α_3	2.88E-04	1.00E-02	6.36E-03	3.21E-02	8.100E-01	8.015E+01	1.135

CCCG = 4, Gamma = 0.320

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9503060	0.9751379	0.9773846	0.9922892	1.354E+02	3.453E+00	--
α_2	2.38E-03	1.34E-02	1.13E-02	3.15E-02	1.991E+00	1.470E+02	1.030
α_3	4.27E-04	8.21E-03	5.72E-03	2.45E-02	1.002E+00	1.211E+02	1.257
α_4	8.21E-06	3.30E-03	1.39E-03	1.30E-02	4.599E-01	1.391E+02	1.099

CCCG = 5, Gamma = 0.319

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9625314	0.9795839	0.9809232	0.9920613	2.313E+02	4.821E+00	--
α_2	1.96E-03	9.10E-03	7.87E-03	2.05E-02	2.345E+00	2.553E+02	1.007
α_3	7.43E-04	6.33E-03	5.00E-03	1.65E-02	1.496E+00	2.348E+02	1.098
α_4	8.61E-05	3.76E-03	2.29E-03	1.24E-02	7.566E-01	2.006E+02	1.289
α_5	5.56E-09	1.23E-03	1.69E-04	6.13E-03	2.237E-01	1.822E+02	1.423

CCCG = 6, Gamma = 0.319

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9671822	0.9813794	0.9824154	0.9920383	3.012E+02	5.715E+00	--
α_2	1.48E-03	6.97E-03	6.01E-03	1.58E-02	2.312E+00	3.295E+02	1.017
α_3	7.76E-04	5.36E-03	4.37E-03	1.33E-02	1.715E+00	3.185E+02	1.054
α_4	1.99E-04	3.63E-03	2.54E-03	1.07E-02	1.026E+00	2.820E+02	1.192
α_5	8.36E-06	2.04E-03	9.36E-04	7.81E-03	5.036E-01	2.463E+02	1.367
α_6	1.51E-11	6.29E-04	3.18E-05	3.43E-03	1.582E-01	2.512E+02	1.342

CCCG = 7, Gamma = 0.319

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9729208	0.9838249	0.9845447	0.9922715	4.376E+02	7.195E+00	--
α_2	1.20E-03	5.18E-03	4.51E-03	1.14E-02	2.511E+00	4.826E+02	0.983
α_3	8.94E-04	4.72E-03	4.00E-03	1.10E-02	2.101E+00	4.430E+02	1.071
α_4	2.67E-04	2.89E-03	2.20E-03	7.87E-03	1.309E+00	4.519E+02	1.052
α_5	6.72E-05	2.13E-03	1.37E-03	6.78E-03	8.374E-01	3.929E+02	1.211
α_6	4.12E-07	1.00E-03	3.10E-04	4.35E-03	3.519E-01	3.510E+02	1.357
α_7	6.46E-19	2.60E-04	4.93E-07	1.52E-03	8.416E-02	3.232E+02	1.475

CCCG = 8, Gamma = 0.318

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9751741	0.9849028	0.9855217	0.9925185	5.109E+02	7.832E+00	--
α_2	7.54E-04	3.69E-03	3.16E-03	8.43E-03	2.245E+00	6.063E+02	0.916
α_3	1.06E-03	4.92E-03	4.25E-03	1.11E-02	2.354E+00	4.760E+02	1.166
α_4	2.00E-04	2.27E-03	1.71E-03	6.23E-03	1.276E+00	5.616E+02	0.991
α_5	1.33E-04	2.18E-03	1.55E-03	6.35E-03	1.075E+00	4.931E+02	1.128
α_6	8.91E-06	1.27E-03	6.38E-04	4.69E-03	5.615E-01	4.407E+02	1.264
α_7	3.35E-09	5.79E-04	8.32E-05	2.88E-03	2.282E-01	3.940E+02	1.415
α_8	1.07E-17	1.94E-04	7.02E-07	1.13E-03	9.245E-02	4.773E+02	1.168

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.62E-01	9.70E-01	9.75E-01	9.80E-01	9.81E-01	9.84E-01	9.85E-01
α_2	3.81E-02	1.95E-02	1.34E-02	9.10E-03	6.97E-03	5.18E-03	3.69E-03
α_3		1.00E-02	8.21E-03	6.33E-03	5.36E-03	4.72E-03	4.92E-03
α_4			3.30E-03	3.76E-03	3.63E-03	2.89E-03	2.27E-03
α_5				1.23E-03	2.04E-03	2.13E-03	2.18E-03
α_6					6.29E-04	1.00E-03	1.27E-03
α_7						2.60E-04	5.79E-04
α_8							1.94E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.62E-01	9.70E-01	9.75E-01	9.80E-01	9.81E-01	9.84E-01	9.85E-01
Beta	3.81E-02	2.95E-02	2.49E-02	2.04E-02	1.86E-02	1.62E-02	1.51E-02
Gamma		3.39E-01	4.63E-01	5.54E-01	6.26E-01	6.80E-01	7.56E-01
Delta			2.86E-01	4.40E-01	5.40E-01	5.71E-01	5.69E-01
Epsilon				2.46E-01	4.24E-01	5.40E-01	6.50E-01
Mu					2.36E-01	3.72E-01	4.85E-01
Omega						2.06E-01	3.78E-01
Sigma							2.51E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	18.48	27.72	36.96	46.20	55.44	64.68	73.92
N_1	0.5357	0.5357	0.4286	0.2679	0.1071	0.0000	0.0000
N_2	1.1071	0.7679	0.6786	0.6607	0.5982	0.4063	0.0156
N_3		0.5179	0.5714	0.5536	0.6071	0.7813	1.0938

N₄			0.2500	0.3750	0.3750	0.3125	0.2344
N₅				0.1250	0.2500	0.3125	0.3125
N₆					0.0625	0.1563	0.2344
N₇						0.0313	0.0938
N₈							0.0156

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 16.7

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.108

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9822502	0.9953873	0.9979084	0.9999827	1.068E+02	4.949E-01	--
α_2	1.73E-05	4.61E-03	2.09E-03	1.77E-02	4.949E-01	1.068E+02	1.079

CCCG = 3, Gamma = 0.110

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9862929	0.9953116	0.9966619	0.9997191	2.260E+02	1.065E+00	--
α_2	6.08E-05	3.17E-03	1.88E-03	1.07E-02	7.187E-01	2.262E+02	1.138
α_3	5.47E-07	1.52E-03	4.60E-04	6.64E-03	3.458E-01	2.270E+02	1.135

CCCG = 4, Gamma = 0.111

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9894254	0.9954474	0.9961328	0.9991265	4.646E+02	2.125E+00	--
α_2	4.03E-04	3.22E-03	2.57E-03	8.27E-03	1.559E+00	4.824E+02	1.030
α_3	2.08E-08	6.67E-04	1.31E-04	3.18E-03	2.646E-01	3.963E+02	1.257
α_4	7.34E-08	6.64E-04	1.63E-04	3.03E-03	3.010E-01	4.530E+02	1.099

CCCG = 5, Gamma = 0.112

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9929019	0.9960549	0.9962964	0.9983832	1.348E+03	5.341E+00	--
α_2	8.28E-04	2.59E-03	2.36E-03	5.14E-03	3.648E+00	1.406E+03	1.007
α_3	1.03E-04	1.05E-03	8.04E-04	2.82E-03	1.354E+00	1.292E+03	1.098
α_4	2.55E-08	2.69E-04	6.41E-05	1.23E-03	2.961E-01	1.102E+03	1.289
α_5	1.27E-34	4.25E-05	4.68E-11	2.11E-04	4.243E-02	9.982E+02	1.423

CCCG = 6, Gamma = 0.113

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9925131	0.9959134	0.9961825	0.9983949	1.209E+03	4.959E+00	--
α_2	6.21E-04	2.32E-03	2.06E-03	4.89E-03	2.937E+00	1.264E+03	1.017
α_3	8.79E-05	1.03E-03	7.73E-04	2.84E-03	1.258E+00	1.221E+03	1.054
α_4	1.89E-06	4.66E-04	2.13E-04	1.78E-03	5.031E-01	1.080E+03	1.192
α_5	3.55E-15	1.23E-04	1.62E-06	7.03E-04	1.155E-01	9.425E+02	1.367
α_6	7.07E-13	1.51E-04	5.54E-06	8.37E-04	1.451E-01	9.598E+02	1.342

CCCG = 7, Gamma = 0.113

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9942536	0.9963608	0.9964844	0.9980463	2.652E+03	9.686E+00	--
α_2	6.77E-04	1.74E-03	1.62E-03	3.21E-03	4.881E+00	2.798E+03	0.983
α_3	2.79E-04	1.09E-03	9.63E-04	2.33E-03	2.802E+00	2.569E+03	1.071
α_4	5.40E-05	5.28E-04	4.08E-04	1.41E-03	1.384E+00	2.617E+03	1.052
α_5	7.63E-07	2.15E-04	9.63E-05	8.33E-04	4.902E-01	2.275E+03	1.211
α_6	1.34E-15	5.64E-05	7.15E-07	3.24E-04	1.146E-01	2.030E+03	1.357
α_7	4.12E-93	7.84E-06	8.34E-25	9.31E-06	1.464E-02	1.868E+03	1.475

CCCG = 8, Gamma = 0.114

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940394	0.9964525	0.9966144	0.9983127	2.019E+03	7.189E+00	--
α_2	3.62E-04	1.32E-03	1.18E-03	2.76E-03	3.019E+00	2.283E+03	0.916
α_3	1.90E-04	1.09E-03	9.13E-04	2.60E-03	1.963E+00	1.795E+03	1.166
α_4	4.03E-05	5.51E-04	4.04E-04	1.56E-03	1.166E+00	2.114E+03	0.991
α_5	1.64E-06	2.89E-04	1.40E-04	1.08E-03	5.375E-01	1.856E+03	1.128
α_6	2.41E-11	1.09E-04	8.45E-06	5.76E-04	1.805E-01	1.658E+03	1.264
α_7	1.45E-35	2.79E-05	2.09E-11	1.37E-04	4.139E-02	1.481E+03	1.415
α_8	9.61E-09	1.58E-04	3.48E-05	7.35E-04	2.827E-01	1.793E+03	1.168

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	4.61E-03	3.17E-03	3.22E-03	2.59E-03	2.32E-03	1.74E-03	1.32E-03
α_3		1.52E-03	6.67E-04	1.05E-03	1.03E-03	1.09E-03	1.09E-03
α_4			6.64E-04	2.69E-04	4.66E-04	5.28E-04	5.51E-04
α_5				4.25E-05	1.23E-04	2.15E-04	2.89E-04
α_6					1.51E-04	5.64E-05	1.09E-04
α_7						7.84E-06	2.79E-05
α_8							1.58E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	4.61E-03	4.69E-03	4.55E-03	3.95E-03	4.09E-03	3.64E-03	3.55E-03
Gamma		3.24E-01	2.92E-01	3.44E-01	4.33E-01	5.21E-01	6.28E-01
Delta			4.99E-01	2.29E-01	4.18E-01	4.26E-01	5.10E-01
Epsilon				1.37E-01	3.70E-01	3.46E-01	5.14E-01
Mu					5.52E-01	2.30E-01	5.04E-01
Omega						1.22E-01	6.30E-01
Sigma							8.49E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.68	10.02	13.36	16.70	20.04	23.38	26.72
N_1	0.0967	0.1400	0.1800	0.2175	0.2523	0.2845	0.3143
N_2	0.0017	0.0050	0.0100	0.0157	0.0224	0.0301	0.0385
N_3		0.0000	0.0000	0.0003	0.0008	0.0016	0.0025

N₄			0.0000	0.0000	0.0000	0.0000	0.0001
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.4.1.2 ALL-AOV-CC: All Systems Air-Operated Valves Fail to Open

Generic CCF Parameters

Component Group: Valve
Component Type: Air Operated Valve
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 91.8

Total Number of Common-Cause Failure Events: 4

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9240894	0.9672293	0.9720572	0.9938322	0.9601899	6.078E+01	2.059E+00
α_2	6.17E-03	3.28E-02	2.79E-02	7.59E-02	3.98E-02	2.059E+00	6.078E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9442741	0.9725918	0.9752222	0.9919244	0.9642377	1.148E+02	3.234E+00
α_2	3.48E-03	1.80E-02	1.54E-02	4.16E-02	2.16E-02	2.124E+00	1.159E+02
α_3	6.23E-04	9.41E-03	6.82E-03	2.70E-02	1.42E-02	1.110E+00	1.169E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9512356	0.9739249	0.9757626	0.9903398	0.9672283	1.658E+02	4.439E+00
α_2	3.09E-03	1.40E-02	1.22E-02	3.13E-02	1.45E-02	2.388E+00	1.679E+02
α_3	7.74E-04	7.91E-03	6.09E-03	2.13E-02	1.22E-02	1.347E+00	1.689E+02
α_4	7.36E-05	4.13E-03	2.42E-03	1.40E-02	6.08E-03	7.037E-01	1.695E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9629138	0.9785016	0.9795884	0.9903700	0.9707791	2.844E+02	6.249E+00
α_2	2.64E-03	9.95E-03	8.85E-03	2.10E-02	1.01E-02	2.893E+00	2.878E+02
α_3	1.06E-03	6.46E-03	5.37E-03	1.56E-02	8.60E-03	1.878E+00	2.888E+02
α_4	2.65E-04	3.88E-03	2.82E-03	1.11E-02	7.73E-03	1.128E+00	2.895E+02
α_5	4.75E-07	1.20E-03	3.70E-04	5.23E-03	2.83E-03	3.499E-01	2.903E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9661832	0.9799661	0.9808871	0.9905977	0.9734132	3.372E+02	6.894E+00
α_2	1.85E-03	7.64E-03	6.71E-03	1.66E-02	8.07E-03	2.630E+00	3.415E+02
α_3	8.89E-04	5.44E-03	4.51E-03	1.31E-02	5.77E-03	1.871E+00	3.422E+02
α_4	3.88E-04	3.94E-03	3.03E-03	1.06E-02	6.60E-03	1.355E+00	3.428E+02
α_5	5.35E-05	2.23E-03	1.37E-03	7.34E-03	4.75E-03	7.674E-01	3.433E+02
α_6	3.16E-08	7.88E-04	1.61E-04	3.72E-03	1.40E-03	2.710E-01	3.438E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9717964	0.9823217	0.9829445	0.9907171	0.9753868	5.022E+02	9.038E+00
α_2	1.81E-03	6.26E-03	5.63E-03	1.29E-02	7.16E-03	3.200E+00	5.080E+02
α_3	8.42E-04	4.26E-03	3.63E-03	9.82E-03	4.11E-03	2.179E+00	5.090E+02
α_4	4.91E-04	3.37E-03	2.75E-03	8.37E-03	4.79E-03	1.723E+00	5.095E+02
α_5	1.95E-04	2.40E-03	1.79E-03	6.68E-03	4.94E-03	1.226E+00	5.100E+02
α_6	9.06E-06	1.13E-03	5.80E-04	4.12E-03	2.89E-03	5.783E-01	5.106E+02
α_7	1.66E-13	2.58E-04	6.37E-06	1.45E-03	7.26E-04	1.319E-01	5.111E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9732039	0.9831348	0.9837165	0.9910708	0.9769041	5.388E+02	9.242E+00
α_2	1.53E-03	5.54E-03	4.95E-03	1.16E-02	6.69E-03	3.037E+00	5.450E+02
α_3	5.70E-04	3.45E-03	2.86E-03	8.31E-03	3.27E-03	1.889E+00	5.461E+02
α_4	3.58E-04	2.85E-03	2.27E-03	7.32E-03	3.29E-03	1.563E+00	5.465E+02
α_5	2.31E-04	2.43E-03	1.86E-03	6.58E-03	4.13E-03	1.331E+00	5.467E+02
α_6	6.17E-05	1.63E-03	1.08E-03	5.07E-03	3.56E-03	8.918E-01	5.471E+02
α_7	4.75E-07	6.88E-04	2.33E-04	2.92E-03	1.77E-03	3.772E-01	5.476E+02
α_8	4.22E-12	2.81E-04	1.30E-05	1.54E-03	3.91E-04	1.542E-01	5.479E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.67E-01	9.73E-01	9.74E-01	9.79E-01	9.80E-01	9.82E-01	9.83E-01
α_2	3.28E-02	1.80E-02	1.40E-02	9.95E-03	7.64E-03	6.26E-03	5.54E-03
α_3		9.41E-03	7.91E-03	6.46E-03	5.44E-03	4.26E-03	3.45E-03
α_4			4.13E-03	3.88E-03	3.94E-03	3.37E-03	2.85E-03
α_5				1.20E-03	2.23E-03	2.40E-03	2.43E-03
α_6					7.88E-04	1.13E-03	1.63E-03
α_7						2.58E-04	6.88E-04
α_8							2.81E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.67E-01	9.73E-01	9.74E-01	9.79E-01	9.80E-01	9.82E-01	9.83E-01
Beta	3.28E-02	2.74E-02	2.61E-02	2.15E-02	2.00E-02	1.77E-02	1.69E-02
Gamma		3.43E-01	4.62E-01	5.37E-01	6.19E-01	6.46E-01	6.71E-01
Delta			3.43E-01	4.40E-01	5.61E-01	6.27E-01	6.96E-01
Epsilon				2.37E-01	4.34E-01	5.29E-01	6.38E-01
Mu					2.61E-01	3.67E-01	5.17E-01
Omega						1.86E-01	3.73E-01
Sigma							2.90E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8

Adj. Ind	36.72	55.08	73.44	91.80	110.16	128.52	146.88
N₁	1.6515	1.7045	1.6869	1.7698	1.8329	1.8684	1.8763
N₂	1.5909	1.2727	1.1288	0.9693	0.9285	0.9569	1.0186
N₃		0.8333	0.9444	0.8287	0.6636	0.5491	0.4985
N₄			0.4722	0.7454	0.7593	0.6399	0.5007
N₅				0.2731	0.5463	0.6605	0.6283
N₆					0.1613	0.3867	0.5420
N₇						0.0971	0.2693
N₈							0.0595

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 31.6

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.339

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9576833	0.9884162	0.9940794	0.9999141	4.836E+01	5.667E-01	--
α_2	8.59E-05	1.16E-02	5.92E-03	4.23E-02	5.667E-01	4.836E+01	1.183

CCCG = 3, Gamma = 0.343

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9712184	0.9889537	0.9912815	0.9987284	1.321E+02	1.476E+00	--
α_2	7.28E-04	8.89E-03	6.66E-03	2.47E-02	1.227E+00	1.367E+02	1.096
α_3	3.45E-08	2.15E-03	3.74E-04	1.04E-02	2.487E-01	1.153E+02	1.308

CCCG = 4, Gamma = 0.345

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9716536	0.9870423	0.9886486	0.9969395	1.948E+02	2.557E+00	--
α_2	1.58E-03	9.16E-03	7.67E-03	2.18E-02	1.942E+00	2.100E+02	0.994
α_3	3.21E-06	2.56E-03	9.61E-04	1.05E-02	4.114E-01	1.605E+02	1.310
α_4	1.63E-09	1.24E-03	1.35E-04	6.35E-03	2.036E-01	1.643E+02	1.281

CCCG = 5, Gamma = 0.346

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9780178	0.9883630	0.9892224	0.9957723	3.694E+02	4.350E+00	--
α_2	1.84E-03	7.08E-03	6.27E-03	1.51E-02	2.826E+00	3.964E+02	0.971
α_3	1.78E-04	2.91E-03	2.08E-03	8.50E-03	1.075E+00	3.677E+02	1.051
α_4	9.06E-07	1.33E-03	4.49E-04	5.63E-03	3.765E-01	2.830E+02	1.368
α_5	2.73E-21	3.15E-04	1.80E-07	1.82E-03	7.237E-02	2.297E+02	1.687

CCCG = 6, Gamma = 0.346

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9786262	0.9882934	0.9890500	0.9953766	4.204E+02	4.979E+00	--
α_2	1.59E-03	6.22E-03	5.50E-03	1.33E-02	2.788E+00	4.453E+02	0.991
α_3	2.58E-04	2.83E-03	2.15E-03	7.71E-03	1.301E+00	4.590E+02	0.965
α_4	1.13E-05	1.55E-03	7.82E-04	5.67E-03	5.672E-01	3.663E+02	1.211
α_5	2.92E-09	7.51E-04	1.00E-04	3.77E-03	2.210E-01	2.940E+02	1.510
α_6	4.62E-16	3.62E-04	2.52E-06	2.10E-03	1.027E-01	2.834E+02	1.567

CCCG = 7, Gamma = 0.346

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9826575	0.9895799	0.9900332	0.9949548	7.071E+02	7.446E+00	--
α_2	1.54E-03	4.89E-03	4.44E-03	9.76E-03	3.563E+00	7.253E+02	1.007
α_3	4.55E-04	2.56E-03	2.15E-03	6.08E-03	1.995E+00	7.761E+02	0.943
α_4	1.07E-04	1.59E-03	1.15E-03	4.57E-03	1.123E+00	7.056E+02	1.038
α_5	5.31E-06	9.15E-04	4.45E-04	3.42E-03	5.399E-01	5.897E+02	1.243
α_6	3.51E-10	4.00E-04	4.03E-05	2.06E-03	1.979E-01	4.951E+02	1.482
α_7	1.42E-52	6.33E-05	6.34E-15	2.16E-04	2.656E-02	4.198E+02	1.748

CCCG = 8, Gamma = 0.346

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9830088	0.9898370	0.9902884	0.9951240	7.105E+02	7.295E+00	--
α_2	1.23E-03	4.32E-03	3.87E-03	8.94E-03	3.136E+00	7.227E+02	1.019
α_3	3.74E-04	2.34E-03	1.93E-03	5.70E-03	1.840E+00	7.842E+02	0.941
α_4	1.02E-04	1.49E-03	1.08E-03	4.27E-03	1.130E+00	7.578E+02	0.975
α_5	1.67E-05	1.05E-03	6.02E-04	3.60E-03	6.830E-01	6.502E+02	1.137
α_6	7.61E-08	5.60E-04	1.43E-04	2.54E-03	3.080E-01	5.495E+02	1.346
α_7	1.63E-15	2.33E-04	2.30E-06	1.34E-03	1.093E-01	4.697E+02	1.575
α_8	2.63E-18	1.70E-04	4.73E-07	9.94E-04	8.885E-02	5.211E+02	1.420

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.89E-01	9.87E-01	9.88E-01	9.88E-01	9.90E-01	9.90E-01
α_2	1.16E-02	8.89E-03	9.16E-03	7.08E-03	6.22E-03	4.89E-03	4.32E-03
α_3		2.15E-03	2.56E-03	2.91E-03	2.83E-03	2.56E-03	2.34E-03
α_4			1.24E-03	1.33E-03	1.55E-03	1.59E-03	1.49E-03
α_5				3.15E-04	7.51E-04	9.15E-04	1.05E-03
α_6					3.62E-04	4.00E-04	5.60E-04
α_7						6.33E-05	2.33E-04
α_8							1.70E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.89E-01	9.87E-01	9.88E-01	9.88E-01	9.90E-01	9.90E-01
Beta	1.16E-02	1.10E-02	1.30E-02	1.16E-02	1.17E-02	1.04E-02	1.02E-02
Gamma		1.95E-01	2.93E-01	3.92E-01	4.69E-01	5.31E-01	5.75E-01
Delta			3.26E-01	3.61E-01	4.85E-01	5.36E-01	5.99E-01
Epsilon				1.92E-01	4.19E-01	4.64E-01	5.75E-01
Mu					3.25E-01	3.36E-01	4.79E-01
Omega						1.37E-01	4.18E-01
Sigma							4.23E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	12.64	18.96	25.28	31.60	37.92	44.24	50.56
N_1	0.8333	1.0000	1.0000	1.0417	1.0417	1.0127	0.9645
N_2	0.0833	0.2500	0.5000	0.5833	0.6597	0.7234	0.7716
N_3		0.0000	0.0000	0.0833	0.1667	0.2488	0.3279

N₄			0.0000	0.0000	0.0139	0.0394	0.0743
N₅				0.0000	0.0000	0.0023	0.0085
N₆					0.0000	0.0000	0.0004
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 13.1

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.164

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8381650	0.9452195	0.9612539	0.9973403	1.652E+01	9.574E-01	--
α_2	2.66E-03	5.48E-02	3.87E-02	1.62E-01	9.574E-01	1.652E+01	1.183

CCCG = 3, Gamma = 0.160

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8800637	0.9479600	0.9554417	0.9902206	3.706E+01	2.034E+00	--
α_2	4.09E-03	3.54E-02	2.82E-02	9.16E-02	1.461E+00	3.977E+01	1.096
α_3	1.30E-04	1.66E-02	8.60E-03	6.02E-02	5.729E-01	3.395E+01	1.308

CCCG = 4, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8934744	0.9484745	0.9536393	0.9857960	5.419E+01	2.944E+00	--
α_2	3.61E-03	2.57E-02	2.10E-02	6.39E-02	1.664E+00	6.310E+01	0.994
α_3	5.46E-04	1.70E-02	1.11E-02	5.39E-02	8.371E-01	4.833E+01	1.310
α_4	1.77E-05	8.81E-03	3.62E-03	3.52E-02	4.429E-01	4.983E+01	1.281

CCCG = 5, Gamma = 0.155

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9246474	0.9590177	0.9616877	0.9842612	1.089E+02	4.656E+00	--
α_2	3.65E-03	1.76E-02	1.52E-02	4.00E-02	2.253E+00	1.256E+02	0.971
α_3	1.37E-03	1.23E-02	9.64E-03	3.21E-02	1.448E+00	1.166E+02	1.051
α_4	1.68E-04	8.09E-03	4.87E-03	2.70E-02	7.336E-01	8.998E+01	1.368
α_5	1.15E-08	3.00E-03	4.01E-04	1.51E-02	2.206E-01	7.332E+01	1.687

CCCG = 6, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9318054	0.9615562	0.9637228	0.9839034	1.355E+02	5.418E+00	--
α_2	2.70E-03	1.38E-02	1.18E-02	3.19E-02	2.147E+00	1.532E+02	0.991
α_3	1.27E-03	9.89E-03	7.93E-03	2.52E-02	1.579E+00	1.580E+02	0.965
α_4	3.90E-04	7.77E-03	5.39E-03	2.33E-02	9.885E-01	1.262E+02	1.211
α_5	2.70E-05	5.17E-03	2.48E-03	1.94E-02	5.276E-01	1.015E+02	1.510
α_6	2.56E-10	1.79E-03	1.28E-04	9.52E-03	1.756E-01	9.811E+01	1.567

CCCG = 7, Gamma = 0.153

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9441071	0.9661518	0.9675464	0.9834334	2.141E+02	7.499E+00	--
α_2	3.21E-03	1.22E-02	1.09E-02	2.59E-02	2.856E+00	2.309E+02	1.007
α_3	1.10E-03	7.17E-03	5.90E-03	1.76E-02	1.789E+00	2.478E+02	0.943
α_4	6.51E-04	6.19E-03	4.81E-03	1.64E-02	1.403E+00	2.253E+02	1.038
α_5	2.26E-04	5.01E-03	3.41E-03	1.53E-02	9.491E-01	1.884E+02	1.243
α_6	3.08E-06	2.57E-03	9.59E-04	1.06E-02	4.085E-01	1.585E+02	1.482
α_7	4.92E-17	6.92E-04	2.65E-06	4.04E-03	9.318E-02	1.346E+02	1.748

CCCG = 8, Gamma = 0.152

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9456529	0.9670207	0.9683676	0.9837888	2.223E+02	7.580E+00	--
α_2	2.86E-03	1.14E-02	1.00E-02	2.44E-02	2.735E+00	2.382E+02	1.019
α_3	6.72E-04	5.73E-03	4.53E-03	1.49E-02	1.496E+00	2.595E+02	0.941
α_4	3.90E-04	4.84E-03	3.61E-03	1.35E-02	1.219E+00	2.507E+02	0.975
α_5	2.74E-04	4.82E-03	3.40E-03	1.42E-02	1.041E+00	2.151E+02	1.137
α_6	6.91E-05	3.86E-03	2.26E-03	1.31E-02	7.048E-01	1.818E+02	1.346
α_7	3.08E-08	1.62E-03	2.90E-04	7.82E-03	2.526E-01	1.557E+02	1.575
α_8	4.51E-13	7.59E-04	1.85E-05	4.28E-03	1.314E-01	1.729E+02	1.420

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.45E-01	9.48E-01	9.48E-01	9.59E-01	9.62E-01	9.66E-01	9.67E-01
α_2	5.48E-02	3.54E-02	2.57E-02	1.76E-02	1.38E-02	1.22E-02	1.14E-02
α_3		1.66E-02	1.70E-02	1.23E-02	9.89E-03	7.17E-03	5.73E-03
α_4			8.81E-03	8.09E-03	7.77E-03	6.19E-03	4.84E-03
α_5				3.00E-03	5.17E-03	5.01E-03	4.82E-03
α_6					1.79E-03	2.57E-03	3.86E-03
α_7						6.92E-04	1.62E-03
α_8							7.59E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.45E-01	9.48E-01	9.48E-01	9.59E-01	9.62E-01	9.66E-01	9.67E-01
Beta	5.48E-02	5.20E-02	5.15E-02	4.10E-02	3.84E-02	3.38E-02	3.30E-02
Gamma		3.19E-01	5.01E-01	5.70E-01	6.40E-01	6.39E-01	6.56E-01
Delta			3.41E-01	4.75E-01	5.98E-01	6.69E-01	7.35E-01
Epsilon				2.71E-01	4.72E-01	5.72E-01	6.96E-01
Mu					2.57E-01	3.94E-01	5.64E-01
Omega						2.12E-01	3.81E-01
Sigma							3.19E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.24	7.86	10.48	13.10	15.72	18.34	20.96
N_1	0.8182	0.7045	0.6869	0.7281	0.7912	0.8557	0.9118
N_2	0.5076	0.5227	0.3788	0.2609	0.2062	0.2023	0.2313
N_3		0.3333	0.4444	0.3704	0.2469	0.1440	0.0768

N₄			0.2222	0.3704	0.3704	0.2881	0.1920
N₅				0.1481	0.2963	0.3457	0.3073
N₆					0.0988	0.2305	0.3073
N₇						0.0658	0.1756
N₈							0.0439

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 8.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.080

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7841900	0.9478583	0.9805535	0.9999581	6.910E+00	3.801E-01	--
α_2	4.19E-05	5.21E-02	1.94E-02	2.16E-01	3.801E-01	6.910E+00	1.183

CCCG = 3, Gamma = 0.082

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215362	0.9393259	0.9568628	0.9970147	1.486E+01	9.600E-01	--
α_2	6.08E-04	3.98E-02	2.34E-02	1.35E-01	6.673E-01	1.609E+01	1.096
α_3	1.86E-06	2.09E-02	5.10E-03	9.58E-02	2.927E-01	1.374E+01	1.308

CCCG = 4, Gamma = 0.082

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8448425	0.9363733	0.9472072	0.9907446	2.456E+01	1.669E+00	--
α_2	2.07E-03	3.55E-02	2.55E-02	1.03E-01	1.039E+00	2.823E+01	0.994
α_3	1.54E-05	1.75E-02	6.31E-03	7.30E-02	3.887E-01	2.183E+01	1.310
α_4	1.24E-07	1.06E-02	1.77E-03	5.20E-02	2.414E-01	2.247E+01	1.281

CCCG = 5, Gamma = 0.083

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8899289	0.9441332	0.9488300	0.9822659	5.893E+01	3.487E+00	--
α_2	4.11E-03	2.63E-02	2.18E-02	6.38E-02	1.791E+00	6.631E+01	0.971
α_3	1.53E-03	1.92E-02	1.44E-02	5.33E-02	1.207E+00	6.170E+01	1.051
α_4	1.60E-05	8.98E-03	3.61E-03	3.61E-02	4.340E-01	4.790E+01	1.368
α_5	3.13E-26	1.40E-03	5.02E-08	7.76E-03	5.493E-02	3.913E+01	1.687

CCCG = 6, Gamma = 0.083

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9030351	0.9493948	0.9532412	0.9825985	7.325E+01	3.905E+00	--
α_2	1.56E-03	1.61E-02	1.24E-02	4.33E-02	1.335E+00	8.155E+01	0.991
α_3	2.21E-03	1.80E-02	1.44E-02	4.61E-02	1.531E+00	8.362E+01	0.965
α_4	2.05E-04	1.06E-02	6.33E-03	3.55E-02	7.191E-01	6.713E+01	1.211
α_5	6.67E-08	4.53E-03	7.79E-04	2.20E-02	2.467E-01	5.417E+01	1.510
α_6	1.53E-20	1.39E-03	8.39E-07	8.07E-03	7.279E-02	5.236E+01	1.567

CCCG = 7, Gamma = 0.084

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9207736	0.9545764	0.9569466	0.9802798	1.213E+02	5.770E+00	--
α_2	1.47E-03	1.18E-02	9.41E-03	3.02E-02	1.549E+00	1.299E+02	1.007
α_3	2.52E-03	1.42E-02	1.19E-02	3.35E-02	1.989E+00	1.384E+02	0.943
α_4	9.09E-04	1.01E-02	7.67E-03	2.76E-02	1.287E+00	1.262E+02	1.038
α_5	1.09E-04	6.49E-03	3.77E-03	2.21E-02	6.913E-01	1.058E+02	1.243
α_6	1.93E-08	2.60E-03	3.93E-04	1.29E-02	2.327E-01	8.911E+01	1.482
α_7	1.90E-64	2.79E-04	4.24E-17	7.04E-04	2.112E-02	7.571E+01	1.748

CCCG = 8, Gamma = 0.084

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9298890	0.9580491	0.9598649	0.9800067	1.602E+02	7.016E+00	--
α_2	1.19E-03	9.23E-03	7.41E-03	2.35E-02	1.583E+00	1.699E+02	1.019
α_3	1.90E-03	1.07E-02	8.99E-03	2.53E-02	1.986E+00	1.837E+02	0.941
α_4	1.31E-03	9.32E-03	7.57E-03	2.33E-02	1.672E+00	1.776E+02	0.975
α_5	3.49E-04	6.57E-03	4.60E-03	1.96E-02	1.011E+00	1.528E+02	1.137
α_6	3.34E-05	4.40E-03	2.24E-03	1.61E-02	5.709E-01	1.293E+02	1.346
α_7	3.75E-10	1.63E-03	1.28E-04	8.62E-03	1.809E-01	1.108E+02	1.575
α_8	1.46E-107	1.01E-04	3.06E-27	7.58E-05	1.245E-02	1.231E+02	1.420

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.48E-01	9.39E-01	9.36E-01	9.44E-01	9.49E-01	9.55E-01	9.58E-01
α_2	5.21E-02	3.98E-02	3.55E-02	2.63E-02	1.61E-02	1.18E-02	9.23E-03
α_3		2.09E-02	1.75E-02	1.92E-02	1.80E-02	1.42E-02	1.07E-02
α_4			1.06E-02	8.98E-03	1.06E-02	1.01E-02	9.32E-03
α_5				1.40E-03	4.53E-03	6.49E-03	6.57E-03
α_6					1.39E-03	2.60E-03	4.40E-03
α_7						2.79E-04	1.63E-03
α_8							1.01E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.48E-01	9.39E-01	9.36E-01	9.44E-01	9.49E-01	9.55E-01	9.58E-01
Beta	5.21E-02	6.07E-02	6.36E-02	5.59E-02	5.06E-02	4.54E-02	4.20E-02
Gamma		3.44E-01	4.42E-01	5.29E-01	6.82E-01	7.41E-01	7.80E-01
Delta			3.78E-01	3.51E-01	4.79E-01	5.79E-01	6.73E-01
Epsilon				1.35E-01	3.58E-01	4.82E-01	5.77E-01
Mu					2.34E-01	3.08E-01	4.82E-01
Omega						9.67E-02	2.83E-01
Sigma							5.84E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.20	4.80	6.40	8.00	9.60	11.20	12.80
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 30.5

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.330

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8818811	0.9539259	0.9630861	0.9945759	3.045E+01	1.471E+00	--
α_2	5.42E-03	4.61E-02	3.69E-02	1.18E-01	1.471E+00	3.045E+01	1.183

CCCG = 3, Gamma = 0.328

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9302554	0.9697309	0.9741250	0.9941672	6.736E+01	2.103E+00	--
α_2	1.65E-03	1.76E-02	1.35E-02	4.75E-02	1.310E+00	7.323E+01	1.096
α_3	3.41E-04	1.27E-02	7.99E-03	4.10E-02	7.921E-01	6.163E+01	1.308

CCCG = 4, Gamma = 0.327

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9498364	0.9759821	0.9785166	0.9934612	1.200E+02	2.953E+00	--
α_2	1.40E-03	1.11E-02	8.88E-03	2.84E-02	1.562E+00	1.392E+02	0.994
α_3	3.74E-04	8.71E-03	5.90E-03	2.67E-02	9.307E-01	1.059E+02	1.310
α_4	1.05E-05	4.21E-03	1.78E-03	1.66E-02	4.599E-01	1.088E+02	1.281

CCCG = 5, Gamma = 0.327

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9641325	0.9812469	0.9826926	0.9934214	2.149E+02	4.107E+00	--
α_2	1.13E-03	7.23E-03	5.97E-03	1.77E-02	1.809E+00	2.483E+02	0.971
α_3	5.35E-04	5.70E-03	4.36E-03	1.55E-02	1.318E+00	2.297E+02	1.051
α_4	9.77E-05	4.26E-03	2.60E-03	1.41E-02	7.566E-01	1.768E+02	1.368
α_5	7.05E-09	1.55E-03	2.14E-04	7.77E-03	2.237E-01	1.437E+02	1.687

CCCG = 6, Gamma = 0.327

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9692011	0.9832371	0.9843444	0.9934908	2.829E+02	4.822E+00	--
α_2	8.45E-04	5.55E-03	4.56E-03	1.36E-02	1.777E+00	3.185E+02	0.991
α_3	4.09E-04	4.13E-03	3.18E-03	1.11E-02	1.358E+00	3.277E+02	0.965
α_4	2.15E-04	3.91E-03	2.75E-03	1.16E-02	1.026E+00	2.612E+02	1.211
α_5	9.81E-06	2.39E-03	1.10E-03	9.17E-03	5.036E-01	2.098E+02	1.510
α_6	1.88E-11	7.81E-04	3.95E-05	4.26E-03	1.582E-01	2.024E+02	1.567

CCCG = 7, Gamma = 0.327

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9747723	0.9854332	0.9861874	0.9935184	4.191E+02	6.195E+00	--
α_2	9.15E-04	4.74E-03	4.03E-03	1.10E-02	2.136E+00	4.487E+02	1.007
α_3	3.51E-04	3.07E-03	2.41E-03	8.02E-03	1.476E+00	4.798E+02	0.943
α_4	2.77E-04	2.99E-03	2.28E-03	8.16E-03	1.309E+00	4.358E+02	1.038
α_5	7.25E-05	2.29E-03	1.47E-03	7.31E-03	8.374E-01	3.643E+02	1.243
α_6	4.73E-07	1.15E-03	3.56E-04	4.98E-03	3.519E-01	3.060E+02	1.482
α_7	8.05E-19	3.24E-04	6.14E-07	1.89E-03	8.416E-02	2.596E+02	1.748

CCCG = 8, Gamma = 0.327

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9768065	0.9863123	0.9869566	0.9936180	4.923E+02	6.832E+00	--
α_2	8.80E-04	4.31E-03	3.69E-03	9.83E-03	2.245E+00	5.191E+02	1.019
α_3	2.36E-04	2.40E-03	1.84E-03	6.46E-03	1.354E+00	5.633E+02	0.941
α_4	2.06E-04	2.34E-03	1.77E-03	6.43E-03	1.276E+00	5.439E+02	0.975
α_5	1.41E-04	2.30E-03	1.64E-03	6.71E-03	1.075E+00	4.665E+02	1.137
α_6	9.95E-06	1.42E-03	7.13E-04	5.24E-03	5.615E-01	3.944E+02	1.346
α_7	3.92E-09	6.76E-04	9.72E-05	3.36E-03	2.282E-01	3.373E+02	1.575
α_8	1.36E-17	2.47E-04	8.95E-07	1.44E-03	9.245E-02	3.743E+02	1.420

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.54E-01	9.70E-01	9.76E-01	9.81E-01	9.83E-01	9.85E-01	9.86E-01
α_2	4.61E-02	1.76E-02	1.11E-02	7.23E-03	5.55E-03	4.74E-03	4.31E-03
α_3		1.27E-02	8.71E-03	5.70E-03	4.13E-03	3.07E-03	2.40E-03
α_4			4.21E-03	4.26E-03	3.91E-03	2.99E-03	2.34E-03
α_5				1.55E-03	2.39E-03	2.29E-03	2.30E-03
α_6					7.81E-04	1.15E-03	1.42E-03
α_7						3.24E-04	6.76E-04
α_8							2.47E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.54E-01	9.70E-01	9.76E-01	9.81E-01	9.83E-01	9.85E-01	9.86E-01
Beta	4.61E-02	3.03E-02	2.40E-02	1.88E-02	1.68E-02	1.46E-02	1.37E-02
Gamma		4.19E-01	5.38E-01	6.14E-01	6.69E-01	6.75E-01	6.85E-01
Delta			3.26E-01	5.05E-01	6.32E-01	6.88E-01	7.44E-01
Epsilon				2.67E-01	4.48E-01	5.57E-01	6.65E-01
Mu					2.46E-01	3.91E-01	5.05E-01
Omega						2.20E-01	3.94E-01
Sigma							2.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	12.20	18.30	24.40	30.50	36.60	42.70	48.80
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313	0.0156
N_3		0.5000	0.5000	0.3750	0.2500	0.1563	0.0938

N₄			0.2500	0.3750	0.3750	0.3125	0.2344
N₅				0.1250	0.2500	0.3125	0.3125
N₆					0.0625	0.1563	0.2344
N₇						0.0313	0.0938
N₈							0.0156

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 8.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.086

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9800112	0.9948105	0.9976521	0.9999809	9.454E+01	4.932E-01	--
α_2	1.91E-05	5.19E-03	2.35E-03	2.00E-02	4.932E-01	9.454E+01	1.183

CCCG = 3, Gamma = 0.088

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9857214	0.9951237	0.9965338	0.9997110	2.162E+02	1.059E+00	--
α_2	5.78E-05	3.09E-03	1.82E-03	1.04E-02	7.137E-01	2.303E+02	1.096
α_3	6.43E-07	1.79E-03	5.41E-04	7.80E-03	3.458E-01	1.931E+02	1.308

CCCG = 4, Gamma = 0.089

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9892499	0.9953785	0.9960774	0.9991182	4.554E+02	2.115E+00	--
α_2	3.88E-04	3.13E-03	2.49E-03	8.06E-03	1.549E+00	4.930E+02	0.994
α_3	2.20E-08	7.05E-04	1.38E-04	3.35E-03	2.646E-01	3.751E+02	1.310
α_4	8.67E-08	7.84E-04	1.93E-04	3.58E-03	3.010E-01	3.835E+02	1.281

CCCG = 5, Gamma = 0.089

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9930807	0.9961571	0.9963931	0.9984278	1.380E+03	5.325E+00	--
α_2	7.96E-04	2.50E-03	2.27E-03	4.96E-03	3.632E+00	1.451E+03	0.971
α_3	9.90E-05	1.01E-03	7.74E-04	2.72E-03	1.354E+00	1.342E+03	1.051
α_4	2.72E-08	2.87E-04	6.85E-05	1.32E-03	2.961E-01	1.032E+03	1.368
α_5	1.51E-34	5.07E-05	5.59E-11	2.51E-04	4.243E-02	8.368E+02	1.687

CCCG = 6, Gamma = 0.090

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9926614	0.9959991	0.9962638	0.9984330	1.229E+03	4.936E+00	--
α_2	6.01E-04	2.26E-03	2.01E-03	4.78E-03	2.915E+00	1.286E+03	0.991
α_3	8.10E-05	9.49E-04	7.13E-04	2.62E-03	1.257E+00	1.323E+03	0.965
α_4	1.94E-06	4.77E-04	2.18E-04	1.83E-03	5.031E-01	1.055E+03	1.211
α_5	3.95E-15	1.36E-04	1.80E-06	7.82E-04	1.155E-01	8.464E+02	1.510
α_6	8.32E-13	1.78E-04	6.52E-06	9.86E-04	1.451E-01	8.155E+02	1.567

CCCG = 7, Gamma = 0.090

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9943755	0.9964404	0.9965616	0.9980913	2.703E+03	9.654E+00	--
α_2	6.89E-04	1.78E-03	1.66E-03	3.28E-03	4.851E+00	2.720E+03	1.007
α_3	2.47E-04	9.62E-04	8.51E-04	2.06E-03	2.800E+00	2.907E+03	0.943
α_4	5.35E-05	5.24E-04	4.05E-04	1.40E-03	1.384E+00	2.641E+03	1.038
α_5	7.86E-07	2.22E-04	9.93E-05	8.59E-04	4.902E-01	2.207E+03	1.243
α_6	1.47E-15	6.19E-05	7.84E-07	3.55E-04	1.146E-01	1.852E+03	1.482
α_7	4.90E-93	9.33E-06	9.92E-25	1.11E-05	1.464E-02	1.570E+03	1.748

CCCG = 8, Gamma = 0.090

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940684	0.9964742	0.9966361	0.9983274	2.020E+03	7.148E+00	--
α_2	3.96E-04	1.46E-03	1.30E-03	3.07E-03	2.980E+00	2.039E+03	1.019
α_3	1.54E-04	8.86E-04	7.41E-04	2.11E-03	1.960E+00	2.210E+03	0.941
α_4	3.99E-05	5.46E-04	4.00E-04	1.55E-03	1.166E+00	2.134E+03	0.975
α_5	1.67E-06	2.93E-04	1.42E-04	1.10E-03	5.375E-01	1.831E+03	1.137
α_6	2.58E-11	1.17E-04	9.05E-06	6.17E-04	1.805E-01	1.547E+03	1.346
α_7	1.62E-35	3.13E-05	2.34E-11	1.53E-04	4.139E-02	1.322E+03	1.575
α_8	1.18E-08	1.93E-04	4.25E-05	8.99E-04	2.827E-01	1.466E+03	1.420

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	5.19E-03	3.09E-03	3.13E-03	2.50E-03	2.26E-03	1.78E-03	1.46E-03
α_3		1.79E-03	7.05E-04	1.01E-03	9.49E-04	9.62E-04	8.86E-04
α_4			7.84E-04	2.87E-04	4.77E-04	5.24E-04	5.46E-04
α_5				5.07E-05	1.36E-04	2.22E-04	2.93E-04
α_6					1.78E-04	6.19E-05	1.17E-04
α_7						9.33E-06	3.13E-05
α_8							1.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	5.19E-03	4.88E-03	4.62E-03	3.84E-03	4.00E-03	3.56E-03	3.53E-03
Gamma		3.67E-01	3.22E-01	3.50E-01	4.35E-01	5.00E-01	5.86E-01
Delta			5.27E-01	2.51E-01	4.55E-01	4.59E-01	5.71E-01
Epsilon				1.50E-01	3.97E-01	3.59E-01	5.37E-01
Mu					5.66E-01	2.43E-01	5.37E-01
Omega						1.31E-01	6.58E-01
Sigma							8.60E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.44	5.16	6.88	8.60	10.32	12.04	13.76
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.4.1.3 ALL-AOV-OO: All Systems Air-Operated Valves Fail to Close

Generic CCF Parameters

Component Group: Valve
Component Type: Air Operated Valve
Failure Mode: Fail to Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 45.4

Total Number of Common-Cause Failure Events: 3

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9347992	0.9787140	0.9855949	0.9991237	0.9777831	4.187E+01	9.107E-01
α_2	8.73E-04	2.13E-02	1.44E-02	6.52E-02	2.22E-02	9.107E-01	4.187E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9394473	0.9726117	0.9761030	0.9938358	0.9558072	8.589E+01	2.419E+00
α_2	4.67E-03	2.41E-02	2.06E-02	5.54E-02	4.36E-02	2.124E+00	8.619E+01
α_3	3.05E-07	3.34E-03	7.95E-04	1.53E-02	6.11E-04	2.947E-01	8.802E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9478879	0.9740198	0.9763982	0.9920304	0.9607165	1.276E+02	3.404E+00
α_2	3.38E-03	1.68E-02	1.44E-02	3.84E-02	2.44E-02	2.198E+00	1.288E+02
α_3	3.59E-04	7.43E-03	5.12E-03	2.24E-02	1.49E-02	9.739E-01	1.300E+02
α_4	1.23E-08	1.77E-03	2.63E-04	8.75E-03	0.00E+00	2.315E-01	1.308E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9614961	0.9786576	0.9799618	0.9913617	0.9636614	2.367E+02	5.162E+00
α_2	2.83E-03	1.13E-02	9.95E-03	2.42E-02	1.68E-02	2.726E+00	2.392E+02
α_3	1.05E-03	7.14E-03	5.84E-03	1.77E-02	1.43E-02	1.728E+00	2.402E+02
α_4	3.07E-05	2.61E-03	1.43E-03	9.22E-03	5.25E-03	6.322E-01	2.413E+02
α_5	2.75E-20	3.17E-04	2.96E-07	1.84E-03	0.00E+00	7.674E-02	2.418E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9646066	0.9798781	0.9809854	0.9913663	0.9662393	2.801E+02	5.751E+00
α_2	1.83E-03	8.34E-03	7.23E-03	1.87E-02	1.20E-02	2.384E+00	2.834E+02
α_3	1.17E-03	6.79E-03	5.68E-03	1.62E-02	1.29E-02	1.940E+00	2.839E+02
α_4	1.62E-04	3.40E-03	2.33E-03	1.03E-02	6.61E-03	9.710E-01	2.848E+02
α_5	4.38E-07	1.21E-03	3.67E-04	5.28E-03	2.20E-03	3.461E-01	2.855E+02
α_6	3.02E-15	3.84E-04	3.89E-06	2.22E-03	0.00E+00	1.098E-01	2.857E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9711319	0.9824569	0.9831749	0.9913262	0.9691594	4.356E+02	7.779E+00
α_2	1.52E-03	6.11E-03	5.39E-03	1.32E-02	7.10E-03	2.711E+00	4.407E+02
α_3	1.30E-03	5.65E-03	4.93E-03	1.25E-02	1.33E-02	2.506E+00	4.409E+02
α_4	3.69E-04	3.29E-03	2.58E-03	8.63E-03	5.69E-03	1.458E+00	4.420E+02
α_5	5.35E-05	1.84E-03	1.17E-03	5.92E-03	3.80E-03	8.154E-01	4.426E+02
α_6	1.16E-08	5.73E-04	1.04E-04	2.76E-03	9.49E-04	2.541E-01	4.432E+02
α_7	5.38E-41	7.85E-05	2.92E-12	3.44E-04	0.00E+00	3.480E-02	4.434E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9728282	0.9835011	0.9841787	0.9918465	0.9727831	4.630E+02	7.767E+00
α_2	8.33E-04	4.44E-03	3.76E-03	1.04E-02	9.31E-04	2.088E+00	4.687E+02
α_3	1.27E-03	5.42E-03	4.73E-03	1.19E-02	1.55E-02	2.549E+00	4.682E+02
α_4	2.95E-04	2.92E-03	2.25E-03	7.82E-03	4.17E-03	1.375E+00	4.694E+02
α_5	1.15E-04	2.16E-03	1.51E-03	6.42E-03	4.17E-03	1.015E+00	4.697E+02
α_6	4.51E-06	1.07E-03	4.95E-04	4.11E-03	2.08E-03	5.060E-01	4.702E+02
α_7	5.89E-13	2.95E-04	9.14E-06	1.65E-03	4.17E-04	1.391E-01	4.706E+02
α_8	2.34E-17	2.01E-04	8.52E-07	1.17E-03	0.00E+00	9.469E-02	4.706E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.79E-01	9.73E-01	9.74E-01	9.79E-01	9.80E-01	9.82E-01	9.84E-01
α_2	2.13E-02	2.41E-02	1.68E-02	1.13E-02	8.34E-03	6.11E-03	4.44E-03
α_3		3.34E-03	7.43E-03	7.14E-03	6.79E-03	5.65E-03	5.42E-03
α_4			1.77E-03	2.61E-03	3.40E-03	3.29E-03	2.92E-03
α_5				3.17E-04	1.21E-03	1.84E-03	2.16E-03
α_6					3.84E-04	5.73E-04	1.07E-03
α_7						7.85E-05	2.95E-04
α_8							2.01E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.79E-01	9.73E-01	9.74E-01	9.79E-01	9.80E-01	9.82E-01	9.84E-01
Beta	2.13E-02	2.74E-02	2.60E-02	2.13E-02	2.01E-02	1.75E-02	1.65E-02
Gamma		1.22E-01	3.54E-01	4.72E-01	5.85E-01	6.52E-01	7.31E-01
Delta			1.92E-01	2.91E-01	4.24E-01	5.06E-01	5.51E-01
Epsilon				1.08E-01	3.19E-01	4.31E-01	5.61E-01
Mu					2.41E-01	2.62E-01	4.22E-01
Omega						1.20E-01	3.16E-01
Sigma							4.05E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8

Adj. Ind	18.16	27.24	36.32	45.40	54.48	63.56	72.64
N₁	1.2990	0.6757	0.6086	0.4854	0.3594	0.2845	0.3143
N₂	0.4421	1.2729	0.9386	0.8014	0.6831	0.4676	0.0698
N₃		0.0179	0.5714	0.6789	0.7330	0.8766	1.1588
N₄			0.0000	0.2500	0.3750	0.3750	0.3126
N₅				0.0000	0.1250	0.2500	0.3125
N₆					0.0000	0.0625	0.1563
N₇						0.0000	0.0313
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 10.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.203

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9618888	0.9901564	0.9955997	0.9999672	4.862E+01	4.834E-01	--
α_2	3.28E-05	9.84E-03	4.40E-03	3.81E-02	4.834E-01	4.862E+01	0.985

CCCG = 3, Gamma = 0.207

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9723581	0.9900443	0.9925438	0.9991861	1.219E+02	1.226E+00	--
α_2	4.11E-04	8.42E-03	5.82E-03	2.53E-02	9.769E-01	1.150E+02	1.181
α_3	2.45E-08	1.53E-03	2.66E-04	7.43E-03	2.487E-01	1.621E+02	0.844

CCCG = 4, Gamma = 0.210

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9726718	0.9883166	0.9901085	0.9978339	1.740E+02	2.057E+00	--
α_2	9.04E-04	8.19E-03	6.42E-03	2.15E-02	1.442E+00	1.747E+02	1.090
α_3	3.24E-06	2.59E-03	9.72E-04	1.06E-02	4.114E-01	1.587E+02	1.207
α_4	1.20E-09	9.11E-04	9.93E-05	4.67E-03	2.036E-01	2.232E+02	0.859

CCCG = 5, Gamma = 0.212

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9784462	0.9890816	0.9900327	0.9964675	3.336E+02	3.683E+00	--
α_2	1.34E-03	6.54E-03	5.61E-03	1.49E-02	2.243E+00	3.408E+02	1.062
α_3	1.54E-04	3.06E-03	2.12E-03	9.18E-03	9.912E-01	3.230E+02	1.125
α_4	7.84E-07	1.15E-03	3.89E-04	4.88E-03	3.765E-01	3.271E+02	1.113
α_5	1.48E-21	1.71E-04	9.73E-08	9.86E-04	7.237E-02	4.239E+02	0.860

CCCG = 6, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9793600	0.9892162	0.9900539	0.9962106	3.797E+02	4.139E+00	--
α_2	1.02E-03	5.31E-03	4.51E-03	1.23E-02	2.128E+00	3.987E+02	1.039
α_3	2.17E-04	3.15E-03	2.29E-03	9.01E-03	1.134E+00	3.589E+02	1.157
α_4	9.61E-06	1.47E-03	7.29E-04	5.44E-03	5.533E-01	3.759E+02	1.107
α_5	2.23E-09	5.73E-04	7.65E-05	2.87E-03	2.210E-01	3.856E+02	1.080
α_6	3.60E-16	2.83E-04	1.97E-06	1.64E-03	1.027E-01	3.628E+02	1.148

CCCG = 7, Gamma = 0.215

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9835536	0.9904358	0.9909176	0.9956728	6.661E+02	6.432E+00	--
α_2	9.92E-04	3.82E-03	3.38E-03	8.12E-03	2.840E+00	7.416E+02	0.943
α_3	4.42E-04	2.98E-03	2.43E-03	7.37E-03	1.746E+00	5.848E+02	1.196
α_4	1.01E-04	1.61E-03	1.15E-03	4.70E-03	1.084E+00	6.703E+02	1.045
α_5	4.67E-06	8.21E-04	3.98E-04	3.07E-03	5.376E-01	6.544E+02	1.071
α_6	2.64E-10	3.01E-04	3.04E-05	1.56E-03	1.979E-01	6.572E+02	1.067
α_7	7.99E-53	3.57E-05	3.57E-15	1.22E-04	2.656E-02	7.446E+02	0.942

CCCG = 8, Gamma = 0.215

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9844757	0.9910785	0.9915518	0.9960651	6.790E+02	6.112E+00	--
α_2	5.91E-04	2.73E-03	2.36E-03	6.15E-03	2.364E+00	8.626E+02	0.813
α_3	3.41E-04	2.86E-03	2.26E-03	7.42E-03	1.512E+00	5.271E+02	1.331
α_4	9.14E-05	1.56E-03	1.10E-03	4.58E-03	1.056E+00	6.764E+02	1.038
α_5	1.53E-05	1.01E-03	5.75E-04	3.48E-03	6.745E-01	6.678E+02	1.052
α_6	6.20E-08	4.61E-04	1.17E-04	2.09E-03	3.076E-01	6.666E+02	1.055
α_7	1.21E-15	1.72E-04	1.70E-06	9.94E-04	1.093E-01	6.344E+02	1.109
α_8	1.96E-18	1.27E-04	3.53E-07	7.40E-04	8.885E-02	6.997E+02	1.005

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.90E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01	9.91E-01
α_2	9.84E-03	8.42E-03	8.19E-03	6.54E-03	5.31E-03	3.82E-03	2.73E-03
α_3		1.53E-03	2.59E-03	3.06E-03	3.15E-03	2.98E-03	2.86E-03
α_4			9.11E-04	1.15E-03	1.47E-03	1.61E-03	1.56E-03
α_5				1.71E-04	5.73E-04	8.21E-04	1.01E-03
α_6					2.83E-04	3.01E-04	4.61E-04
α_7						3.57E-05	1.72E-04
α_8							1.27E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.90E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01	9.91E-01
Beta	9.84E-03	9.96E-03	1.17E-02	1.09E-02	1.08E-02	9.56E-03	8.92E-03
Gamma		1.54E-01	2.99E-01	4.01E-01	5.08E-01	6.01E-01	6.94E-01
Delta			2.61E-01	3.02E-01	4.25E-01	4.82E-01	5.38E-01
Epsilon				1.29E-01	3.68E-01	4.18E-01	5.32E-01
Mu					3.31E-01	2.91E-01	4.30E-01
Omega						1.06E-01	3.93E-01
Sigma							4.24E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.04	6.06	8.08	10.10	12.12	14.14	16.16
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 12.5

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.301

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8771478	0.9616475	0.9754513	0.9989752	1.964E+01	7.831E-01	--
α_2	1.02E-03	3.84E-02	2.45E-02	1.23E-01	7.831E-01	1.964E+01	0.985

CCCG = 3, Gamma = 0.291

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8731198	0.9436756	0.9511873	0.9884926	3.650E+01	2.178E+00	--
α_2	9.16E-03	5.18E-02	4.40E-02	1.21E-01	1.939E+00	3.552E+01	1.181
α_3	4.80E-08	4.57E-03	7.39E-04	2.24E-02	2.396E-01	5.221E+01	0.844

CCCG = 4, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8943780	0.9491490	0.9543319	0.9861790	5.410E+01	2.898E+00	--
α_2	4.81E-03	3.08E-02	2.56E-02	7.47E-02	1.785E+00	5.617E+01	1.090
α_3	6.59E-04	1.71E-02	1.14E-02	5.27E-02	8.927E-01	5.146E+01	1.207
α_4	1.16E-08	3.00E-03	4.02E-04	1.51E-02	2.207E-01	7.330E+01	0.859

CCCG = 5, Gamma = 0.284

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9258789	0.9600281	0.9627236	0.9849632	1.082E+02	4.506E+00	--
α_2	4.00E-03	1.94E-02	1.67E-02	4.41E-02	2.242E+00	1.132E+02	1.062
α_3	1.86E-03	1.45E-02	1.16E-02	3.68E-02	1.578E+00	1.075E+02	1.125
α_4	5.79E-05	5.57E-03	2.99E-03	1.98E-02	6.132E-01	1.096E+02	1.113
α_5	4.69E-21	5.08E-04	2.94E-07	2.94E-03	7.248E-02	1.426E+02	0.860

CCCG = 6, Gamma = 0.282

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9330086	0.9626154	0.9648148	0.9847060	1.339E+02	5.199E+00	--
α_2	2.63E-03	1.41E-02	1.20E-02	3.29E-02	2.066E+00	1.445E+02	1.039
α_3	1.88E-03	1.30E-02	1.06E-02	3.22E-02	1.707E+00	1.299E+02	1.157
α_4	3.66E-04	7.22E-03	5.01E-03	2.16E-02	9.931E-01	1.366E+02	1.107
α_5	1.15E-06	2.53E-03	7.97E-04	1.09E-02	3.563E-01	1.407E+02	1.080
α_6	5.28E-20	5.79E-04	5.46E-07	3.37E-03	7.684E-02	1.326E+02	1.148

CCCG = 7, Gamma = 0.281

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9459125	0.9675196	0.9689127	0.9843688	2.151E+02	7.223E+00	--
α_2	2.75E-03	1.10E-02	9.68E-03	2.36E-02	2.717E+00	2.449E+02	0.943
α_3	1.62E-03	9.71E-03	8.10E-03	2.33E-02	1.895E+00	1.932E+02	1.196
α_4	7.78E-04	6.67E-03	5.27E-03	1.74E-02	1.490E+00	2.219E+02	1.045
α_5	1.31E-04	3.92E-03	2.54E-03	1.24E-02	8.534E-01	2.170E+02	1.071
α_6	1.20E-08	1.10E-03	1.78E-04	5.39E-03	2.405E-01	2.184E+02	1.067
α_7	6.01E-51	1.10E-04	2.27E-14	3.90E-04	2.734E-02	2.477E+02	0.942

CCCG = 8, Gamma = 0.280

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9491088	0.9694343	0.9707463	0.9852791	2.298E+02	7.246E+00	--
α_2	1.98E-03	8.47E-03	7.40E-03	1.86E-02	2.535E+00	2.968E+02	0.813
α_3	1.10E-03	8.61E-03	6.90E-03	2.20E-02	1.575E+00	1.814E+02	1.331
α_4	5.52E-04	5.71E-03	4.38E-03	1.54E-02	1.340E+00	2.331E+02	1.038
α_5	2.60E-04	4.52E-03	3.20E-03	1.33E-02	1.046E+00	2.303E+02	1.052
α_6	1.58E-05	2.40E-03	1.19E-03	8.88E-03	5.538E-01	2.303E+02	1.055
α_7	2.69E-15	4.93E-04	4.63E-06	2.85E-03	1.083E-01	2.195E+02	1.109
α_8	3.35E-18	3.61E-04	9.03E-07	2.11E-03	8.749E-02	2.421E+02	1.005

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.62E-01	9.44E-01	9.49E-01	9.60E-01	9.63E-01	9.68E-01	9.69E-01
α_2	3.84E-02	5.18E-02	3.08E-02	1.94E-02	1.41E-02	1.10E-02	8.47E-03
α_3		4.57E-03	1.71E-02	1.45E-02	1.30E-02	9.71E-03	8.61E-03
α_4			3.00E-03	5.57E-03	7.22E-03	6.67E-03	5.71E-03
α_5				5.08E-04	2.53E-03	3.92E-03	4.52E-03
α_6					5.79E-04	1.10E-03	2.40E-03
α_7						1.10E-04	4.93E-04
α_8							3.61E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.62E-01	9.44E-01	9.49E-01	9.60E-01	9.63E-01	9.68E-01	9.69E-01
Beta	3.84E-02	5.63E-02	5.09E-02	4.00E-02	3.74E-02	3.25E-02	3.06E-02
Gamma		8.11E-02	3.94E-01	5.14E-01	6.23E-01	6.62E-01	7.23E-01
Delta			1.50E-01	2.96E-01	4.43E-01	5.48E-01	6.10E-01
Epsilon				8.37E-02	3.01E-01	4.35E-01	5.76E-01
Mu					1.86E-01	2.36E-01	4.18E-01
Omega						9.12E-02	2.63E-01
Sigma							4.23E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.00	7.50	10.00	12.50	15.00	17.50	20.00
N_1	0.6667	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.3333	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313
N_3		0.0000	0.5000	0.5000	0.3750	0.2500	0.1563

N₄			0.0000	0.2500	0.3750	0.3750	0.3125
N₅				0.0000	0.1250	0.2500	0.3125
N₆					0.0000	0.0625	0.1563
N₇						0.0000	0.0313
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.020

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7357819	0.9357261	0.9755071	0.9999471	5.534E+00	3.801E-01	--
α_2	5.29E-05	6.43E-02	2.45E-02	2.64E-01	3.801E-01	5.534E+00	0.985

CCCG = 3, Gamma = 0.021

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7865471	0.9268937	0.9475661	0.9963549	1.217E+01	9.600E-01	--
α_2	8.68E-04	5.57E-02	3.32E-02	1.87E-01	6.673E-01	1.132E+01	1.181
α_3	1.54E-06	1.74E-02	4.23E-03	8.02E-02	2.927E-01	1.649E+01	0.844

CCCG = 4, Gamma = 0.021

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8135140	0.9230027	0.9357671	0.9886830	2.001E+01	1.669E+00	--
α_2	2.85E-03	4.82E-02	3.50E-02	1.39E-01	1.039E+00	2.051E+01	1.090
α_3	1.76E-05	2.00E-02	7.23E-03	8.32E-02	3.887E-01	1.908E+01	1.207
α_4	1.02E-07	8.83E-03	1.47E-03	4.32E-02	2.414E-01	2.710E+01	0.859

CCCG = 5, Gamma = 0.021

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8740867	0.9358898	0.9411865	0.9795635	5.090E+01	3.487E+00	--
α_2	5.06E-03	3.22E-02	2.67E-02	7.79E-02	1.791E+00	5.386E+01	1.062
α_3	1.84E-03	2.30E-02	1.72E-02	6.37E-02	1.207E+00	5.136E+01	1.125
α_4	1.45E-05	8.17E-03	3.28E-03	3.29E-02	4.340E-01	5.269E+01	1.113
α_5	1.77E-26	7.99E-04	2.84E-08	4.40E-03	5.493E-02	6.872E+01	0.860

CCCG = 6, Gamma = 0.021

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8885252	0.9416575	0.9460205	0.9798638	6.302E+01	3.905E+00	--
α_2	1.83E-03	1.88E-02	1.45E-02	5.05E-02	1.335E+00	6.966E+01	1.039
α_3	2.97E-03	2.40E-02	1.92E-02	6.14E-02	1.531E+00	6.224E+01	1.157
α_4	2.09E-04	1.08E-02	6.44E-03	3.62E-02	7.191E-01	6.595E+01	1.107
α_5	5.30E-08	3.61E-03	6.19E-04	1.76E-02	2.467E-01	6.808E+01	1.080
α_6	1.25E-20	1.13E-03	6.83E-07	6.57E-03	7.279E-02	6.420E+01	1.148

CCCG = 7, Gamma = 0.021

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9120037	0.9494686	0.9520770	0.9780193	1.084E+02	5.770E+00	--
α_2	1.49E-03	1.19E-02	9.52E-03	3.05E-02	1.549E+00	1.285E+02	0.943
α_3	3.47E-03	1.94E-02	1.64E-02	4.57E-02	1.989E+00	1.005E+02	1.196
α_4	9.88E-04	1.10E-02	8.34E-03	2.99E-02	1.287E+00	1.160E+02	1.045
α_5	1.01E-04	6.04E-03	3.51E-03	2.06E-02	6.913E-01	1.137E+02	1.071
α_6	1.50E-08	2.03E-03	3.06E-04	1.00E-02	2.327E-01	1.146E+02	1.067
α_7	1.10E-64	1.62E-04	2.46E-17	4.09E-04	2.112E-02	1.300E+02	0.942

CCCG = 8, Gamma = 0.021

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9230265	0.9538887	0.9558670	0.9779923	1.451E+02	7.016E+00	--
α_2	1.01E-03	7.87E-03	6.31E-03	2.01E-02	1.583E+00	1.996E+02	0.813
α_3	2.88E-03	1.62E-02	1.36E-02	3.81E-02	1.986E+00	1.210E+02	1.331
α_4	1.49E-03	1.06E-02	8.62E-03	2.65E-02	1.672E+00	1.559E+02	1.038
α_5	3.45E-04	6.50E-03	4.54E-03	1.93E-02	1.011E+00	1.545E+02	1.052
α_6	2.79E-05	3.68E-03	1.87E-03	1.35E-02	5.709E-01	1.546E+02	1.055
α_7	2.82E-10	1.23E-03	9.61E-05	6.48E-03	1.809E-01	1.474E+02	1.109
α_8	1.10E-107	7.65E-05	2.31E-27	5.73E-05	1.245E-02	1.628E+02	1.005

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.36E-01	9.27E-01	9.23E-01	9.36E-01	9.42E-01	9.49E-01	9.54E-01
α_2	6.43E-02	5.57E-02	4.82E-02	3.22E-02	1.88E-02	1.19E-02	7.87E-03
α_3		1.74E-02	2.00E-02	2.30E-02	2.40E-02	1.94E-02	1.62E-02
α_4			8.83E-03	8.17E-03	1.08E-02	1.10E-02	1.06E-02
α_5				7.99E-04	3.61E-03	6.04E-03	6.50E-03
α_6					1.13E-03	2.03E-03	3.68E-03
α_7						1.62E-04	1.23E-03
α_8							7.65E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.36E-01	9.27E-01	9.23E-01	9.36E-01	9.42E-01	9.49E-01	9.54E-01
Beta	6.43E-02	7.31E-02	7.70E-02	6.41E-02	5.83E-02	5.05E-02	4.61E-02
Gamma		2.39E-01	3.74E-01	4.98E-01	6.78E-01	7.64E-01	8.29E-01
Delta			3.07E-01	2.81E-01	3.93E-01	4.97E-01	5.78E-01
Epsilon				8.91E-02	3.05E-01	4.29E-01	5.20E-01
Mu					2.39E-01	2.66E-01	4.34E-01
Omega						7.42E-02	2.61E-01
Sigma							5.87E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.40	0.60	0.80	1.00	1.20	1.40	1.60
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 13.7

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.308

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9329598	0.9814563	0.9903100	0.9998485	3.058E+01	5.777E-01	--
α_2	1.51E-04	1.85E-02	9.69E-03	6.70E-02	5.777E-01	3.058E+01	0.985

CCCG = 3, Gamma = 0.310

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9431122	0.9784999	0.9832146	0.9977533	6.318E+01	1.388E+00	--
α_2	1.11E-03	1.78E-02	1.29E-02	5.16E-02	1.078E+00	5.937E+01	1.181
α_3	5.30E-07	3.66E-03	9.48E-04	1.66E-02	3.100E-01	8.433E+01	0.844

CCCG = 4, Gamma = 0.309

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9531418	0.9787721	0.9814709	0.9951718	1.131E+02	2.453E+00	--
α_2	2.24E-03	1.50E-02	1.23E-02	3.70E-02	1.741E+00	1.142E+02	1.090
α_3	1.94E-05	4.79E-03	2.20E-03	1.83E-02	5.021E-01	1.043E+02	1.207
α_4	2.84E-09	1.43E-03	1.68E-04	7.26E-03	2.099E-01	1.469E+02	0.859

CCCG = 5, Gamma = 0.308

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9643867	0.9817329	0.9832462	0.9939079	2.054E+02	3.821E+00	--
α_2	2.11E-03	1.04E-02	8.94E-03	2.38E-02	2.220E+00	2.105E+02	1.062
α_3	3.76E-04	5.58E-03	4.05E-03	1.60E-02	1.121E+00	1.998E+02	1.125
α_4	1.41E-06	1.88E-03	6.46E-04	7.93E-03	3.816E-01	2.027E+02	1.113
α_5	1.50E-16	3.75E-04	2.05E-06	2.18E-03	9.865E-02	2.628E+02	0.860

CCCG = 6, Gamma = 0.307

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9680879	0.9827252	0.9838907	0.9933812	2.682E+02	4.715E+00	--
α_2	1.62E-03	7.86E-03	6.75E-03	1.79E-02	2.250E+00	2.839E+02	1.039
α_3	6.46E-04	5.70E-03	4.48E-03	1.49E-02	1.465E+00	2.556E+02	1.157
α_4	3.20E-05	2.42E-03	1.35E-03	8.45E-03	6.509E-01	2.681E+02	1.107
α_5	1.82E-08	9.21E-04	1.66E-04	4.44E-03	2.536E-01	2.752E+02	1.080
α_6	5.99E-17	3.69E-04	1.68E-06	2.15E-03	9.572E-02	2.590E+02	1.148

CCCG = 7, Gamma = 0.306

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9737386	0.9848336	0.9856180	0.9932501	4.023E+02	6.195E+00	--
α_2	1.24E-03	5.43E-03	4.73E-03	1.20E-02	2.480E+00	4.541E+02	0.943
α_3	9.31E-04	5.41E-03	4.52E-03	1.29E-02	1.945E+00	3.578E+02	1.196
α_4	1.23E-04	2.42E-03	1.68E-03	7.25E-03	9.967E-01	4.108E+02	1.045
α_5	6.61E-06	1.31E-03	6.21E-04	4.93E-03	5.249E-01	4.012E+02	1.071
α_6	3.61E-10	4.85E-04	4.75E-05	2.51E-03	1.956E-01	4.030E+02	1.067
α_7	3.30E-28	1.16E-04	2.63E-09	6.29E-04	5.291E-02	4.567E+02	0.942

CCCG = 8, Gamma = 0.306

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9755775	0.9855840	0.9862617	0.9932767	4.671E+02	6.832E+00	--
α_2	7.28E-04	3.59E-03	3.07E-03	8.22E-03	2.229E+00	6.183E+02	0.813
α_3	1.23E-03	5.96E-03	5.12E-03	1.36E-02	2.260E+00	3.770E+02	1.331
α_4	1.22E-04	2.14E-03	1.51E-03	6.32E-03	1.042E+00	4.850E+02	1.038
α_5	3.73E-05	1.59E-03	9.73E-04	5.24E-03	7.626E-01	4.789E+02	1.052
α_6	1.56E-07	6.84E-04	1.91E-04	3.04E-03	3.271E-01	4.781E+02	1.055
α_7	2.86E-13	2.95E-04	7.91E-06	1.66E-03	1.344E-01	4.551E+02	1.109
α_8	1.38E-20	1.53E-04	1.44E-07	8.88E-04	7.682E-02	5.020E+02	1.005

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.78E-01	9.79E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.85E-02	1.78E-02	1.50E-02	1.04E-02	7.86E-03	5.43E-03	3.59E-03
α_3		3.66E-03	4.79E-03	5.58E-03	5.70E-03	5.41E-03	5.96E-03
α_4			1.43E-03	1.88E-03	2.42E-03	2.42E-03	2.14E-03
α_5				3.75E-04	9.21E-04	1.31E-03	1.59E-03
α_6					3.69E-04	4.85E-04	6.84E-04
α_7						1.16E-04	2.95E-04
α_8							1.53E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.78E-01	9.79E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.85E-02	2.15E-02	2.12E-02	1.83E-02	1.73E-02	1.52E-02	1.44E-02
Gamma		1.70E-01	2.93E-01	4.29E-01	5.45E-01	6.42E-01	7.51E-01
Delta			2.29E-01	2.88E-01	3.94E-01	4.45E-01	4.50E-01
Epsilon				1.66E-01	3.48E-01	4.41E-01	5.59E-01
Mu					2.86E-01	3.15E-01	4.16E-01
Omega						1.93E-01	3.96E-01
Sigma							3.41E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.48	8.22	10.96	13.70	16.44	19.18	21.92
N_1	0.5357	0.5357	0.4286	0.2679	0.1071	0.0000	0.0000
N_2	0.1071	0.2679	0.4286	0.5357	0.5357	0.3750	0.0000
N_3		0.0179	0.0714	0.1786	0.3571	0.6250	1.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 8.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.168

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9833027	0.9956614	0.9980333	0.9999837	1.136E+02	4.949E-01	--
α_2	1.63E-05	4.34E-03	1.97E-03	1.67E-02	4.949E-01	1.136E+02	0.985

CCCG = 3, Gamma = 0.171

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9868152	0.9954907	0.9967898	0.9997299	2.350E+02	1.065E+00	--
α_2	6.44E-05	3.36E-03	1.99E-03	1.13E-02	7.187E-01	2.134E+02	1.181
α_3	4.15E-07	1.15E-03	3.49E-04	5.03E-03	3.458E-01	2.995E+02	0.844

CCCG = 4, Gamma = 0.174

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9892358	0.9953656	0.9960632	0.9991107	4.563E+02	2.125E+00	--
α_2	4.33E-04	3.46E-03	2.76E-03	8.88E-03	1.559E+00	4.492E+02	1.090
α_3	2.03E-08	6.50E-04	1.27E-04	3.09E-03	2.646E-01	4.070E+02	1.207
α_4	5.81E-08	5.26E-04	1.29E-04	2.41E-03	3.010E-01	5.716E+02	0.859

CCCG = 5, Gamma = 0.175

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9926542	0.9959170	0.9961669	0.9983267	1.303E+03	5.341E+00	--
α_2	8.78E-04	2.74E-03	2.50E-03	5.45E-03	3.648E+00	1.325E+03	1.062
α_3	1.06E-04	1.08E-03	8.28E-04	2.91E-03	1.354E+00	1.254E+03	1.125
α_4	2.21E-08	2.33E-04	5.57E-05	1.07E-03	2.961E-01	1.268E+03	1.113
α_5	7.69E-35	2.58E-05	2.85E-11	1.28E-04	4.243E-02	1.642E+03	0.860

CCCG = 6, Gamma = 0.176

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9923222	0.9958091	0.9960850	0.9983539	1.178E+03	4.959E+00	--
α_2	6.40E-04	2.39E-03	2.12E-03	5.04E-03	2.937E+00	1.227E+03	1.039
α_3	9.73E-05	1.14E-03	8.56E-04	3.15E-03	1.258E+00	1.103E+03	1.157
α_4	1.77E-06	4.36E-04	1.99E-04	1.67E-03	5.031E-01	1.154E+03	1.107
α_5	2.83E-15	9.76E-05	1.29E-06	5.60E-04	1.155E-01	1.183E+03	1.080
α_6	6.09E-13	1.30E-04	4.77E-06	7.22E-04	1.451E-01	1.113E+03	1.148

CCCG = 7, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9942094	0.9963328	0.9964573	0.9980312	2.632E+03	9.686E+00	--
α_2	6.52E-04	1.68E-03	1.56E-03	3.09E-03	4.881E+00	2.906E+03	0.943
α_3	3.13E-04	1.22E-03	1.08E-03	2.61E-03	2.802E+00	2.290E+03	1.196
α_4	5.39E-05	5.27E-04	4.07E-04	1.41E-03	1.384E+00	2.624E+03	1.045
α_5	6.78E-07	1.91E-04	8.56E-05	7.41E-04	4.902E-01	2.560E+03	1.071
α_6	1.06E-15	4.46E-05	5.65E-07	2.56E-04	1.146E-01	2.570E+03	1.067
α_7	2.64E-93	5.03E-06	5.35E-25	5.97E-06	1.464E-02	2.911E+03	0.942

CCCG = 8, Gamma = 0.178

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940568	0.9964628	0.9966243	0.9983177	2.025E+03	7.189E+00	--
α_2	3.23E-04	1.18E-03	1.05E-03	2.47E-03	3.019E+00	2.557E+03	0.813
α_3	2.18E-04	1.25E-03	1.05E-03	2.99E-03	1.963E+00	1.562E+03	1.331
α_4	4.25E-05	5.82E-04	4.26E-04	1.65E-03	1.166E+00	2.004E+03	1.038
α_5	1.54E-06	2.72E-04	1.31E-04	1.02E-03	5.375E-01	1.978E+03	1.052
α_6	2.02E-11	9.15E-05	7.10E-06	4.84E-04	1.805E-01	1.973E+03	1.055
α_7	1.14E-35	2.20E-05	1.65E-11	1.08E-04	4.139E-02	1.878E+03	1.109
α_8	8.33E-09	1.37E-04	3.01E-05	6.36E-04	2.827E-01	2.070E+03	1.005

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	4.34E-03	3.36E-03	3.46E-03	2.74E-03	2.39E-03	1.68E-03	1.18E-03
α_3		1.15E-03	6.50E-04	1.08E-03	1.14E-03	1.22E-03	1.25E-03
α_4			5.26E-04	2.33E-04	4.36E-04	5.27E-04	5.82E-04
α_5				2.58E-05	9.76E-05	1.91E-04	2.72E-04
α_6					1.30E-04	4.46E-05	9.15E-05
α_7						5.03E-06	2.20E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	4.34E-03	4.51E-03	4.63E-03	4.08E-03	4.19E-03	3.67E-03	3.54E-03
Gamma		2.56E-01	2.54E-01	3.28E-01	4.30E-01	5.43E-01	6.67E-01
Delta			4.48E-01	1.94E-01	3.68E-01	3.86E-01	4.68E-01
Epsilon				9.97E-02	3.43E-01	3.14E-01	4.73E-01
Mu					5.72E-01	2.06E-01	4.79E-01
Omega						1.01E-01	6.34E-01
Sigma							8.61E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.24	4.86	6.48	8.10	9.72	11.34	12.96
N_1	0.0967	0.1400	0.1800	0.2175	0.2523	0.2845	0.3143
N_2	0.0017	0.0050	0.0100	0.0157	0.0224	0.0301	0.0385
N_3		0.0000	0.0000	0.0003	0.0008	0.0016	0.0025

N₄			0.0000	0.0000	0.0000	0.0000	0.0001
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.4.1.4 ALL-AOV-SO: All Systems Air-Operated Valves Spurious Operation

Generic CCF Parameters

Component Group: Valve
Component Type: Air Operated Valve
Failure Mode: Spurious Closing, Spurious Opening, Spurious Operation
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 29.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9281171	0.9722298	0.9779448	0.9967892	0.9666667	5.141E+01	1.469E+00
α_2	3.21E-03	2.78E-02	2.21E-02	7.19E-02	3.33E-02	1.469E+00	5.141E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9526442	0.9794605	0.9824637	0.9960137	0.9775281	1.015E+02	2.128E+00
α_2	1.29E-03	1.30E-02	1.01E-02	3.50E-02	1.12E-02	1.351E+00	1.023E+02
α_3	1.88E-04	7.50E-03	4.66E-03	2.45E-02	1.12E-02	7.768E-01	1.028E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9598206	0.9809090	0.9829814	0.9949116	0.9830508	1.487E+02	2.894E+00
α_2	1.19E-03	9.96E-03	7.90E-03	2.58E-02	4.24E-03	1.510E+00	1.501E+02
α_3	2.34E-04	5.95E-03	3.97E-03	1.84E-02	8.47E-03	9.024E-01	1.507E+02
α_4	1.02E-05	3.18E-03	1.40E-03	1.24E-02	4.24E-03	4.815E-01	1.511E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9689361	0.9834479	0.9846347	0.9939021	0.9863946	2.633E+02	4.432E+00
α_2	1.41E-03	7.65E-03	6.47E-03	1.80E-02	1.70E-03	2.049E+00	2.657E+02
α_3	5.74E-04	5.32E-03	4.15E-03	1.41E-02	5.10E-03	1.424E+00	2.663E+02
α_4	6.49E-05	2.83E-03	1.73E-03	9.34E-03	5.10E-03	7.572E-01	2.670E+02
α_5	8.70E-10	7.53E-04	8.01E-05	3.87E-03	1.70E-03	2.017E-01	2.676E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9719831	0.9847505	0.9857562	0.9940685	0.9886364	3.122E+02	4.835E+00
α_2	8.39E-04	5.56E-03	4.56E-03	1.37E-02	7.10E-04	1.764E+00	3.153E+02
α_3	5.15E-04	4.60E-03	3.60E-03	1.21E-02	2.84E-03	1.457E+00	3.156E+02
α_4	1.46E-04	3.06E-03	2.10E-03	9.26E-03	4.26E-03	9.710E-01	3.161E+02
α_5	4.23E-06	1.49E-03	6.41E-04	5.83E-03	2.84E-03	4.711E-01	3.166E+02
α_6	5.68E-11	5.43E-04	3.65E-05	2.91E-03	7.10E-04	1.723E-01	3.169E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9761218	0.9859444	0.9866118	0.9934819	0.9902439	4.733E+02	6.747E+00
α_2	9.84E-04	4.74E-03	4.07E-03	1.08E-02	3.05E-04	2.274E+00	4.778E+02
α_3	5.70E-04	3.72E-03	3.06E-03	9.13E-03	1.52E-03	1.786E+00	4.783E+02
α_4	3.02E-04	2.91E-03	2.25E-03	7.75E-03	3.05E-03	1.395E+00	4.787E+02
α_5	6.63E-05	1.83E-03	1.20E-03	5.73E-03	3.05E-03	8.779E-01	4.792E+02
α_6	2.73E-07	7.25E-04	2.21E-04	3.16E-03	1.52E-03	3.478E-01	4.797E+02
α_7	2.48E-23	1.38E-04	3.42E-08	7.86E-04	3.05E-04	6.605E-02	4.800E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9776946	0.9868832	0.9875095	0.9939272	0.9914530	5.060E+02	6.726E+00
α_2	7.21E-04	3.97E-03	3.34E-03	9.34E-03	1.34E-04	2.034E+00	5.107E+02
α_3	3.34E-04	2.89E-03	2.28E-03	7.56E-03	8.01E-04	1.484E+00	5.113E+02
α_4	2.29E-04	2.53E-03	1.92E-03	6.91E-03	2.00E-03	1.296E+00	5.114E+02
α_5	1.06E-04	1.98E-03	1.38E-03	5.89E-03	2.67E-03	1.015E+00	5.117E+02
α_6	9.54E-06	1.14E-03	5.89E-04	4.14E-03	2.00E-03	5.841E-01	5.122E+02
α_7	4.49E-10	3.93E-04	4.17E-05	2.02E-03	8.01E-04	2.016E-01	5.125E+02
α_8	1.92E-15	2.15E-04	2.23E-06	1.24E-03	1.34E-04	1.103E-01	5.126E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.72E-01	9.79E-01	9.81E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01
α_2	2.78E-02	1.30E-02	9.96E-03	7.65E-03	5.56E-03	4.74E-03	3.97E-03
α_3		7.50E-03	5.95E-03	5.32E-03	4.60E-03	3.72E-03	2.89E-03
α_4			3.18E-03	2.83E-03	3.06E-03	2.91E-03	2.53E-03
α_5				7.53E-04	1.49E-03	1.83E-03	1.98E-03
α_6					5.43E-04	7.25E-04	1.14E-03
α_7						1.38E-04	3.93E-04
α_8							2.15E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.72E-01	9.79E-01	9.81E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01
Beta	2.78E-02	2.05E-02	1.91E-02	1.66E-02	1.52E-02	1.41E-02	1.31E-02
Gamma		3.65E-01	4.78E-01	5.38E-01	6.35E-01	6.63E-01	6.98E-01
Delta			3.48E-01	4.02E-01	5.26E-01	6.01E-01	6.84E-01
Epsilon				2.10E-01	3.99E-01	4.81E-01	5.96E-01
Mu					2.68E-01	3.20E-01	4.69E-01
Omega						1.60E-01	3.48E-01
Sigma							3.54E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8

Adj. Ind	29.00	43.50	58.00	72.50	87.00	101.50	116.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313	0.0156
N₃		0.5000	0.5000	0.3750	0.2500	0.1563	0.0938
N₄			0.2500	0.3750	0.3750	0.3125	0.2344
N₅				0.1250	0.2500	0.3125	0.3125
N₆					0.0625	0.1563	0.2344
N₇						0.0313	0.0938
N₈							0.0156

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 8.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.267

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9608835	0.9898956	0.9954815	0.9999663	4.736E+01	4.834E-01	--
α_2	3.37E-05	1.01E-02	4.52E-03	3.91E-02	4.834E-01	4.736E+01	1.094

CCCG = 3, Gamma = 0.270

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787915	0.9923702	0.9942929	0.9993775	1.594E+02	1.226E+00	--
α_2	2.71E-04	5.58E-03	3.85E-03	1.68E-02	9.769E-01	1.740E+02	0.817
α_3	3.28E-08	2.05E-03	3.56E-04	9.93E-03	2.487E-01	1.212E+02	1.177

CCCG = 4, Gamma = 0.271

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9802811	0.9915818	0.9928804	0.9984426	2.423E+02	2.057E+00	--
α_2	5.59E-04	5.07E-03	3.97E-03	1.34E-02	1.442E+00	2.828E+02	0.704
α_3	2.82E-06	2.25E-03	8.45E-04	9.25E-03	4.114E-01	1.825E+02	1.093
α_4	1.44E-09	1.10E-03	1.19E-04	5.62E-03	2.036E-01	1.857E+02	1.075

CCCG = 5, Gamma = 0.272

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9846961	0.9922564	0.9929350	0.9974985	4.719E+02	3.683E+00	--
α_2	8.57E-04	4.20E-03	3.60E-03	9.59E-03	2.243E+00	5.321E+02	0.700
α_3	1.10E-04	2.20E-03	1.52E-03	6.60E-03	9.912E-01	4.501E+02	0.830
α_4	7.46E-07	1.09E-03	3.70E-04	4.64E-03	3.765E-01	3.438E+02	1.088
α_5	2.21E-21	2.55E-04	1.45E-07	1.47E-03	7.237E-02	2.840E+02	1.318

CCCG = 6, Gamma = 0.273

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9856723	0.9925227	0.9931072	0.9973764	5.494E+02	4.139E+00	--
α_2	6.45E-04	3.36E-03	2.85E-03	7.80E-03	2.128E+00	6.314E+02	0.676
α_3	1.38E-04	2.00E-03	1.45E-03	5.73E-03	1.134E+00	5.657E+02	0.756
α_4	8.04E-06	1.23E-03	6.10E-04	4.56E-03	5.533E-01	4.489E+02	0.953
α_5	2.29E-09	5.89E-04	7.86E-05	2.95E-03	2.210E-01	3.750E+02	1.142
α_6	3.79E-16	2.98E-04	2.07E-06	1.73E-03	1.027E-01	3.447E+02	1.242

CCCG = 7, Gamma = 0.273

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9882252	0.9931578	0.9935044	0.9969073	9.336E+02	6.432E+00	--
α_2	7.01E-04	2.70E-03	2.39E-03	5.74E-03	2.840E+00	1.050E+03	0.680
α_3	2.71E-04	1.83E-03	1.50E-03	4.53E-03	1.746E+00	9.523E+02	0.750
α_4	7.87E-05	1.26E-03	9.04E-04	3.68E-03	1.084E+00	8.564E+02	0.834
α_5	4.02E-06	7.07E-04	3.42E-04	2.65E-03	5.376E-01	7.599E+02	0.941
α_6	2.62E-10	2.99E-04	3.02E-05	1.54E-03	1.979E-01	6.622E+02	1.080
α_7	1.01E-52	4.51E-05	4.52E-15	1.54E-04	2.656E-02	5.884E+02	1.216

CCCG = 8, Gamma = 0.274

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9888385	0.9935904	0.9939321	0.9971756	9.475E+02	6.112E+00	--
α_2	4.64E-04	2.15E-03	1.85E-03	4.83E-03	2.364E+00	1.100E+03	0.653
α_3	1.81E-04	1.52E-03	1.20E-03	3.95E-03	1.512E+00	9.914E+02	0.724
α_4	6.95E-05	1.19E-03	8.40E-04	3.48E-03	1.056E+00	8.894E+02	0.808
α_5	1.27E-05	8.38E-04	4.77E-04	2.89E-03	6.745E-01	8.047E+02	0.893
α_6	5.57E-08	4.15E-04	1.05E-04	1.88E-03	3.076E-01	7.415E+02	0.969
α_7	1.23E-15	1.76E-04	1.73E-06	1.01E-03	1.093E-01	6.225E+02	1.155
α_8	1.97E-18	1.28E-04	3.55E-07	7.45E-04	8.885E-02	6.955E+02	1.034

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.92E-01	9.92E-01	9.92E-01	9.93E-01	9.93E-01	9.94E-01
α_2	1.01E-02	5.58E-03	5.07E-03	4.20E-03	3.36E-03	2.70E-03	2.15E-03
α_3		2.05E-03	2.25E-03	2.20E-03	2.00E-03	1.83E-03	1.52E-03
α_4			1.10E-03	1.09E-03	1.23E-03	1.26E-03	1.19E-03
α_5				2.55E-04	5.89E-04	7.07E-04	8.38E-04
α_6					2.98E-04	2.99E-04	4.15E-04
α_7						4.51E-05	1.76E-04
α_8							1.28E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.92E-01	9.92E-01	9.92E-01	9.93E-01	9.93E-01	9.94E-01
Beta	1.01E-02	7.63E-03	8.42E-03	7.74E-03	7.48E-03	6.84E-03	6.41E-03
Gamma		2.68E-01	3.97E-01	4.58E-01	5.51E-01	6.06E-01	6.65E-01
Delta			3.27E-01	3.80E-01	5.14E-01	5.58E-01	6.43E-01
Epsilon				1.89E-01	4.19E-01	4.54E-01	5.67E-01
Mu					3.36E-01	3.27E-01	4.62E-01
Omega						1.31E-01	4.22E-01
Sigma							4.21E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.00	12.00	16.00	20.00	24.00	28.00	32.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 10.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9193113	0.9795954	0.9913530	0.9999541	2.159E+01	4.498E-01	--
α_2	4.59E-05	2.04E-02	8.65E-03	8.07E-02	4.498E-01	2.159E+01	1.094

CCCG = 3, Gamma = 0.337

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9421601	0.9793375	0.9846250	0.9984272	5.585E+01	1.178E+00	--
α_2	6.68E-04	1.51E-02	1.03E-02	4.59E-02	9.387E-01	6.121E+01	0.817
α_3	5.86E-08	5.56E-03	9.01E-04	2.73E-02	2.396E-01	4.287E+01	1.177

CCCG = 4, Gamma = 0.339

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9480358	0.9782408	0.9817814	0.9963306	8.535E+01	1.898E+00	--
α_2	1.13E-03	1.25E-02	9.53E-03	3.42E-02	1.285E+00	1.013E+02	0.704
α_3	5.50E-06	5.95E-03	2.13E-03	2.48E-02	3.927E-01	6.564E+01	1.093
α_4	1.27E-08	3.29E-03	4.41E-04	1.65E-02	2.207E-01	6.690E+01	1.075

CCCG = 5, Gamma = 0.340

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9586712	0.9792686	0.9811290	0.9935073	1.656E+02	3.506E+00	--
α_2	1.85E-03	1.04E-02	8.75E-03	2.46E-02	1.992E+00	1.895E+02	0.700
α_3	4.12E-04	6.67E-03	4.78E-03	1.94E-02	1.078E+00	1.605E+02	0.830
α_4	1.55E-06	2.95E-03	9.54E-04	1.26E-02	3.632E-01	1.230E+02	1.088
α_5	6.59E-21	7.12E-04	4.13E-07	4.13E-03	7.248E-02	1.017E+02	1.318

CCCG = 6, Gamma = 0.341

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9626403	0.9803475	0.9818271	0.9929992	2.095E+02	4.199E+00	--
α_2	1.36E-03	7.89E-03	6.60E-03	1.88E-02	1.941E+00	2.440E+02	0.676
α_3	5.79E-04	6.05E-03	4.64E-03	1.64E-02	1.332E+00	2.187E+02	0.756
α_4	3.80E-05	3.54E-03	1.91E-03	1.26E-02	6.181E-01	1.738E+02	0.953
α_5	1.09E-08	1.59E-03	2.36E-04	7.87E-03	2.313E-01	1.454E+02	1.142
α_6	5.24E-20	5.74E-04	5.41E-07	3.34E-03	7.684E-02	1.338E+02	1.242

CCCG = 7, Gamma = 0.341

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9670859	0.9809506	0.9819239	0.9914912	3.204E+02	6.223E+00	--
α_2	1.76E-03	7.22E-03	6.34E-03	1.56E-02	2.654E+00	3.651E+02	0.680
α_3	6.72E-04	4.94E-03	3.99E-03	1.24E-02	1.645E+00	3.316E+02	0.750
α_4	2.48E-04	3.72E-03	2.69E-03	1.07E-02	1.115E+00	2.984E+02	0.834
α_5	2.20E-05	2.27E-03	1.20E-03	8.15E-03	6.034E-01	2.650E+02	0.941
α_6	1.37E-10	7.69E-04	5.73E-05	4.08E-03	1.780E-01	2.312E+02	1.080
α_7	7.25E-51	1.33E-04	2.73E-14	4.70E-04	2.734E-02	2.055E+02	1.216

CCCG = 8, Gamma = 0.342

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9689958	0.9820466	0.9829626	0.9919693	3.416E+02	6.246E+00	--
α_2	1.43E-03	6.23E-03	5.43E-03	1.37E-02	2.504E+00	3.996E+02	0.653
α_3	4.19E-04	3.92E-03	3.05E-03	1.04E-02	1.419E+00	3.609E+02	0.724
α_4	1.74E-04	3.16E-03	2.22E-03	9.37E-03	1.027E+00	3.239E+02	0.808
α_5	5.14E-05	2.50E-03	1.50E-03	8.34E-03	7.337E-01	2.931E+02	0.893
α_6	1.46E-06	1.47E-03	5.30E-04	6.11E-03	3.975E-01	2.703E+02	0.969
α_7	3.39E-20	3.39E-04	3.25E-07	1.97E-03	7.703E-02	2.271E+02	1.155
α_8	3.20E-18	3.45E-04	8.61E-07	2.01E-03	8.749E-02	2.537E+02	1.034

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.80E-01	9.79E-01	9.78E-01	9.79E-01	9.80E-01	9.81E-01	9.82E-01
α_2	2.04E-02	1.51E-02	1.25E-02	1.04E-02	7.89E-03	7.22E-03	6.23E-03
α_3		5.56E-03	5.95E-03	6.67E-03	6.05E-03	4.94E-03	3.92E-03
α_4			3.29E-03	2.95E-03	3.54E-03	3.72E-03	3.16E-03
α_5				7.12E-04	1.59E-03	2.27E-03	2.50E-03
α_6					5.74E-04	7.69E-04	1.47E-03
α_7						1.33E-04	3.39E-04
α_8							3.45E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.80E-01	9.79E-01	9.78E-01	9.79E-01	9.80E-01	9.81E-01	9.82E-01
Beta	2.04E-02	2.07E-02	2.18E-02	2.07E-02	1.97E-02	1.90E-02	1.80E-02
Gamma		2.69E-01	4.24E-01	4.98E-01	5.98E-01	6.21E-01	6.53E-01
Delta			3.56E-01	3.54E-01	4.85E-01	5.83E-01	6.66E-01
Epsilon				1.95E-01	3.79E-01	4.60E-01	5.95E-01
Mu					2.65E-01	2.84E-01	4.63E-01
Omega						1.47E-01	3.18E-01
Sigma							5.04E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	10.00	15.00	20.00	25.00	30.00	35.00	40.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.067

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7687205	0.9440042	0.9789735	0.9999546	6.408E+00	3.801E-01	--
α_2	4.54E-05	5.60E-02	2.10E-02	2.31E-01	3.801E-01	6.408E+00	1.094

CCCG = 3, Gamma = 0.067

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8413778	0.9462883	0.9619989	0.9973767	1.691E+01	9.600E-01	--
α_2	4.98E-04	3.29E-02	1.92E-02	1.12E-01	6.673E-01	1.961E+01	0.817
α_3	1.86E-06	2.08E-02	5.09E-03	9.56E-02	2.927E-01	1.378E+01	1.177

CCCG = 4, Gamma = 0.068

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8700198	0.9469803	0.9561956	0.9923499	2.981E+01	1.669E+00	--
α_2	1.58E-03	2.74E-02	1.96E-02	7.98E-02	1.039E+00	3.691E+01	0.704
α_3	1.40E-05	1.59E-02	5.73E-03	6.64E-02	3.887E-01	2.403E+01	1.093
α_4	1.13E-07	9.72E-03	1.62E-03	4.76E-02	2.414E-01	2.458E+01	1.075

CCCG = 5, Gamma = 0.068

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9122025	0.9556328	0.9594523	0.9859979	7.511E+01	3.487E+00	--
α_2	3.09E-03	1.99E-02	1.64E-02	4.84E-02	1.791E+00	8.832E+01	0.700
α_3	1.26E-03	1.59E-02	1.19E-02	4.42E-02	1.207E+00	7.486E+01	0.830
α_4	1.33E-05	7.48E-03	3.00E-03	3.01E-02	4.340E-01	5.760E+01	1.088
α_5	2.56E-26	1.15E-03	4.10E-08	6.34E-03	5.493E-02	4.784E+01	1.318

CCCG = 6, Gamma = 0.068

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9236728	0.9603228	0.9634070	0.9864268	9.450E+01	3.905E+00	--
α_2	1.11E-03	1.15E-02	8.83E-03	3.10E-02	1.335E+00	1.149E+02	0.676
α_3	1.81E-03	1.47E-02	1.17E-02	3.78E-02	1.531E+00	1.024E+02	0.756
α_4	1.69E-04	8.72E-03	5.20E-03	2.93E-02	7.191E-01	8.171E+01	0.953
α_5	5.26E-08	3.59E-03	6.15E-04	1.74E-02	2.467E-01	6.856E+01	1.142
α_6	1.27E-20	1.15E-03	6.94E-07	6.68E-03	7.279E-02	6.317E+01	1.242

CCCG = 7, Gamma = 0.068

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9379510	0.9645335	0.9664228	0.9846611	1.569E+02	5.770E+00	--
α_2	1.02E-03	8.21E-03	6.55E-03	2.11E-02	1.549E+00	1.871E+02	0.680
α_3	2.07E-03	1.16E-02	9.80E-03	2.75E-02	1.989E+00	1.689E+02	0.750
α_4	7.53E-04	8.38E-03	6.36E-03	2.29E-02	1.287E+00	1.523E+02	0.834
α_5	8.47E-05	5.07E-03	2.95E-03	1.73E-02	6.913E-01	1.355E+02	0.941
α_6	1.45E-08	1.96E-03	2.96E-04	9.70E-03	2.327E-01	1.184E+02	1.080
α_7	1.36E-64	2.00E-04	3.04E-17	5.05E-04	2.112E-02	1.054E+02	1.216

CCCG = 8, Gamma = 0.068

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9457840	0.9676475	0.9690761	0.9846320	2.099E+02	7.016E+00	--
α_2	7.81E-04	6.08E-03	4.87E-03	1.55E-02	1.583E+00	2.589E+02	0.653
α_3	1.50E-03	8.46E-03	7.11E-03	2.00E-02	1.986E+00	2.327E+02	0.724
α_4	1.11E-03	7.94E-03	6.45E-03	1.99E-02	1.672E+00	2.088E+02	0.808
α_5	2.81E-04	5.31E-03	3.71E-03	1.58E-02	1.011E+00	1.894E+02	0.893
α_6	2.47E-05	3.26E-03	1.66E-03	1.19E-02	5.709E-01	1.748E+02	0.969
α_7	2.82E-10	1.23E-03	9.63E-05	6.50E-03	1.809E-01	1.470E+02	1.155
α_8	1.09E-107	7.57E-05	2.29E-27	5.67E-05	1.245E-02	1.644E+02	1.034

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.44E-01	9.46E-01	9.47E-01	9.56E-01	9.60E-01	9.65E-01	9.68E-01
α_2	5.60E-02	3.29E-02	2.74E-02	1.99E-02	1.15E-02	8.21E-03	6.08E-03
α_3		2.08E-02	1.59E-02	1.59E-02	1.47E-02	1.16E-02	8.46E-03
α_4			9.72E-03	7.48E-03	8.72E-03	8.38E-03	7.94E-03
α_5				1.15E-03	3.59E-03	5.07E-03	5.31E-03
α_6					1.15E-03	1.96E-03	3.26E-03
α_7						2.00E-04	1.23E-03
α_8							7.57E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.44E-01	9.46E-01	9.47E-01	9.56E-01	9.60E-01	9.65E-01	9.68E-01
Beta	5.60E-02	5.37E-02	5.30E-02	4.44E-02	3.97E-02	3.55E-02	3.24E-02
Gamma		3.87E-01	4.84E-01	5.52E-01	7.10E-01	7.68E-01	8.12E-01
Delta			3.79E-01	3.52E-01	4.78E-01	5.73E-01	6.78E-01
Epsilon				1.33E-01	3.52E-01	4.63E-01	5.54E-01
Mu					2.43E-01	2.99E-01	4.62E-01
Omega						9.27E-02	2.86E-01
Sigma							5.80E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	3.00	4.00	5.00	6.00	7.00	8.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 8.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8772508	0.9520746	0.9615704	0.9943494	2.921E+01	1.471E+00	--
α_2	5.65E-03	4.79E-02	3.84E-02	1.23E-01	1.471E+00	2.921E+01	1.094

CCCG = 3, Gamma = 0.292

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9386745	0.9734287	0.9773125	0.9948922	7.702E+01	2.103E+00	--
α_2	1.33E-03	1.42E-02	1.09E-02	3.84E-02	1.310E+00	9.098E+01	0.817
α_3	3.33E-04	1.24E-02	7.79E-03	4.00E-02	7.921E-01	6.323E+01	1.177

CCCG = 4, Gamma = 0.288

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9584769	0.9801517	0.9822629	0.9946086	1.458E+02	2.953E+00	--
α_2	1.05E-03	8.35E-03	6.68E-03	2.14E-02	1.562E+00	1.854E+02	0.704
α_3	3.32E-04	7.73E-03	5.23E-03	2.37E-02	9.307E-01	1.194E+02	1.093
α_4	9.37E-06	3.76E-03	1.59E-03	1.49E-02	4.599E-01	1.219E+02	1.075

CCCG = 5, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9713288	0.9850290	0.9861916	0.9947571	2.702E+02	4.107E+00	--
α_2	8.52E-04	5.45E-03	4.50E-03	1.33E-02	1.809E+00	3.299E+02	0.700
α_3	4.41E-04	4.71E-03	3.59E-03	1.28E-02	1.318E+00	2.786E+02	0.830
α_4	8.12E-05	3.54E-03	2.16E-03	1.17E-02	7.566E-01	2.129E+02	1.088
α_5	5.75E-09	1.27E-03	1.74E-04	6.34E-03	2.237E-01	1.761E+02	1.318

CCCG = 6, Gamma = 0.284

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9760052	0.9869561	0.9878239	0.9949427	3.649E+02	4.822E+00	--
α_2	6.00E-04	3.94E-03	3.24E-03	9.69E-03	1.777E+00	4.491E+02	0.676
α_3	3.33E-04	3.37E-03	2.59E-03	9.05E-03	1.358E+00	4.021E+02	0.756
α_4	1.76E-04	3.21E-03	2.25E-03	9.51E-03	1.026E+00	3.188E+02	0.953
α_5	7.72E-06	1.89E-03	8.65E-04	7.22E-03	5.036E-01	2.665E+02	1.142
α_6	1.55E-11	6.45E-04	3.26E-05	3.51E-03	1.582E-01	2.453E+02	1.242

CCCG = 7, Gamma = 0.283

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9805739	0.9887941	0.9893782	0.9950199	5.466E+02	6.195E+00	--
α_2	6.38E-04	3.31E-03	2.81E-03	7.67E-03	2.136E+00	6.442E+02	0.680
α_3	2.88E-04	2.52E-03	1.98E-03	6.59E-03	1.476E+00	5.841E+02	0.750
α_4	2.30E-04	2.49E-03	1.89E-03	6.78E-03	1.309E+00	5.250E+02	0.834
α_5	5.67E-05	1.79E-03	1.15E-03	5.72E-03	8.374E-01	4.659E+02	0.941
α_6	3.56E-07	8.65E-04	2.68E-04	3.76E-03	3.519E-01	4.063E+02	1.080
α_7	5.78E-19	2.33E-04	4.41E-07	1.36E-03	8.416E-02	3.611E+02	1.216

CCCG = 8, Gamma = 0.282

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9824041	0.9896253	0.9901169	0.9951682	6.517E+02	6.832E+00	--
α_2	5.81E-04	2.85E-03	2.44E-03	6.50E-03	2.245E+00	7.864E+02	0.653
α_3	1.87E-04	1.91E-03	1.46E-03	5.13E-03	1.354E+00	7.093E+02	0.724
α_4	1.76E-04	2.00E-03	1.51E-03	5.51E-03	1.276E+00	6.360E+02	0.808
α_5	1.14E-04	1.87E-03	1.33E-03	5.44E-03	1.075E+00	5.753E+02	0.893
α_6	7.40E-06	1.06E-03	5.30E-04	3.90E-03	5.615E-01	5.304E+02	0.969
α_7	2.97E-09	5.12E-04	7.36E-05	2.55E-03	2.282E-01	4.454E+02	1.155
α_8	1.03E-17	1.86E-04	6.73E-07	1.08E-03	9.245E-02	4.978E+02	1.034

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.52E-01	9.73E-01	9.80E-01	9.85E-01	9.87E-01	9.89E-01	9.90E-01
α_2	4.79E-02	1.42E-02	8.35E-03	5.45E-03	3.94E-03	3.31E-03	2.85E-03
α_3		1.24E-02	7.73E-03	4.71E-03	3.37E-03	2.52E-03	1.91E-03
α_4			3.76E-03	3.54E-03	3.21E-03	2.49E-03	2.00E-03
α_5				1.27E-03	1.89E-03	1.79E-03	1.87E-03
α_6					6.45E-04	8.65E-04	1.06E-03
α_7						2.33E-04	5.12E-04
α_8							1.86E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.52E-01	9.73E-01	9.80E-01	9.85E-01	9.87E-01	9.89E-01	9.90E-01
Beta	4.79E-02	2.66E-02	1.98E-02	1.50E-02	1.30E-02	1.12E-02	1.04E-02
Gamma		4.66E-01	5.79E-01	6.36E-01	6.98E-01	7.05E-01	7.26E-01
Delta			3.27E-01	5.05E-01	6.30E-01	6.81E-01	7.47E-01
Epsilon				2.64E-01	4.41E-01	5.38E-01	6.44E-01
Mu					2.55E-01	3.80E-01	4.85E-01
Omega						2.12E-01	3.97E-01
Sigma							2.66E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.00	12.00	16.00	20.00	24.00	28.00	32.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313	0.0156
N_3		0.5000	0.5000	0.3750	0.2500	0.1563	0.0938

N₄			0.2500	0.3750	0.3750	0.3125	0.2344
N₅				0.1250	0.2500	0.3125	0.3125
N₆					0.0625	0.1563	0.2344
N₇						0.0313	0.0938
N₈							0.0156

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9811083	0.9950959	0.9977821	0.9999819	1.001E+02	4.932E-01	--
α_2	1.81E-05	4.90E-03	2.22E-03	1.89E-02	4.932E-01	1.001E+02	1.094

CCCG = 3, Gamma = 0.034

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9883756	0.9960320	0.9971810	0.9997650	2.659E+02	1.059E+00	--
α_2	4.37E-05	2.34E-03	1.38E-03	7.89E-03	7.137E-01	3.048E+02	0.817
α_3	5.87E-07	1.63E-03	4.94E-04	7.12E-03	3.458E-01	2.116E+02	1.177

CCCG = 4, Gamma = 0.034

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9918596	0.9965021	0.9970321	0.9993331	6.024E+02	2.115E+00	--
α_2	2.77E-04	2.24E-03	1.78E-03	5.76E-03	1.549E+00	6.904E+02	0.704
α_3	1.86E-08	5.94E-04	1.16E-04	2.83E-03	2.646E-01	4.450E+02	1.093
α_4	7.35E-08	6.65E-04	1.63E-04	3.04E-03	3.010E-01	4.524E+02	1.075

CCCG = 5, Gamma = 0.034

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9948172	0.9971225	0.9972995	0.9988232	1.845E+03	5.325E+00	--
α_2	5.77E-04	1.81E-03	1.65E-03	3.60E-03	3.632E+00	2.004E+03	0.700
α_3	7.85E-05	7.99E-04	6.14E-04	2.15E-03	1.354E+00	1.693E+03	0.830
α_4	2.17E-08	2.29E-04	5.47E-05	1.05E-03	2.961E-01	1.292E+03	1.088
α_5	1.18E-34	3.98E-05	4.38E-11	1.97E-04	4.243E-02	1.067E+03	1.318

CCCG = 6, Gamma = 0.034

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9946392	0.9970784	0.9972721	0.9988562	1.684E+03	4.936E+00	--
α_2	4.12E-04	1.55E-03	1.38E-03	3.28E-03	2.915E+00	1.876E+03	0.676
α_3	6.38E-05	7.48E-04	5.62E-04	2.07E-03	1.257E+00	1.680E+03	0.756
α_4	1.53E-06	3.77E-04	1.73E-04	1.45E-03	5.031E-01	1.333E+03	0.953
α_5	3.00E-15	1.04E-04	1.37E-06	5.95E-04	1.155E-01	1.113E+03	1.142
α_6	6.63E-13	1.42E-04	5.19E-06	7.86E-04	1.451E-01	1.023E+03	1.242

CCCG = 7, Gamma = 0.034

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9958662	0.9973844	0.9974737	0.9985979	3.681E+03	9.654E+00	--
α_2	4.67E-04	1.21E-03	1.12E-03	2.22E-03	4.851E+00	4.020E+03	0.680
α_3	1.97E-04	7.68E-04	6.79E-04	1.64E-03	2.800E+00	3.644E+03	0.750
α_4	4.31E-05	4.22E-04	3.26E-04	1.13E-03	1.384E+00	3.277E+03	0.834
α_5	5.97E-07	1.69E-04	7.54E-05	6.52E-04	4.902E-01	2.906E+03	0.941
α_6	1.08E-15	4.53E-05	5.73E-07	2.60E-04	1.146E-01	2.532E+03	1.080
α_7	3.42E-93	6.51E-06	6.93E-25	7.73E-06	1.464E-02	2.249E+03	1.216

CCCG = 8, Gamma = 0.034

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9956945	0.9974415	0.9975591	0.9987867	2.787E+03	7.148E+00	--
α_2	2.54E-04	9.39E-04	8.36E-04	1.97E-03	2.980E+00	3.172E+03	0.653
α_3	1.19E-04	6.85E-04	5.73E-04	1.64E-03	1.960E+00	2.859E+03	0.724
α_4	3.32E-05	4.54E-04	3.33E-04	1.29E-03	1.166E+00	2.564E+03	0.808
α_5	1.32E-06	2.32E-04	1.12E-04	8.67E-04	5.375E-01	2.320E+03	0.893
α_6	1.87E-11	8.45E-05	6.55E-06	4.46E-04	1.805E-01	2.137E+03	0.969
α_7	1.19E-35	2.31E-05	1.73E-11	1.13E-04	4.139E-02	1.794E+03	1.155
α_8	8.60E-09	1.41E-04	3.11E-05	6.58E-04	2.827E-01	2.004E+03	1.034

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	4.90E-03	2.34E-03	2.24E-03	1.81E-03	1.55E-03	1.21E-03	9.39E-04
α_3		1.63E-03	5.94E-04	7.99E-04	7.48E-04	7.68E-04	6.85E-04
α_4			6.65E-04	2.29E-04	3.77E-04	4.22E-04	4.54E-04
α_5				3.98E-05	1.04E-04	1.69E-04	2.32E-04
α_6					1.42E-04	4.53E-05	8.45E-05
α_7						6.51E-06	2.31E-05
α_8							1.41E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	4.90E-03	3.97E-03	3.50E-03	2.88E-03	2.92E-03	2.62E-03	2.56E-03
Gamma		4.11E-01	3.60E-01	3.71E-01	4.69E-01	5.39E-01	6.33E-01
Delta			5.28E-01	2.52E-01	4.55E-01	4.56E-01	5.77E-01
Epsilon				1.48E-01	3.94E-01	3.43E-01	5.14E-01
Mu					5.77E-01	2.35E-01	5.18E-01
Omega						1.26E-01	6.60E-01
Sigma							8.59E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.50	2.00	2.50	3.00	3.50	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.4.2 Auxiliary Feedwater Air-Operated Valves

2.4.2.1 AFW-AOV-FTOC: AFW Air-Operated Valves Fail to Open/Close

Generic CCF Parameters

System Group: Clean Water
System: Auxiliary Feedwater
Component Group: Valve
Component Type: Air Operated Valve
Failure Mode: Fail to Close, Fail to Open, Fail to Open or Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 33.3

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9205546	0.9661657	0.9713630	0.9939743	0.9575071	5.621E+01	1.969E+00
α_2	6.03E-03	3.38E-02	2.86E-02	7.94E-02	4.25E-02	1.969E+00	5.621E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9444512	0.9733547	0.9761467	0.9927183	0.9647662	1.082E+02	2.961E+00
α_2	2.71E-03	1.67E-02	1.39E-02	4.02E-02	1.92E-02	1.851E+00	1.093E+02
α_3	6.62E-04	9.99E-03	7.24E-03	2.87E-02	1.60E-02	1.110E+00	1.100E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9532674	0.9758581	0.9778021	0.9918206	0.9708926	1.574E+02	3.894E+00
α_2	1.84E-03	1.14E-02	9.48E-03	2.77E-02	8.49E-03	1.843E+00	1.594E+02
α_3	8.17E-04	8.35E-03	6.43E-03	2.25E-02	1.37E-02	1.347E+00	1.599E+02
α_4	7.77E-05	4.36E-03	2.56E-03	1.48E-02	6.87E-03	7.037E-01	1.606E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9649987	0.9803097	0.9814418	0.9917410	0.9757050	2.741E+02	5.506E+00
α_2	1.63E-03	7.99E-03	6.85E-03	1.82E-02	3.63E-03	2.234E+00	2.774E+02
α_3	9.92E-04	6.42E-03	5.28E-03	1.57E-02	8.73E-03	1.794E+00	2.778E+02
α_4	2.75E-04	4.03E-03	2.93E-03	1.16E-02	8.73E-03	1.128E+00	2.785E+02
α_5	4.93E-07	1.25E-03	3.85E-04	5.44E-03	3.20E-03	3.499E-01	2.793E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9686552	0.9820590	0.9830188	0.9921782	0.9793681	3.251E+02	5.940E+00
α_2	9.07E-04	5.61E-03	4.65E-03	1.36E-02	1.52E-03	1.856E+00	3.292E+02

α_3	7.39E-04	5.15E-03	4.19E-03	1.28E-02	4.87E-03	1.704E+00	3.294E+02
α_4	3.92E-04	4.05E-03	3.11E-03	1.09E-02	7.31E-03	1.341E+00	3.297E+02
α_5	5.56E-05	2.32E-03	1.42E-03	7.62E-03	5.35E-03	7.674E-01	3.303E+02
α_6	3.28E-08	8.19E-04	1.68E-04	3.87E-03	1.58E-03	2.710E-01	3.308E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9739640	0.9841510	0.9847945	0.9921281	0.9821589	4.884E+02	7.865E+00
α_2	9.90E-04	4.67E-03	4.02E-03	1.06E-02	6.27E-04	2.318E+00	4.939E+02
α_3	6.62E-04	3.89E-03	3.25E-03	9.31E-03	2.53E-03	1.930E+00	4.943E+02
α_4	4.78E-04	3.39E-03	2.75E-03	8.49E-03	5.06E-03	1.683E+00	4.945E+02
α_5	2.00E-04	2.47E-03	1.84E-03	6.88E-03	5.55E-03	1.224E+00	4.950E+02
α_6	9.33E-06	1.17E-03	5.98E-04	4.25E-03	3.26E-03	5.783E-01	4.956E+02
α_7	1.72E-13	2.66E-04	6.57E-06	1.50E-03	8.18E-04	1.319E-01	4.961E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9757071	0.9852230	0.9858256	0.9926738	0.9843186	5.232E+02	7.848E+00
α_2	7.11E-04	3.87E-03	3.26E-03	9.08E-03	2.57E-04	2.053E+00	5.290E+02
α_3	3.69E-04	2.94E-03	2.34E-03	7.55E-03	1.26E-03	1.561E+00	5.295E+02
α_4	3.25E-04	2.80E-03	2.21E-03	7.31E-03	3.15E-03	1.489E+00	5.296E+02
α_5	2.34E-04	2.49E-03	1.90E-03	6.76E-03	4.58E-03	1.322E+00	5.297E+02
α_6	6.36E-05	1.68E-03	1.11E-03	5.23E-03	4.00E-03	8.914E-01	5.302E+02
α_7	4.90E-07	7.10E-04	2.40E-04	3.01E-03	1.99E-03	3.772E-01	5.307E+02
α_8	4.36E-12	2.90E-04	1.34E-05	1.59E-03	4.40E-04	1.542E-01	5.309E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.66E-01	9.73E-01	9.76E-01	9.80E-01	9.82E-01	9.84E-01	9.85E-01
α_2	3.38E-02	1.67E-02	1.14E-02	7.99E-03	5.61E-03	4.67E-03	3.87E-03
α_3		9.99E-03	8.35E-03	6.42E-03	5.15E-03	3.89E-03	2.94E-03
α_4			4.36E-03	4.03E-03	4.05E-03	3.39E-03	2.80E-03
α_5				1.25E-03	2.32E-03	2.47E-03	2.49E-03
α_6					8.19E-04	1.17E-03	1.68E-03
α_7						2.66E-04	7.10E-04
α_8							2.90E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.66E-01	9.73E-01	9.76E-01	9.80E-01	9.82E-01	9.84E-01	9.85E-01
Beta	3.38E-02	2.66E-02	2.41E-02	1.97E-02	1.79E-02	1.58E-02	1.48E-02
Gamma		3.75E-01	5.27E-01	5.94E-01	6.88E-01	7.05E-01	7.38E-01
Delta			3.43E-01	4.52E-01	5.83E-01	6.52E-01	7.31E-01
Epsilon				2.37E-01	4.36E-01	5.35E-01	6.48E-01
Mu					2.61E-01	3.67E-01	5.18E-01
Omega						1.86E-01	3.73E-01
Sigma							2.90E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	33.30	49.95	66.60	83.25	99.90	116.55	133.20
N₁	0.5000	0.2500	0.1111	0.0463	0.0185	0.0072	0.0027
N₂	1.5000	1.0000	0.5833	0.3102	0.1551	0.0745	0.0348
N₃		0.8333	0.9444	0.7454	0.4969	0.3003	0.1706
N₄			0.4722	0.7454	0.7454	0.6006	0.4264
N₅				0.2731	0.5463	0.6582	0.6198
N₆					0.1613	0.3867	0.5416
N₇						0.0971	0.2693
N₈							0.0595

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 10.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.283

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9572706	0.9889577	0.9950560	0.9999632	4.329E+01	4.834E-01	--
α_2	3.68E-05	1.10E-02	4.94E-03	4.27E-02	4.834E-01	4.329E+01	1.241

CCCG = 3, Gamma = 0.288

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9730015	0.9902772	0.9927191	0.9992053	1.248E+02	1.226E+00	--
α_2	3.55E-04	7.29E-03	5.03E-03	2.19E-02	9.769E-01	1.331E+02	1.088
α_3	3.90E-08	2.44E-03	4.24E-04	1.18E-02	2.487E-01	1.018E+02	1.430

CCCG = 4, Gamma = 0.291

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9747147	0.9891941	0.9908541	0.9979977	1.883E+02	2.057E+00	--
α_2	7.20E-04	6.52E-03	5.11E-03	1.72E-02	1.442E+00	2.196E+02	0.923
α_3	3.61E-06	2.88E-03	1.08E-03	1.18E-02	4.114E-01	1.426E+02	1.426
α_4	1.85E-09	1.41E-03	1.53E-04	7.21E-03	2.036E-01	1.447E+02	1.408

CCCG = 5, Gamma = 0.293

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9799663	0.9898545	0.9907395	0.9967188	3.593E+02	3.683E+00	--
α_2	1.09E-03	5.32E-03	4.56E-03	1.21E-02	2.243E+00	4.193E+02	0.900
α_3	1.52E-04	3.02E-03	2.09E-03	9.06E-03	9.912E-01	3.274E+02	1.155
α_4	1.01E-06	1.48E-03	5.01E-04	6.28E-03	3.765E-01	2.538E+02	1.492
α_5	2.82E-21	3.25E-04	1.85E-07	1.88E-03	7.237E-02	2.225E+02	1.704

CCCG = 6, Gamma = 0.294

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9813464	0.9902575	0.9910159	0.9965782	4.207E+02	4.139E+00	--
α_2	7.85E-04	4.09E-03	3.47E-03	9.49E-03	2.128E+00	5.185E+02	0.834
α_3	1.89E-04	2.74E-03	1.99E-03	7.83E-03	1.134E+00	4.132E+02	1.049
α_4	1.12E-05	1.71E-03	8.50E-04	6.34E-03	5.533E-01	3.224E+02	1.345
α_5	3.19E-09	8.18E-04	1.09E-04	4.11E-03	2.210E-01	2.698E+02	1.609
α_6	4.93E-16	3.87E-04	2.70E-06	2.25E-03	1.027E-01	2.652E+02	1.637

CCCG = 7, Gamma = 0.295

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9845408	0.9910113	0.9914647	0.9959340	7.091E+02	6.432E+00	--
α_2	8.57E-04	3.30E-03	2.92E-03	7.02E-03	2.840E+00	8.584E+02	0.839
α_3	3.59E-04	2.42E-03	1.98E-03	5.99E-03	1.746E+00	7.191E+02	1.002
α_4	1.09E-04	1.74E-03	1.25E-03	5.07E-03	1.084E+00	6.204E+02	1.163
α_5	5.83E-06	1.02E-03	4.96E-04	3.83E-03	5.376E-01	5.244E+02	1.376
α_6	3.84E-10	4.37E-04	4.41E-05	2.26E-03	1.979E-01	4.526E+02	1.596
α_7	1.43E-52	6.37E-05	6.38E-15	2.18E-04	2.656E-02	4.171E+02	1.732

CCCG = 8, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9854362	0.9916318	0.9920763	0.9963099	7.243E+02	6.112E+00	--
α_2	5.63E-04	2.60E-03	2.25E-03	5.85E-03	2.364E+00	9.062E+02	0.800
α_3	2.33E-04	1.96E-03	1.55E-03	5.08E-03	1.512E+00	7.712E+02	0.941
α_4	9.35E-05	1.60E-03	1.13E-03	4.68E-03	1.056E+00	6.609E+02	1.099
α_5	1.78E-05	1.17E-03	6.69E-04	4.05E-03	6.745E-01	5.738E+02	1.266
α_6	8.38E-08	6.24E-04	1.58E-04	2.83E-03	3.076E-01	4.929E+02	1.475
α_7	1.79E-15	2.56E-04	2.53E-06	1.48E-03	1.093E-01	4.273E+02	1.701
α_8	2.48E-18	1.61E-04	4.46E-07	9.37E-04	8.885E-02	5.528E+02	1.315

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.90E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.92E-01
α_2	1.10E-02	7.29E-03	6.52E-03	5.32E-03	4.09E-03	3.30E-03	2.60E-03
α_3		2.44E-03	2.88E-03	3.02E-03	2.74E-03	2.42E-03	1.96E-03
α_4			1.41E-03	1.48E-03	1.71E-03	1.74E-03	1.60E-03
α_5				3.25E-04	8.18E-04	1.02E-03	1.17E-03
α_6					3.87E-04	4.37E-04	6.24E-04
α_7						6.37E-05	2.56E-04
α_8							1.61E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.90E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.92E-01
Beta	1.10E-02	9.72E-03	1.08E-02	1.01E-02	9.74E-03	8.99E-03	8.37E-03
Gamma		2.51E-01	3.96E-01	4.76E-01	5.80E-01	6.33E-01	6.89E-01
Delta			3.28E-01	3.74E-01	5.16E-01	5.74E-01	6.61E-01
Epsilon				1.80E-01	4.13E-01	4.66E-01	5.81E-01
Mu					3.21E-01	3.28E-01	4.70E-01
Omega						1.27E-01	4.00E-01
Sigma							3.86E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	10.00	15.00	20.00	25.00	30.00	35.00	40.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 6.5

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.212

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8384001	0.9454592	0.9615466	0.9974065	1.646E+01	9.498E-01	--
α_2	2.59E-03	5.45E-02	3.85E-02	1.62E-01	9.498E-01	1.646E+01	1.241

CCCG = 3, Gamma = 0.208

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8815395	0.9487980	0.9562523	0.9905151	3.728E+01	2.012E+00	--
α_2	3.77E-03	3.36E-02	2.66E-02	8.73E-02	1.439E+00	4.136E+01	1.088
α_3	1.38E-04	1.76E-02	9.13E-03	6.38E-02	5.729E-01	3.200E+01	1.430

CCCG = 4, Gamma = 0.205

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8962449	0.9500666	0.9551655	0.9864354	5.515E+01	2.898E+00	--
α_2	3.03E-03	2.25E-02	1.83E-02	5.66E-02	1.618E+00	7.022E+01	0.923
α_3	5.78E-04	1.80E-02	1.17E-02	5.69E-02	8.371E-01	4.566E+01	1.426
α_4	1.90E-05	9.40E-03	3.86E-03	3.76E-02	4.429E-01	4.665E+01	1.408

CCCG = 5, Gamma = 0.203

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9255049	0.9596575	0.9623324	0.9846665	1.089E+02	4.580E+00	--
α_2	3.08E-03	1.55E-02	1.33E-02	3.55E-02	2.177E+00	1.384E+02	0.900
α_3	1.48E-03	1.32E-02	1.04E-02	3.46E-02	1.448E+00	1.080E+02	1.155
α_4	1.80E-04	8.65E-03	5.22E-03	2.88E-02	7.336E-01	8.403E+01	1.492
α_5	1.14E-08	2.97E-03	3.98E-04	1.49E-02	2.206E-01	7.399E+01	1.704

CCCG = 6, Gamma = 0.202

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9338702	0.9629232	0.9650632	0.9846639	1.378E+02	5.304E+00	--
α_2	1.98E-03	1.08E-02	9.13E-03	2.54E-02	2.034E+00	1.860E+02	0.834
α_3	1.35E-03	1.05E-02	8.46E-03	2.69E-02	1.579E+00	1.481E+02	1.049
α_4	4.26E-04	8.47E-03	5.88E-03	2.54E-02	9.885E-01	1.157E+02	1.345
α_5	2.82E-05	5.41E-03	2.59E-03	2.03E-02	5.276E-01	9.701E+01	1.609
α_6	2.63E-10	1.83E-03	1.31E-04	9.76E-03	1.756E-01	9.566E+01	1.637

CCCG = 7, Gamma = 0.201

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9457522	0.9673084	0.9686877	0.9841540	2.172E+02	7.340E+00	--
α_2	2.35E-03	9.48E-03	8.35E-03	2.04E-02	2.697E+00	2.820E+02	0.839
α_3	1.16E-03	7.51E-03	6.18E-03	1.84E-02	1.789E+00	2.365E+02	1.002
α_4	7.19E-04	6.83E-03	5.31E-03	1.81E-02	1.403E+00	2.040E+02	1.163
α_5	2.47E-04	5.47E-03	3.73E-03	1.66E-02	9.491E-01	1.725E+02	1.376
α_6	3.27E-06	2.73E-03	1.02E-03	1.12E-02	4.085E-01	1.492E+02	1.596
α_7	4.80E-17	6.76E-04	2.59E-06	3.94E-03	9.318E-02	1.378E+02	1.732

CCCG = 8, Gamma = 0.200

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9486468	0.9690425	0.9703484	0.9849784	2.306E+02	7.368E+00	--
α_2	1.88E-03	8.09E-03	7.07E-03	1.78E-02	2.523E+00	3.093E+02	0.800
α_3	6.61E-04	5.64E-03	4.46E-03	1.47E-02	1.496E+00	2.637E+02	0.941
α_4	4.32E-04	5.37E-03	4.00E-03	1.50E-02	1.219E+00	2.260E+02	1.099
α_5	3.00E-04	5.28E-03	3.73E-03	1.56E-02	1.041E+00	1.961E+02	1.266
α_6	7.45E-05	4.16E-03	2.44E-03	1.41E-02	7.048E-01	1.685E+02	1.475
α_7	3.28E-08	1.72E-03	3.09E-04	8.31E-03	2.526E-01	1.464E+02	1.701
α_8	4.11E-13	6.92E-04	1.69E-05	3.90E-03	1.314E-01	1.896E+02	1.315

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.45E-01	9.49E-01	9.50E-01	9.60E-01	9.63E-01	9.67E-01	9.69E-01
α_2	5.45E-02	3.36E-02	2.25E-02	1.55E-02	1.08E-02	9.48E-03	8.09E-03
α_3		1.76E-02	1.80E-02	1.32E-02	1.05E-02	7.51E-03	5.64E-03
α_4			9.40E-03	8.65E-03	8.47E-03	6.83E-03	5.37E-03
α_5				2.97E-03	5.41E-03	5.47E-03	5.28E-03
α_6					1.83E-03	2.73E-03	4.16E-03
α_7						6.76E-04	1.72E-03
α_8							6.92E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.45E-01	9.49E-01	9.50E-01	9.60E-01	9.63E-01	9.67E-01	9.69E-01
Beta	5.45E-02	5.12E-02	4.99E-02	4.03E-02	3.71E-02	3.27E-02	3.10E-02
Gamma		3.44E-01	5.49E-01	6.16E-01	7.08E-01	7.10E-01	7.39E-01
Delta			3.43E-01	4.68E-01	5.98E-01	6.77E-01	7.53E-01
Epsilon				2.56E-01	4.61E-01	5.65E-01	6.88E-01
Mu					2.53E-01	3.84E-01	5.55E-01
Omega						1.98E-01	3.67E-01
Sigma							2.87E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.50	9.75	13.00	16.25	19.50	22.75	26.00
N_1	0.5000	0.2500	0.1111	0.0463	0.0185	0.0072	0.0027
N_2	0.5000	0.5000	0.3333	0.1852	0.0926	0.0432	0.0192
N_3		0.3333	0.4444	0.3704	0.2469	0.1440	0.0768

N₄			0.2222	0.3704	0.3704	0.2881	0.1920
N₅				0.1481	0.2963	0.3457	0.3073
N₆					0.0988	0.2305	0.3073
N₇						0.0658	0.1756
N₈							0.0439

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.028

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.6998738	0.9265782	0.9715567	0.9999384	4.797E+00	3.801E-01	--
α_2	6.16E-05	7.34E-02	2.84E-02	3.00E-01	3.801E-01	4.797E+00	1.241

CCCG = 3, Gamma = 0.029

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7784404	0.9239837	0.9453665	0.9961979	1.167E+01	9.600E-01	--
α_2	7.45E-04	4.82E-02	2.86E-02	1.63E-01	6.673E-01	1.317E+01	1.088
α_3	2.52E-06	2.78E-02	6.90E-03	1.28E-01	2.927E-01	1.024E+01	1.430

CCCG = 4, Gamma = 0.029

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8181241	0.9249826	0.9374689	0.9889910	2.058E+01	1.669E+00	--
α_2	2.27E-03	3.88E-02	2.80E-02	1.12E-01	1.039E+00	2.572E+01	0.923
α_3	1.99E-05	2.24E-02	8.16E-03	9.34E-02	3.887E-01	1.693E+01	1.426
α_4	1.62E-07	1.38E-02	2.31E-03	6.74E-02	2.414E-01	1.730E+01	1.408

CCCG = 5, Gamma = 0.029

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8784968	0.9381901	0.9433218	0.9803199	5.293E+01	3.487E+00	--
α_2	4.16E-03	2.66E-02	2.20E-02	6.45E-02	1.791E+00	6.559E+01	0.900
α_3	1.84E-03	2.30E-02	1.73E-02	6.38E-02	1.207E+00	5.127E+01	1.155
α_4	1.91E-05	1.07E-02	4.31E-03	4.30E-02	4.340E-01	4.019E+01	1.492
α_5	3.46E-26	1.54E-03	5.54E-08	8.56E-03	5.493E-02	3.551E+01	1.704

CCCG = 6, Gamma = 0.029

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8936455	0.9443931	0.9485756	0.9808330	6.631E+01	3.905E+00	--
α_2	1.43E-03	1.47E-02	1.13E-02	3.96E-02	1.335E+00	8.924E+01	0.834
α_3	2.62E-03	2.12E-02	1.70E-02	5.44E-02	1.531E+00	7.055E+01	1.049
α_4	2.49E-04	1.28E-02	7.66E-03	4.29E-02	7.191E-01	5.547E+01	1.345
α_5	7.74E-08	5.25E-03	9.04E-04	2.55E-02	2.467E-01	4.673E+01	1.609
α_6	1.74E-20	1.58E-03	9.54E-07	9.17E-03	7.279E-02	4.608E+01	1.637

CCCG = 7, Gamma = 0.029

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9140801	0.9506795	0.9532319	0.9785560	1.112E+02	5.770E+00	--
α_2	1.30E-03	1.04E-02	8.32E-03	2.67E-02	1.549E+00	1.471E+02	0.839
α_3	2.85E-03	1.60E-02	1.35E-02	3.77E-02	1.989E+00	1.224E+02	1.002
α_4	1.08E-03	1.20E-02	9.13E-03	3.27E-02	1.287E+00	1.059E+02	1.163
α_5	1.28E-04	7.63E-03	4.44E-03	2.60E-02	6.913E-01	8.989E+01	1.376
α_6	2.21E-08	2.98E-03	4.50E-04	1.47E-02	2.327E-01	7.789E+01	1.596
α_7	2.00E-64	2.93E-04	4.46E-17	7.41E-04	2.112E-02	7.196E+01	1.732

CCCG = 8, Gamma = 0.030

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9253752	0.9553137	0.9572368	0.9786829	1.500E+02	7.016E+00	--
α_2	9.82E-04	7.63E-03	6.12E-03	1.95E-02	1.583E+00	2.058E+02	0.800
α_3	2.00E-03	1.13E-02	9.47E-03	2.66E-02	1.986E+00	1.744E+02	0.941
α_4	1.55E-03	1.11E-02	8.99E-03	2.77E-02	1.672E+00	1.494E+02	1.099
α_5	4.09E-04	7.71E-03	5.39E-03	2.29E-02	1.011E+00	1.301E+02	1.266
α_6	3.85E-05	5.07E-03	2.59E-03	1.85E-02	5.709E-01	1.120E+02	1.475
α_7	4.27E-10	1.85E-03	1.46E-04	9.81E-03	1.809E-01	9.739E+01	1.701
α_8	1.43E-107	9.86E-05	2.99E-27	7.40E-05	1.245E-02	1.262E+02	1.315

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.27E-01	9.24E-01	9.25E-01	9.38E-01	9.44E-01	9.51E-01	9.55E-01
α_2	7.34E-02	4.82E-02	3.88E-02	2.66E-02	1.47E-02	1.04E-02	7.63E-03
α_3		2.78E-02	2.24E-02	2.30E-02	2.12E-02	1.60E-02	1.13E-02
α_4			1.38E-02	1.07E-02	1.28E-02	1.20E-02	1.11E-02
α_5				1.54E-03	5.25E-03	7.63E-03	7.71E-03
α_6					1.58E-03	2.98E-03	5.07E-03
α_7						2.93E-04	1.85E-03
α_8							9.86E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.27E-01	9.24E-01	9.25E-01	9.38E-01	9.44E-01	9.51E-01	9.55E-01
Beta	7.34E-02	7.60E-02	7.50E-02	6.18E-02	5.56E-02	4.93E-02	4.47E-02
Gamma		3.66E-01	4.83E-01	5.70E-01	7.35E-01	7.89E-01	8.29E-01
Delta			3.80E-01	3.47E-01	4.80E-01	5.89E-01	6.96E-01
Epsilon				1.26E-01	3.48E-01	4.76E-01	5.71E-01
Mu					2.31E-01	3.00E-01	4.77E-01
Omega						8.97E-02	2.78E-01
Sigma							5.05E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.50	2.00	2.50	3.00	3.50	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 10.2

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.317

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8695060	0.9489695	0.9590226	0.9939680	2.735E+01	1.471E+00	--
α_2	6.03E-03	5.10E-02	4.10E-02	1.30E-01	1.471E+00	2.735E+01	1.241

CCCG = 3, Gamma = 0.313

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9251220	0.9674701	0.9721724	0.9937222	6.253E+01	2.103E+00	--
α_2	1.70E-03	1.81E-02	1.39E-02	4.90E-02	1.310E+00	7.097E+01	1.088
α_3	3.88E-04	1.44E-02	9.09E-03	4.65E-02	7.921E-01	5.421E+01	1.430

CCCG = 4, Gamma = 0.311

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9475462	0.9748746	0.9775204	0.9931556	1.146E+02	2.953E+00	--
α_2	1.34E-03	1.06E-02	8.48E-03	2.71E-02	1.562E+00	1.458E+02	0.923
α_3	4.20E-04	9.76E-03	6.61E-03	2.98E-02	9.307E-01	9.442E+01	1.426
α_4	1.19E-05	4.76E-03	2.02E-03	1.88E-02	4.599E-01	9.612E+01	1.408

CCCG = 5, Gamma = 0.310

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9625353	0.9804060	0.9819141	0.9931238	2.055E+02	4.107E+00	--
α_2	1.07E-03	6.84E-03	5.65E-03	1.67E-02	1.809E+00	2.625E+02	0.900
α_3	6.00E-04	6.40E-03	4.89E-03	1.74E-02	1.318E+00	2.046E+02	1.155
α_4	1.09E-04	4.75E-03	2.90E-03	1.57E-02	7.566E-01	1.586E+02	1.492
α_5	7.27E-09	1.60E-03	2.21E-04	8.02E-03	2.237E-01	1.393E+02	1.704

CCCG = 6, Gamma = 0.310

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9684193	0.9828092	0.9839438	0.9933235	2.757E+02	4.822E+00	--
α_2	7.25E-04	4.76E-03	3.91E-03	1.17E-02	1.777E+00	3.716E+02	0.834
α_3	4.53E-04	4.57E-03	3.52E-03	1.23E-02	1.358E+00	2.958E+02	1.049
α_4	2.43E-04	4.43E-03	3.11E-03	1.31E-02	1.026E+00	2.306E+02	1.345
α_5	1.07E-05	2.60E-03	1.19E-03	9.95E-03	5.036E-01	1.931E+02	1.609
α_6	2.00E-11	8.32E-04	4.21E-05	4.53E-03	1.582E-01	1.901E+02	1.637

CCCG = 7, Gamma = 0.309

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9742171	0.9851112	0.9858816	0.9933743	4.099E+02	6.195E+00	--
α_2	7.74E-04	4.01E-03	3.41E-03	9.30E-03	2.136E+00	5.306E+02	0.839
α_3	3.79E-04	3.31E-03	2.60E-03	8.66E-03	1.476E+00	4.444E+02	1.002
α_4	3.15E-04	3.41E-03	2.59E-03	9.27E-03	1.309E+00	3.831E+02	1.163
α_5	8.15E-05	2.58E-03	1.66E-03	8.22E-03	8.374E-01	3.238E+02	1.376
α_6	5.17E-07	1.26E-03	3.89E-04	5.45E-03	3.519E-01	2.797E+02	1.596
α_7	8.10E-19	3.26E-04	6.18E-07	1.90E-03	8.416E-02	2.579E+02	1.732

CCCG = 8, Gamma = 0.309

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9767888	0.9863018	0.9869466	0.9936131	4.919E+02	6.832E+00	--
α_2	7.01E-04	3.43E-03	2.94E-03	7.84E-03	2.245E+00	6.518E+02	0.800
α_3	2.39E-04	2.43E-03	1.87E-03	6.55E-03	1.354E+00	5.549E+02	0.941
α_4	2.36E-04	2.68E-03	2.02E-03	7.36E-03	1.276E+00	4.753E+02	1.099
α_5	1.59E-04	2.60E-03	1.86E-03	7.58E-03	1.075E+00	4.125E+02	1.266
α_6	1.11E-05	1.58E-03	7.93E-04	5.82E-03	5.615E-01	3.545E+02	1.475
α_7	4.30E-09	7.41E-04	1.07E-04	3.69E-03	2.282E-01	3.075E+02	1.701
α_8	1.28E-17	2.32E-04	8.42E-07	1.35E-03	9.245E-02	3.980E+02	1.315

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.49E-01	9.67E-01	9.75E-01	9.80E-01	9.83E-01	9.85E-01	9.86E-01
α_2	5.10E-02	1.81E-02	1.06E-02	6.84E-03	4.76E-03	4.01E-03	3.43E-03
α_3		1.44E-02	9.76E-03	6.40E-03	4.57E-03	3.31E-03	2.43E-03
α_4			4.76E-03	4.75E-03	4.43E-03	3.41E-03	2.68E-03
α_5				1.60E-03	2.60E-03	2.58E-03	2.60E-03
α_6					8.32E-04	1.26E-03	1.58E-03
α_7						3.26E-04	7.41E-04
α_8							2.32E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.49E-01	9.67E-01	9.75E-01	9.80E-01	9.83E-01	9.85E-01	9.86E-01
Beta	5.10E-02	3.25E-02	2.51E-02	1.96E-02	1.72E-02	1.49E-02	1.37E-02
Gamma		4.43E-01	5.78E-01	6.51E-01	7.23E-01	7.31E-01	7.49E-01
Delta			3.28E-01	4.98E-01	6.32E-01	6.96E-01	7.63E-01
Epsilon				2.52E-01	4.37E-01	5.50E-01	6.58E-01
Mu					2.42E-01	3.80E-01	4.96E-01
Omega						2.06E-01	3.81E-01
Sigma							2.39E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	10.20	15.30	20.40	25.50	30.60	35.70	40.80
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313	0.0156
N ₃		0.5000	0.5000	0.3750	0.2500	0.1563	0.0938

N₄			0.2500	0.3750	0.3750	0.3125	0.2344
N₅				0.1250	0.2500	0.3125	0.3125
N₆					0.0625	0.1563	0.2344
N₇						0.0313	0.0938
N₈							0.0156

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 5.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.159

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794300	0.9946592	0.9975832	0.9999803	9.185E+01	4.932E-01	--
α_2	1.97E-05	5.34E-03	2.42E-03	2.06E-02	4.932E-01	9.185E+01	1.241

CCCG = 3, Gamma = 0.161

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9854802	0.9950412	0.9964749	0.9997061	2.126E+02	1.059E+00	--
α_2	5.67E-05	3.03E-03	1.79E-03	1.02E-02	7.137E-01	2.349E+02	1.088
α_3	6.95E-07	1.93E-03	5.84E-04	8.42E-03	3.458E-01	1.789E+02	1.430

CCCG = 4, Gamma = 0.163

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9895394	0.9955032	0.9961834	0.9991420	4.681E+02	2.115E+00	--
α_2	3.57E-04	2.88E-03	2.29E-03	7.42E-03	1.549E+00	5.359E+02	0.923
α_3	2.38E-08	7.61E-04	1.49E-04	3.62E-03	2.646E-01	3.476E+02	1.426
α_4	9.44E-08	8.54E-04	2.10E-04	3.90E-03	3.010E-01	3.521E+02	1.408

CCCG = 5, Gamma = 0.164

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9932086	0.9962283	0.9964599	0.9984570	1.406E+03	5.325E+00	--
α_2	7.35E-04	2.31E-03	2.10E-03	4.58E-03	3.632E+00	1.572E+03	0.900
α_3	1.08E-04	1.10E-03	8.47E-04	2.97E-03	1.354E+00	1.226E+03	1.155
α_4	2.96E-08	3.12E-04	7.44E-05	1.43E-03	2.961E-01	9.496E+02	1.492
α_5	1.52E-34	5.10E-05	5.62E-11	2.53E-04	4.243E-02	8.316E+02	1.704

CCCG = 6, Gamma = 0.165

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9930746	0.9962247	0.9964745	0.9985215	1.302E+03	4.936E+00	--
α_2	5.03E-04	1.89E-03	1.68E-03	4.00E-03	2.915E+00	1.537E+03	0.834
α_3	8.75E-05	1.03E-03	7.71E-04	2.84E-03	1.257E+00	1.224E+03	1.049
α_4	2.14E-06	5.27E-04	2.41E-04	2.02E-03	5.031E-01	9.547E+02	1.345
α_5	4.19E-15	1.45E-04	1.91E-06	8.29E-04	1.155E-01	7.984E+02	1.609
α_6	8.65E-13	1.85E-04	6.77E-06	1.02E-03	1.451E-01	7.844E+02	1.637

CCCG = 7, Gamma = 0.165

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9946196	0.9965950	0.9967110	0.9981743	2.826E+03	9.654E+00	--
α_2	5.73E-04	1.48E-03	1.38E-03	2.73E-03	4.851E+00	3.275E+03	0.839
α_3	2.61E-04	1.02E-03	9.02E-04	2.18E-03	2.800E+00	2.742E+03	1.002
α_4	5.98E-05	5.85E-04	4.52E-04	1.56E-03	1.384E+00	2.365E+03	1.163
α_5	8.68E-07	2.45E-04	1.10E-04	9.49E-04	4.902E-01	1.998E+03	1.376
α_6	1.58E-15	6.65E-05	8.42E-07	3.81E-04	1.146E-01	1.724E+03	1.596
α_7	4.85E-93	9.22E-06	9.81E-25	1.10E-05	1.464E-02	1.588E+03	1.732

CCCG = 8, Gamma = 0.166

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9944473	0.9966997	0.9968513	0.9984345	2.159E+03	7.148E+00	--
α_2	3.09E-04	1.14E-03	1.02E-03	2.40E-03	2.980E+00	2.609E+03	0.800
α_3	1.53E-04	8.82E-04	7.38E-04	2.11E-03	1.960E+00	2.219E+03	0.941
α_4	4.48E-05	6.13E-04	4.49E-04	1.74E-03	1.166E+00	1.902E+03	1.099
α_5	1.85E-06	3.25E-04	1.58E-04	1.22E-03	5.375E-01	1.651E+03	1.266
α_6	2.81E-11	1.27E-04	9.88E-06	6.73E-04	1.805E-01	1.418E+03	1.475
α_7	1.74E-35	3.37E-05	2.52E-11	1.65E-04	4.139E-02	1.229E+03	1.701
α_8	1.08E-08	1.78E-04	3.92E-05	8.29E-04	2.827E-01	1.589E+03	1.315

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
α_2	5.34E-03	3.03E-03	2.88E-03	2.31E-03	1.89E-03	1.48E-03	1.14E-03
α_3		1.93E-03	7.61E-04	1.10E-03	1.03E-03	1.02E-03	8.82E-04
α_4			8.54E-04	3.12E-04	5.27E-04	5.85E-04	6.13E-04
α_5				5.10E-05	1.45E-04	2.45E-04	3.25E-04
α_6					1.85E-04	6.65E-05	1.27E-04
α_7						9.22E-06	3.37E-05
α_8							1.78E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
Beta	5.34E-03	4.96E-03	4.50E-03	3.77E-03	3.78E-03	3.41E-03	3.30E-03
Gamma		3.89E-01	3.59E-01	3.89E-01	4.99E-01	5.66E-01	6.54E-01
Delta			5.29E-01	2.47E-01	4.55E-01	4.70E-01	5.91E-01
Epsilon				1.41E-01	3.85E-01	3.54E-01	5.20E-01
Mu					5.61E-01	2.36E-01	5.10E-01
Omega						1.22E-01	6.24E-01
Sigma							8.41E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.60	8.40	11.20	14.00	16.80	19.60	22.40
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.4.2.2 AFW-AOV-CC: AFW Air-Operated Valves Fail to Open

Generic CCF Parameters

System Group: Clean Water
System: Auxiliary Feedwater
Component Group: Valve
Component Type: Air Operated Valve
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 16.1

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.8879518	0.9519654	0.9591544	0.9913554	0.9171271	3.901E+01	1.969E+00
α_2	8.64E-03	4.80E-02	4.08E-02	1.12E-01	8.29E-02	1.969E+00	3.901E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9278945	0.9652993	0.9688785	0.9904709	0.9301144	8.238E+01	2.961E+00
α_2	3.54E-03	2.17E-02	1.81E-02	5.22E-02	3.81E-02	1.851E+00	8.349E+01
α_3	8.64E-04	1.30E-02	9.45E-03	3.73E-02	3.18E-02	1.110E+00	8.423E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9407305	0.9693128	0.9717453	0.9895650	0.9417098	1.230E+02	3.894E+00
α_2	2.34E-03	1.45E-02	1.21E-02	3.51E-02	1.70E-02	1.843E+00	1.250E+02
α_3	1.04E-03	1.06E-02	8.18E-03	2.85E-02	2.75E-02	1.347E+00	1.255E+02
α_4	9.89E-05	5.55E-03	3.25E-03	1.88E-02	1.38E-02	7.037E-01	1.262E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9586850	0.9767318	0.9780657	0.9902316	0.9510490	2.311E+02	5.506E+00
α_2	1.93E-03	9.44E-03	8.10E-03	2.15E-02	7.32E-03	2.234E+00	2.344E+02
α_3	1.17E-03	7.58E-03	6.25E-03	1.86E-02	1.76E-02	1.794E+00	2.348E+02
α_4	3.25E-04	4.77E-03	3.46E-03	1.37E-02	1.76E-02	1.128E+00	2.355E+02
α_5	5.83E-07	1.48E-03	4.55E-04	6.43E-03	6.45E-03	3.499E-01	2.363E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9629049	0.9787466	0.9798769	0.9907216	0.9582548	2.735E+02	5.940E+00
α_2	1.08E-03	6.64E-03	5.51E-03	1.61E-02	3.08E-03	1.856E+00	2.776E+02
α_3	8.76E-04	6.10E-03	4.97E-03	1.52E-02	9.85E-03	1.704E+00	2.778E+02
α_4	4.65E-04	4.80E-03	3.68E-03	1.30E-02	1.48E-02	1.341E+00	2.781E+02

α_5	6.59E-05	2.75E-03	1.69E-03	9.03E-03	1.08E-02	7.674E-01	2.787E+02
α_6	3.89E-08	9.70E-04	1.99E-04	4.58E-03	3.20E-03	2.710E-01	2.792E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9703912	0.9819627	0.9826923	0.9910394	0.9637913	4.282E+02	7.865E+00
α_2	1.13E-03	5.32E-03	4.58E-03	1.20E-02	1.27E-03	2.318E+00	4.337E+02
α_3	7.54E-04	4.43E-03	3.69E-03	1.06E-02	5.14E-03	1.930E+00	4.341E+02
α_4	5.44E-04	3.86E-03	3.13E-03	9.66E-03	1.03E-02	1.683E+00	4.343E+02
α_5	2.27E-04	2.81E-03	2.09E-03	7.82E-03	1.13E-02	1.224E+00	4.348E+02
α_6	1.06E-05	1.33E-03	6.80E-04	4.83E-03	6.61E-03	5.783E-01	4.354E+02
α_7	1.95E-13	3.02E-04	7.47E-06	1.70E-03	1.66E-03	1.319E-01	4.359E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9721074	0.9830237	0.9837131	0.9915720	0.9681009	4.544E+02	7.848E+00
α_2	8.17E-04	4.44E-03	3.75E-03	1.04E-02	5.24E-04	2.053E+00	4.602E+02
α_3	4.24E-04	3.38E-03	2.69E-03	8.67E-03	2.56E-03	1.561E+00	4.607E+02
α_4	3.74E-04	3.22E-03	2.54E-03	8.40E-03	6.41E-03	1.489E+00	4.608E+02
α_5	2.69E-04	2.86E-03	2.18E-03	7.77E-03	9.32E-03	1.322E+00	4.609E+02
α_6	7.31E-05	1.93E-03	1.27E-03	6.01E-03	8.14E-03	8.914E-01	4.614E+02
α_7	5.63E-07	8.16E-04	2.76E-04	3.46E-03	4.05E-03	3.772E-01	4.619E+02
α_8	5.01E-12	3.34E-04	1.54E-05	1.83E-03	8.95E-04	1.542E-01	4.621E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.52E-01	9.65E-01	9.69E-01	9.77E-01	9.79E-01	9.82E-01	9.83E-01
α_2	4.80E-02	2.17E-02	1.45E-02	9.44E-03	6.64E-03	5.32E-03	4.44E-03
α_3		1.30E-02	1.06E-02	7.58E-03	6.10E-03	4.43E-03	3.38E-03
α_4			5.55E-03	4.77E-03	4.80E-03	3.86E-03	3.22E-03
α_5				1.48E-03	2.75E-03	2.81E-03	2.86E-03
α_6					9.70E-04	1.33E-03	1.93E-03
α_7						3.02E-04	8.16E-04
α_8							3.34E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.52E-01	9.65E-01	9.69E-01	9.77E-01	9.79E-01	9.82E-01	9.83E-01
Beta	4.80E-02	3.47E-02	3.07E-02	2.33E-02	2.13E-02	1.80E-02	1.70E-02
Gamma		3.75E-01	5.27E-01	5.94E-01	6.88E-01	7.05E-01	7.38E-01
Delta			3.43E-01	4.52E-01	5.83E-01	6.52E-01	7.31E-01
Epsilon				2.37E-01	4.36E-01	5.35E-01	6.48E-01
Mu					2.61E-01	3.67E-01	5.18E-01
Omega						1.86E-01	3.73E-01
Sigma							2.90E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	16.10	24.15	32.20	40.25	48.30	56.35	64.40
N₁	0.5000	0.2500	0.1111	0.0463	0.0185	0.0072	0.0027
N₂	1.5000	1.0000	0.5833	0.3102	0.1551	0.0745	0.0348
N₃		0.8333	0.9444	0.7454	0.4969	0.3003	0.1706
N₄			0.4722	0.7454	0.7454	0.6006	0.4264
N₅				0.2731	0.5463	0.6582	0.6198
N₆					0.1613	0.3867	0.5416
N₇						0.0971	0.2693
N₈							0.0595

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 7.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.387

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9357043	0.9833423	0.9924857	0.9999439	2.854E+01	4.834E-01	--
α_2	5.61E-05	1.67E-02	7.51E-03	6.43E-02	4.834E-01	2.854E+01	1.769

CCCG = 3, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9588701	0.9851501	0.9888490	0.9987808	8.131E+01	1.226E+00	--
α_2	5.44E-04	1.11E-02	7.70E-03	3.34E-02	9.769E-01	8.681E+01	1.611
α_3	5.98E-08	3.72E-03	6.49E-04	1.80E-02	2.487E-01	6.658E+01	2.116

CCCG = 4, Gamma = 0.408

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9610733	0.9833213	0.9858566	0.9968976	1.213E+02	2.057E+00	--
α_2	1.10E-03	9.94E-03	7.80E-03	2.61E-02	1.442E+00	1.436E+02	1.365
α_3	5.66E-06	4.50E-03	1.70E-03	1.85E-02	4.114E-01	9.105E+01	2.164
α_4	2.95E-09	2.24E-03	2.45E-04	1.15E-02	2.036E-01	9.079E+01	2.176

CCCG = 5, Gamma = 0.413

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9707275	0.9851506	0.9864345	0.9951867	2.443E+02	3.683E+00	--
α_2	1.56E-03	7.60E-03	6.52E-03	1.73E-02	2.243E+00	2.930E+02	1.259
α_3	2.29E-04	4.55E-03	3.15E-03	1.36E-02	9.912E-01	2.168E+02	1.707
α_4	1.52E-06	2.22E-03	7.51E-04	9.41E-03	3.765E-01	1.693E+02	2.191
α_5	4.18E-21	4.82E-04	2.75E-07	2.79E-03	7.237E-02	1.502E+02	2.474

CCCG = 6, Gamma = 0.416

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9726095	0.9856718	0.9867774	0.9949572	2.847E+02	4.139E+00	--
α_2	1.09E-03	5.69E-03	4.84E-03	1.32E-02	2.128E+00	3.718E+02	1.138
α_3	2.91E-04	4.21E-03	3.07E-03	1.20E-02	1.134E+00	2.681E+02	1.580
α_4	1.71E-05	2.61E-03	1.30E-03	9.65E-03	5.533E-01	2.116E+02	2.006
α_5	4.88E-09	1.25E-03	1.67E-04	6.28E-03	2.210E-01	1.763E+02	2.410
α_6	7.21E-16	5.65E-04	3.94E-06	3.28E-03	1.027E-01	1.815E+02	2.342

CCCG = 7, Gamma = 0.419

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9779944	0.9871910	0.9878322	0.9941980	4.957E+02	6.432E+00	--
α_2	1.16E-03	4.45E-03	3.95E-03	9.48E-03	2.840E+00	6.350E+02	1.116
α_3	5.22E-04	3.51E-03	2.87E-03	8.69E-03	1.746E+00	4.951E+02	1.433
α_4	1.59E-04	2.55E-03	1.83E-03	7.43E-03	1.084E+00	4.233E+02	1.678
α_5	8.75E-06	1.54E-03	7.45E-04	5.75E-03	5.376E-01	3.493E+02	2.035
α_6	5.77E-10	6.57E-04	6.63E-05	3.39E-03	1.979E-01	3.012E+02	2.362
α_7	2.13E-52	9.48E-05	9.51E-15	3.24E-04	2.656E-02	2.801E+02	2.542

CCCG = 8, Gamma = 0.421

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9790145	0.9879289	0.9885654	0.9946698	5.002E+02	6.112E+00	--
α_2	7.72E-04	3.57E-03	3.08E-03	8.02E-03	2.364E+00	6.604E+02	1.079
α_3	3.35E-04	2.82E-03	2.23E-03	7.31E-03	1.512E+00	5.355E+02	1.332
α_4	1.38E-04	2.35E-03	1.67E-03	6.90E-03	1.056E+00	4.482E+02	1.592
α_5	2.65E-05	1.75E-03	9.96E-04	6.02E-03	6.745E-01	3.853E+02	1.853
α_6	1.32E-07	9.80E-04	2.49E-04	4.45E-03	3.076E-01	3.136E+02	2.279
α_7	2.76E-15	3.95E-04	3.90E-06	2.28E-03	1.093E-01	2.769E+02	2.582
α_8	3.34E-18	2.16E-04	6.01E-07	1.26E-03	8.885E-02	4.108E+02	1.741

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.85E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.67E-02	1.11E-02	9.94E-03	7.60E-03	5.69E-03	4.45E-03	3.57E-03
α_3		3.72E-03	4.50E-03	4.55E-03	4.21E-03	3.51E-03	2.82E-03
α_4			2.24E-03	2.22E-03	2.61E-03	2.55E-03	2.35E-03
α_5				4.82E-04	1.25E-03	1.54E-03	1.75E-03
α_6					5.65E-04	6.57E-04	9.80E-04
α_7						9.48E-05	3.95E-04
α_8							2.16E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.85E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.67E-02	1.48E-02	1.67E-02	1.48E-02	1.43E-02	1.28E-02	1.21E-02
Gamma		2.51E-01	4.04E-01	4.88E-01	6.03E-01	6.52E-01	7.05E-01
Delta			3.32E-01	3.72E-01	5.12E-01	5.79E-01	6.69E-01
Epsilon				1.78E-01	4.11E-01	4.72E-01	5.87E-01
Mu					3.11E-01	3.28E-01	4.77E-01
Omega						1.26E-01	3.84E-01
Sigma							3.54E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.00	10.50	14.00	17.50	21.00	24.50	28.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.5

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.138

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7087610	0.8988670	0.9262737	0.9949408	8.442E+00	9.498E-01	--
α_2	5.06E-03	1.01E-01	7.37E-02	2.91E-01	9.498E-01	8.442E+00	1.769

CCCG = 3, Gamma = 0.127

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7948892	0.9096684	0.9218017	0.9828040	2.026E+01	2.012E+00	--
α_2	6.80E-03	5.93E-02	4.76E-02	1.52E-01	1.439E+00	2.282E+01	1.611
α_3	2.48E-04	3.10E-02	1.63E-02	1.12E-01	5.729E-01	1.789E+01	2.116

CCCG = 4, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8189753	0.9114653	0.9197919	0.9754166	2.984E+01	2.898E+00	--
α_2	5.35E-03	3.92E-02	3.20E-02	9.78E-02	1.618E+00	3.963E+01	1.365
α_3	1.05E-03	3.22E-02	2.12E-02	1.01E-01	8.371E-01	2.518E+01	2.164
α_4	3.49E-05	1.71E-02	7.11E-03	6.82E-02	4.429E-01	2.543E+01	2.176

CCCG = 5, Gamma = 0.115

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8816238	0.9353595	0.9394311	0.9751693	6.627E+01	4.580E+00	--
α_2	4.81E-03	2.41E-02	2.06E-02	5.50E-02	2.177E+00	8.833E+01	1.259
α_3	2.44E-03	2.17E-02	1.71E-02	5.66E-02	1.448E+00	6.531E+01	1.707
α_4	2.94E-04	1.41E-02	8.54E-03	4.69E-02	7.336E-01	5.129E+01	2.191
α_5	1.85E-08	4.79E-03	6.44E-04	2.41E-02	2.206E-01	4.585E+01	2.474

CCCG = 6, Gamma = 0.112

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8942778	0.9402940	0.9435795	0.9750779	8.353E+01	5.304E+00	--
α_2	2.99E-03	1.63E-02	1.38E-02	3.82E-02	2.034E+00	1.227E+02	1.138
α_3	2.27E-03	1.76E-02	1.41E-02	4.46E-02	1.579E+00	8.825E+01	1.580
α_4	7.06E-04	1.40E-02	9.73E-03	4.17E-02	9.885E-01	6.978E+01	2.006
α_5	4.70E-05	8.96E-03	4.31E-03	3.36E-02	5.276E-01	5.837E+01	2.410
α_6	4.17E-10	2.90E-03	2.09E-04	1.55E-02	1.756E-01	6.041E+01	2.342

CCCG = 7, Gamma = 0.109

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9174476	0.9500120	0.9520457	0.9756289	1.395E+02	7.340E+00	--
α_2	3.39E-03	1.36E-02	1.20E-02	2.93E-02	2.697E+00	1.955E+02	1.116
α_3	1.79E-03	1.16E-02	9.55E-03	2.83E-02	1.789E+00	1.526E+02	1.433
α_4	1.12E-03	1.06E-02	8.29E-03	2.82E-02	1.403E+00	1.305E+02	1.678
α_5	3.95E-04	8.73E-03	5.96E-03	2.65E-02	9.491E-01	1.078E+02	2.035
α_6	5.23E-06	4.36E-03	1.63E-03	1.80E-02	4.085E-01	9.328E+01	2.362
α_7	7.62E-17	1.07E-03	4.11E-06	6.25E-03	9.318E-02	8.696E+01	2.542

CCCG = 8, Gamma = 0.107

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9203823	0.9517741	0.9537361	0.9764634	1.454E+02	7.368E+00	--
α_2	2.76E-03	1.19E-02	1.04E-02	2.61E-02	2.523E+00	2.102E+02	1.079
α_3	1.02E-03	8.68E-03	6.87E-03	2.25E-02	1.496E+00	1.709E+02	1.332
α_4	6.83E-04	8.45E-03	6.32E-03	2.35E-02	1.219E+00	1.430E+02	1.592
α_5	4.79E-04	8.40E-03	5.95E-03	2.47E-02	1.041E+00	1.229E+02	1.853
α_6	1.26E-04	7.00E-03	4.11E-03	2.37E-02	7.048E-01	1.000E+02	2.279
α_7	5.42E-08	2.84E-03	5.10E-04	1.37E-02	2.526E-01	8.866E+01	2.582
α_8	5.93E-13	9.96E-04	2.43E-05	5.62E-03	1.314E-01	1.317E+02	1.741

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	8.99E-01	9.10E-01	9.11E-01	9.35E-01	9.40E-01	9.50E-01	9.52E-01
α_2	1.01E-01	5.93E-02	3.92E-02	2.41E-02	1.63E-02	1.36E-02	1.19E-02
α_3		3.10E-02	3.22E-02	2.17E-02	1.76E-02	1.16E-02	8.68E-03
α_4			1.71E-02	1.41E-02	1.40E-02	1.06E-02	8.45E-03
α_5				4.79E-03	8.96E-03	8.73E-03	8.40E-03
α_6					2.90E-03	4.36E-03	7.00E-03
α_7						1.07E-03	2.84E-03
α_8							9.96E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	8.99E-01	9.10E-01	9.11E-01	9.35E-01	9.40E-01	9.50E-01	9.52E-01
Beta	1.01E-01	9.03E-02	8.85E-02	6.46E-02	5.97E-02	5.00E-02	4.82E-02
Gamma		3.43E-01	5.57E-01	6.28E-01	7.27E-01	7.28E-01	7.54E-01
Delta			3.47E-01	4.65E-01	5.95E-01	6.82E-01	7.61E-01
Epsilon				2.54E-01	4.59E-01	5.71E-01	6.95E-01
Mu					2.44E-01	3.84E-01	5.63E-01
Omega						1.97E-01	3.54E-01
Sigma							2.60E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.50	2.25	3.00	3.75	4.50	5.25	6.00
N_1	0.5000	0.2500	0.1111	0.0463	0.0185	0.0072	0.0027
N_2	0.5000	0.5000	0.3333	0.1852	0.0926	0.0432	0.0192
N_3		0.3333	0.4444	0.3704	0.2469	0.1440	0.0768

N₄			0.2222	0.3704	0.3704	0.2881	0.1920
N₅				0.1481	0.2963	0.3457	0.3073
N₆					0.0988	0.2305	0.3073
N₇						0.0658	0.1756
N₈							0.0439

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 4.5

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.304

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7828745	0.9134789	0.9293828	0.9894665	1.553E+01	1.471E+00	--
α_2	1.05E-02	8.65E-02	7.06E-02	2.17E-01	1.471E+00	1.553E+01	1.769

CCCG = 3, Gamma = 0.295

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8768658	0.9459806	0.9534725	0.9894250	3.682E+01	2.103E+00	--
α_2	2.85E-03	3.01E-02	2.32E-02	8.09E-02	1.310E+00	4.221E+01	1.611
α_3	6.52E-04	2.39E-02	1.52E-02	7.69E-02	7.921E-01	3.234E+01	2.116

CCCG = 4, Gamma = 0.291

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9142842	0.9586762	0.9628922	0.9886428	6.850E+01	2.953E+00	--
α_2	2.17E-03	1.71E-02	1.37E-02	4.36E-02	1.562E+00	8.969E+01	1.365
α_3	7.00E-04	1.62E-02	1.10E-02	4.93E-02	9.307E-01	5.662E+01	2.164
α_4	2.02E-05	8.03E-03	3.42E-03	3.17E-02	4.599E-01	5.679E+01	2.176

CCCG = 5, Gamma = 0.289

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9425779	0.9698579	0.9721301	0.9893712	1.321E+02	4.107E+00	--
α_2	1.60E-03	1.02E-02	8.42E-03	2.48E-02	1.809E+00	1.757E+02	1.259
α_3	9.47E-04	1.01E-02	7.70E-03	2.73E-02	1.318E+00	1.296E+02	1.707
α_4	1.71E-04	7.41E-03	4.54E-03	2.44E-02	7.566E-01	1.013E+02	2.191
α_5	1.13E-08	2.48E-03	3.41E-04	1.24E-02	2.237E-01	9.014E+01	2.474

CCCG = 6, Gamma = 0.288

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9514255	0.9734782	0.9751967	0.9896594	1.770E+02	4.822E+00	--
α_2	1.05E-03	6.87E-03	5.64E-03	1.69E-02	1.777E+00	2.570E+02	1.138
α_3	7.24E-04	7.29E-03	5.62E-03	1.96E-02	1.358E+00	1.850E+02	1.580
α_4	3.84E-04	6.99E-03	4.91E-03	2.07E-02	1.026E+00	1.458E+02	2.006
α_5	1.69E-05	4.12E-03	1.90E-03	1.58E-02	5.036E-01	1.217E+02	2.410
α_6	3.03E-11	1.26E-03	6.38E-05	6.86E-03	1.582E-01	1.255E+02	2.342

CCCG = 7, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9617668	0.9778746	0.9790032	0.9901281	2.738E+02	6.195E+00	--
α_2	1.08E-03	5.59E-03	4.75E-03	1.29E-02	2.136E+00	3.803E+02	1.116
α_3	5.68E-04	4.95E-03	3.90E-03	1.29E-02	1.476E+00	2.965E+02	1.433
α_4	4.76E-04	5.15E-03	3.92E-03	1.40E-02	1.309E+00	2.531E+02	1.678
α_5	1.26E-04	3.99E-03	2.57E-03	1.27E-02	8.374E-01	2.090E+02	2.035
α_6	8.02E-07	1.95E-03	6.04E-04	8.45E-03	3.519E-01	1.804E+02	2.362
α_7	1.25E-18	5.01E-04	9.50E-07	2.92E-03	8.416E-02	1.679E+02	2.542

CCCG = 8, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9652845	0.9794731	0.9804264	0.9904066	3.260E+02	6.832E+00	--
α_2	9.89E-04	4.84E-03	4.15E-03	1.10E-02	2.245E+00	4.618E+02	1.079
α_3	3.54E-04	3.60E-03	2.77E-03	9.69E-03	1.354E+00	3.746E+02	1.332
α_4	3.58E-04	4.06E-03	3.07E-03	1.11E-02	1.276E+00	3.133E+02	1.592
α_5	2.44E-04	3.98E-03	2.84E-03	1.16E-02	1.075E+00	2.692E+02	1.853
α_6	1.79E-05	2.56E-03	1.28E-03	9.41E-03	5.615E-01	2.192E+02	2.279
α_7	6.83E-09	1.18E-03	1.69E-04	5.85E-03	2.282E-01	1.937E+02	2.582
α_8	1.78E-17	3.21E-04	1.17E-06	1.87E-03	9.245E-02	2.876E+02	1.741

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.13E-01	9.46E-01	9.59E-01	9.70E-01	9.73E-01	9.78E-01	9.79E-01
α_2	8.65E-02	3.01E-02	1.71E-02	1.02E-02	6.87E-03	5.59E-03	4.84E-03
α_3		2.39E-02	1.62E-02	1.01E-02	7.29E-03	4.95E-03	3.60E-03
α_4			8.03E-03	7.41E-03	6.99E-03	5.15E-03	4.06E-03
α_5				2.48E-03	4.12E-03	3.99E-03	3.98E-03
α_6					1.26E-03	1.95E-03	2.56E-03
α_7						5.01E-04	1.18E-03
α_8							3.21E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.13E-01	9.46E-01	9.59E-01	9.70E-01	9.73E-01	9.78E-01	9.79E-01
Beta	8.65E-02	5.40E-02	4.13E-02	3.01E-02	2.65E-02	2.21E-02	2.05E-02
Gamma		4.43E-01	5.86E-01	6.62E-01	7.41E-01	7.48E-01	7.64E-01
Delta			3.32E-01	4.96E-01	6.29E-01	7.00E-01	7.70E-01
Epsilon				2.50E-01	4.35E-01	5.56E-01	6.64E-01
Mu					2.34E-01	3.80E-01	5.05E-01
Omega						2.05E-01	3.70E-01
Sigma							2.15E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.50	6.75	9.00	11.25	13.50	15.75	18.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313	0.0156
N_3		0.5000	0.5000	0.3750	0.2500	0.1563	0.0938

N₄			0.2500	0.3750	0.3750	0.3125	0.2344
N₅				0.1250	0.2500	0.3125	0.3125
N₆					0.0625	0.1563	0.2344
N₇						0.0313	0.0938
N₈							0.0156

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 3.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.171

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9700610	0.9922184	0.9964675	0.9999712	6.289E+01	4.932E-01	--
α_2	2.88E-05	7.78E-03	3.53E-03	2.99E-02	4.932E-01	6.289E+01	1.769

CCCG = 3, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9782169	0.9925513	0.9946967	0.9995574	1.412E+02	1.059E+00	--
α_2	8.53E-05	4.55E-03	2.69E-03	1.54E-02	7.137E-01	1.561E+02	1.611
α_3	1.05E-06	2.90E-03	8.79E-04	1.26E-02	3.458E-01	1.190E+02	2.116

CCCG = 4, Gamma = 0.181

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9841832	0.9931939	0.9942192	0.9986995	3.086E+02	2.115E+00	--
α_2	5.34E-04	4.31E-03	3.43E-03	1.11E-02	1.549E+00	3.582E+02	1.365
α_3	3.65E-08	1.17E-03	2.28E-04	5.55E-03	2.646E-01	2.266E+02	2.164
α_4	1.48E-07	1.33E-03	3.28E-04	6.09E-03	3.010E-01	2.254E+02	2.176

CCCG = 5, Gamma = 0.183

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9902570	0.9945863	0.9949178	0.9977839	9.782E+02	5.325E+00	--
α_2	1.03E-03	3.24E-03	2.95E-03	6.44E-03	3.632E+00	1.117E+03	1.259
α_3	1.61E-04	1.64E-03	1.26E-03	4.41E-03	1.354E+00	8.252E+02	1.707
α_4	4.36E-08	4.60E-04	1.10E-04	2.11E-03	2.961E-01	6.438E+02	2.191
α_5	2.22E-34	7.44E-05	8.20E-11	3.69E-04	4.243E-02	5.703E+02	2.474

CCCG = 6, Gamma = 0.184

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9900523	0.9945742	0.9949322	0.9978737	9.047E+02	4.936E+00	--
α_2	6.91E-04	2.60E-03	2.31E-03	5.49E-03	2.915E+00	1.120E+03	1.138
α_3	1.33E-04	1.55E-03	1.17E-03	4.30E-03	1.257E+00	8.071E+02	1.580
α_4	3.21E-06	7.90E-04	3.62E-04	3.03E-03	5.031E-01	6.363E+02	2.006
α_5	6.31E-15	2.18E-04	2.88E-06	1.25E-03	1.155E-01	5.299E+02	2.410
α_6	1.25E-12	2.66E-04	9.75E-06	1.47E-03	1.451E-01	5.451E+02	2.342

CCCG = 7, Gamma = 0.186

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9924802	0.9952395	0.9954013	0.9974466	2.018E+03	9.654E+00	--
α_2	7.65E-04	1.97E-03	1.84E-03	3.64E-03	4.851E+00	2.452E+03	1.116
α_3	3.75E-04	1.46E-03	1.29E-03	3.13E-03	2.800E+00	1.911E+03	1.433
α_4	8.65E-05	8.47E-04	6.54E-04	2.27E-03	1.384E+00	1.633E+03	1.678
α_5	1.29E-06	3.64E-04	1.63E-04	1.41E-03	4.902E-01	1.347E+03	2.035
α_6	2.35E-15	9.87E-05	1.25E-06	5.66E-04	1.146E-01	1.161E+03	2.362
α_7	7.14E-93	1.36E-05	1.44E-24	1.61E-05	1.464E-02	1.079E+03	2.542

CCCG = 8, Gamma = 0.186

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9921682	0.9953433	0.9955566	0.9977901	1.528E+03	7.148E+00	--
α_2	4.19E-04	1.55E-03	1.38E-03	3.25E-03	2.980E+00	1.925E+03	1.079
α_3	2.17E-04	1.25E-03	1.05E-03	2.99E-03	1.960E+00	1.560E+03	1.332
α_4	6.53E-05	8.92E-04	6.54E-04	2.53E-03	1.166E+00	1.306E+03	1.592
α_5	2.72E-06	4.79E-04	2.32E-04	1.79E-03	5.375E-01	1.122E+03	1.853
α_6	4.37E-11	1.98E-04	1.53E-05	1.05E-03	1.805E-01	9.129E+02	2.279
α_7	2.66E-35	5.14E-05	3.84E-11	2.51E-04	4.139E-02	8.058E+02	2.582
α_8	1.44E-08	2.37E-04	5.22E-05	1.10E-03	2.827E-01	1.195E+03	1.741

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.93E-01	9.93E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01
α_2	7.78E-03	4.55E-03	4.31E-03	3.24E-03	2.60E-03	1.97E-03	1.55E-03
α_3		2.90E-03	1.17E-03	1.64E-03	1.55E-03	1.46E-03	1.25E-03
α_4			1.33E-03	4.60E-04	7.90E-04	8.47E-04	8.92E-04
α_5				7.44E-05	2.18E-04	3.64E-04	4.79E-04
α_6					2.66E-04	9.87E-05	1.98E-04
α_7						1.36E-05	5.14E-05
α_8							2.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.93E-01	9.93E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01
Beta	7.78E-03	7.45E-03	6.81E-03	5.41E-03	5.43E-03	4.76E-03	4.66E-03
Gamma		3.89E-01	3.67E-01	4.01E-01	5.21E-01	5.85E-01	6.68E-01
Delta			5.33E-01	2.46E-01	4.50E-01	4.75E-01	5.97E-01
Epsilon				1.39E-01	3.80E-01	3.60E-01	5.19E-01
Mu					5.50E-01	2.36E-01	5.04E-01
Omega						1.21E-01	5.93E-01
Sigma							8.22E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.10	4.65	6.20	7.75	9.30	10.85	12.40
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.4.2.3 AFW-AOV-OO: AFW Air-Operated Valves Fail to Close

Generic CCF Parameters

System Group: Clean Water
 System: Auxiliary Feedwater
 Component Group: Valve
 Component Type: Air Operated Valve
 Failure Mode: Fail to Close
 Date Range: 2006 through 2020
 Prior: Default 2015

Total Number of Independent Failure Events: 15.2

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9518791	0.9876967	0.9946360	0.9999627	1.0000000	3.761E+01	4.685E-01
α_2	3.46E-05	1.23E-02	5.36E-03	4.81E-02	0.00E+00	4.685E-01	3.761E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9567346	0.9848192	0.9888965	0.9989508	1.0000000	7.318E+01	1.128E+00
α_2	3.84E-04	1.15E-02	7.47E-03	3.61E-02	0.00E+00	8.512E-01	7.346E+01
α_3	1.86E-07	3.73E-03	7.98E-04	1.75E-02	0.00E+00	2.768E-01	7.403E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9579225	0.9824290	0.9853190	0.9970580	1.0000000	1.059E+02	1.894E+00
α_2	1.01E-03	1.17E-02	8.84E-03	3.21E-02	0.00E+00	1.260E+00	1.065E+02
α_3	4.06E-06	3.73E-03	1.37E-03	1.55E-02	0.00E+00	4.024E-01	1.074E+02
α_4	1.49E-08	2.15E-03	3.20E-04	1.06E-02	0.00E+00	2.315E-01	1.075E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9670956	0.9836151	0.9851272	0.9949654	1.0000000	2.060E+02	3.432E+00
α_2	1.56E-03	9.19E-03	7.68E-03	2.20E-02	0.00E+00	1.924E+00	2.075E+02
α_3	2.90E-04	5.01E-03	3.55E-03	1.47E-02	0.00E+00	1.049E+00	2.084E+02
α_4	1.39E-06	1.82E-03	6.29E-04	7.70E-03	0.00E+00	3.822E-01	2.091E+02
α_5	3.18E-20	3.66E-04	3.41E-07	2.13E-03	0.00E+00	7.674E-02	2.094E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9693940	0.9842995	0.9856002	0.9947585	1.0000000	2.404E+02	3.835E+00
α_2	9.98E-04	6.96E-03	5.67E-03	1.73E-02	0.00E+00	1.701E+00	2.426E+02
α_3	3.90E-04	4.94E-03	3.67E-03	1.38E-02	0.00E+00	1.207E+00	2.430E+02
α_4	2.24E-05	2.44E-03	1.28E-03	8.79E-03	0.00E+00	5.960E-01	2.437E+02

α_5	3.54E-09	9.05E-04	1.21E-04	4.54E-03	0.00E+00	2.211E-01	2.440E+02
α_6	3.54E-15	4.49E-04	4.55E-06	2.59E-03	0.00E+00	1.098E-01	2.441E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9742101	0.9853663	0.9861803	0.9937368	1.0000000	3.870E+02	5.747E+00
α_2	1.17E-03	5.71E-03	4.90E-03	1.30E-02	0.00E+00	2.243E+00	3.905E+02
α_3	5.57E-04	4.15E-03	3.34E-03	1.05E-02	0.00E+00	1.630E+00	3.911E+02
α_4	1.72E-04	2.76E-03	1.97E-03	8.02E-03	0.00E+00	1.083E+00	3.917E+02
α_5	1.04E-05	1.44E-03	7.26E-04	5.29E-03	0.00E+00	5.654E-01	3.922E+02
α_6	2.68E-10	4.88E-04	4.51E-05	2.54E-03	0.00E+00	1.916E-01	3.926E+02
α_7	6.07E-41	8.86E-05	3.30E-12	3.89E-04	0.00E+00	3.480E-02	3.927E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9754181	0.9860674	0.9868465	0.9940449	1.0000000	4.052E+02	5.726E+00
α_2	8.85E-04	4.91E-03	4.13E-03	1.16E-02	0.00E+00	2.018E+00	4.089E+02
α_3	3.49E-04	3.38E-03	2.62E-03	9.03E-03	0.00E+00	1.391E+00	4.096E+02
α_4	1.54E-04	2.58E-03	1.84E-03	7.57E-03	0.00E+00	1.062E+00	4.099E+02
α_5	3.02E-05	1.71E-03	9.99E-04	5.81E-03	0.00E+00	7.026E-01	4.102E+02
α_6	3.34E-07	8.51E-04	2.61E-04	3.70E-03	0.00E+00	3.497E-01	4.106E+02
α_7	1.28E-15	2.62E-04	2.41E-06	1.52E-03	0.00E+00	1.078E-01	4.108E+02
α_8	2.68E-17	2.30E-04	9.76E-07	1.34E-03	0.00E+00	9.469E-02	4.109E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.85E-01	9.82E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.23E-02	1.15E-02	1.17E-02	9.19E-03	6.96E-03	5.71E-03	4.91E-03
α_3		3.73E-03	3.73E-03	5.01E-03	4.94E-03	4.15E-03	3.38E-03
α_4			2.15E-03	1.82E-03	2.44E-03	2.76E-03	2.58E-03
α_5				3.66E-04	9.05E-04	1.44E-03	1.71E-03
α_6					4.49E-04	4.88E-04	8.51E-04
α_7						8.86E-05	2.62E-04
α_8							2.30E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.85E-01	9.82E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.23E-02	1.52E-02	1.76E-02	1.64E-02	1.57E-02	1.46E-02	1.39E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	15.20	15.20	15.20	15.20	15.20	15.20	15.20
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 2.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.164

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9733068	0.9931144	0.9969340	0.9999772	6.972E+01	4.834E-01	--
α_2	2.28E-05	6.89E-03	3.07E-03	2.67E-02	4.834E-01	6.972E+01	0.667

CCCG = 3, Gamma = 0.164

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9808968	0.9931302	0.9948635	0.9994399	1.772E+02	1.226E+00	--
α_2	2.66E-04	5.47E-03	3.77E-03	1.65E-02	9.769E-01	1.776E+02	0.747
α_3	2.23E-08	1.40E-03	2.43E-04	6.78E-03	2.487E-01	1.776E+02	0.750

CCCG = 4, Gamma = 0.164

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9795058	0.9912495	0.9925986	0.9983808	2.330E+02	2.057E+00	--
α_2	6.74E-04	6.11E-03	4.78E-03	1.61E-02	1.442E+00	2.345E+02	0.790
α_3	2.20E-06	1.75E-03	6.58E-04	7.21E-03	4.114E-01	2.342E+02	0.795
α_4	1.16E-09	8.86E-04	9.65E-05	4.54E-03	2.036E-01	2.297E+02	0.811

CCCG = 5, Gamma = 0.164

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9831004	0.9914465	0.9921949	0.9972358	4.269E+02	3.683E+00	--
α_2	1.07E-03	5.22E-03	4.48E-03	1.19E-02	2.243E+00	4.271E+02	0.831
α_3	1.14E-04	2.27E-03	1.57E-03	6.83E-03	9.912E-01	4.348E+02	0.819
α_4	6.01E-07	8.82E-04	2.98E-04	3.74E-03	3.765E-01	4.266E+02	0.836
α_5	1.50E-21	1.73E-04	9.86E-08	1.00E-03	7.237E-02	4.182E+02	0.853

CCCG = 6, Gamma = 0.164

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9836852	0.9914826	0.9921471	0.9970101	4.818E+02	4.139E+00	--
α_2	8.36E-04	4.35E-03	3.69E-03	1.01E-02	2.128E+00	4.872E+02	0.832
α_3	1.58E-04	2.30E-03	1.67E-03	6.58E-03	1.134E+00	4.925E+02	0.824
α_4	7.37E-06	1.13E-03	5.60E-04	4.18E-03	5.533E-01	4.896E+02	0.830
α_5	1.76E-09	4.52E-04	6.04E-05	2.27E-03	2.210E-01	4.883E+02	0.833
α_6	3.70E-16	2.90E-04	2.02E-06	1.68E-03	1.027E-01	3.539E+02	1.150

CCCG = 7, Gamma = 0.164

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9865955	0.9922087	0.9926026	0.9964771	8.191E+02	6.432E+00	--
α_2	8.79E-04	3.38E-03	3.00E-03	7.20E-03	2.840E+00	8.371E+02	0.822
α_3	3.20E-04	2.16E-03	1.77E-03	5.35E-03	1.746E+00	8.064E+02	0.854
α_4	8.22E-05	1.32E-03	9.44E-04	3.84E-03	1.084E+00	8.203E+02	0.840
α_5	3.67E-06	6.46E-04	3.13E-04	2.42E-03	5.376E-01	8.312E+02	0.830
α_6	2.17E-10	2.47E-04	2.50E-05	1.28E-03	1.979E-01	7.995E+02	0.863
α_7	8.05E-53	3.59E-05	3.60E-15	1.23E-04	2.656E-02	7.390E+02	0.934

CCCG = 8, Gamma = 0.164

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9871358	0.9926105	0.9930037	0.9967426	8.210E+02	6.112E+00	--
α_2	5.95E-04	2.75E-03	2.37E-03	6.18E-03	2.364E+00	8.575E+02	0.802
α_3	2.22E-04	1.87E-03	1.48E-03	4.85E-03	1.512E+00	8.077E+02	0.852
α_4	7.68E-05	1.31E-03	9.28E-04	3.85E-03	1.056E+00	8.052E+02	0.855
α_5	1.23E-05	8.14E-04	4.64E-04	2.81E-03	6.745E-01	8.277E+02	0.833
α_6	4.88E-08	3.63E-04	9.23E-05	1.65E-03	3.076E-01	8.462E+02	0.815
α_7	1.01E-15	1.44E-04	1.42E-06	8.32E-04	1.093E-01	7.576E+02	0.910
α_8	2.16E-18	1.40E-04	3.89E-07	8.18E-04	8.885E-02	6.334E+02	1.089

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.93E-01
α_2	6.89E-03	5.47E-03	6.11E-03	5.22E-03	4.35E-03	3.38E-03	2.75E-03
α_3		1.40E-03	1.75E-03	2.27E-03	2.30E-03	2.16E-03	1.87E-03
α_4			8.86E-04	8.82E-04	1.13E-03	1.32E-03	1.31E-03
α_5				1.73E-04	4.52E-04	6.46E-04	8.14E-04
α_6					2.90E-04	2.47E-04	3.63E-04
α_7						3.59E-05	1.44E-04
α_8							1.40E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.93E-01
Beta	6.89E-03	6.87E-03	8.75E-03	8.55E-03	8.52E-03	7.79E-03	7.39E-03
Gamma		2.04E-01	3.02E-01	3.89E-01	4.89E-01	5.66E-01	6.28E-01
Delta			3.36E-01	3.17E-01	4.49E-01	5.10E-01	5.97E-01
Epsilon				1.64E-01	3.97E-01	4.13E-01	5.27E-01
Mu					3.91E-01	3.05E-01	4.43E-01
Omega						1.27E-01	4.39E-01
Sigma							4.93E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.50	2.50	2.50	2.50	2.50	2.50	2.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 4.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9361311	0.9838795	0.9932104	0.9999640	2.745E+01	4.498E-01	--
α_2	3.60E-05	1.61E-02	6.79E-03	6.39E-02	4.498E-01	2.745E+01	0.667

CCCG = 3, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9387486	0.9781050	0.9836965	0.9983315	5.264E+01	1.178E+00	--
α_2	7.73E-04	1.74E-02	1.19E-02	5.29E-02	9.387E-01	5.292E+01	0.747
α_3	4.70E-08	4.47E-03	7.22E-04	2.19E-02	2.396E-01	5.341E+01	0.750

CCCG = 4, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9366734	0.9734244	0.9777112	0.9955034	6.954E+01	1.898E+00	--
α_2	1.62E-03	1.79E-02	1.37E-02	4.87E-02	1.285E+00	7.045E+01	0.790
α_3	5.09E-06	5.51E-03	1.97E-03	2.30E-02	3.927E-01	7.094E+01	0.795
α_4	1.22E-08	3.16E-03	4.23E-04	1.59E-02	2.207E-01	6.967E+01	0.811

CCCG = 5, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9491459	0.9744450	0.9767169	0.9919775	1.337E+02	3.506E+00	--
α_2	2.60E-03	1.46E-02	1.23E-02	3.44E-02	1.992E+00	1.347E+02	0.831
α_3	4.81E-04	7.77E-03	5.57E-03	2.26E-02	1.078E+00	1.377E+02	0.819
α_4	1.40E-06	2.67E-03	8.65E-04	1.15E-02	3.632E-01	1.356E+02	0.836
α_5	5.03E-21	5.44E-04	3.15E-07	3.15E-03	7.248E-02	1.331E+02	0.853

CCCG = 6, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9527433	0.9750963	0.9769521	0.9911076	1.644E+02	4.199E+00	--
α_2	1.98E-03	1.15E-02	9.60E-03	2.73E-02	1.941E+00	1.674E+02	0.832
α_3	7.48E-04	7.80E-03	5.98E-03	2.11E-02	1.332E+00	1.695E+02	0.824
α_4	3.91E-05	3.65E-03	1.97E-03	1.30E-02	6.181E-01	1.690E+02	0.830
α_5	9.39E-09	1.37E-03	2.03E-04	6.78E-03	2.313E-01	1.688E+02	0.833
α_6	5.73E-20	6.27E-04	5.92E-07	3.65E-03	7.684E-02	1.224E+02	1.150

CCCG = 7, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9590981	0.9762952	0.9774952	0.9893939	2.563E+02	6.223E+00	--
α_2	2.43E-03	9.94E-03	8.74E-03	2.15E-02	2.654E+00	2.644E+02	0.822
α_3	8.73E-04	6.40E-03	5.17E-03	1.61E-02	1.645E+00	2.553E+02	0.854
α_4	2.84E-04	4.27E-03	3.09E-03	1.23E-02	1.115E+00	2.601E+02	0.840
α_5	2.21E-05	2.28E-03	1.21E-03	8.18E-03	6.034E-01	2.639E+02	0.830
α_6	1.24E-10	7.00E-04	5.22E-05	3.71E-03	1.780E-01	2.541E+02	0.863
α_7	6.34E-51	1.16E-04	2.39E-14	4.11E-04	2.734E-02	2.350E+02	0.934

CCCG = 8, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9605145	0.9771023	0.9782591	0.9897394	2.665E+02	6.246E+00	--
α_2	2.04E-03	8.85E-03	7.72E-03	1.95E-02	2.504E+00	2.804E+02	0.802
α_3	5.71E-04	5.33E-03	4.15E-03	1.41E-02	1.419E+00	2.648E+02	0.852
α_4	2.13E-04	3.87E-03	2.72E-03	1.15E-02	1.027E+00	2.643E+02	0.855
α_5	5.55E-05	2.69E-03	1.61E-03	9.00E-03	7.337E-01	2.718E+02	0.833
α_6	1.42E-06	1.43E-03	5.15E-04	5.94E-03	3.975E-01	2.781E+02	0.815
α_7	3.09E-20	3.09E-04	2.97E-07	1.80E-03	7.703E-02	2.492E+02	0.910
α_8	3.90E-18	4.20E-04	1.05E-06	2.45E-03	8.749E-02	2.084E+02	1.089

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.78E-01	9.73E-01	9.74E-01	9.75E-01	9.76E-01	9.77E-01
α_2	1.61E-02	1.74E-02	1.79E-02	1.46E-02	1.15E-02	9.94E-03	8.85E-03
α_3		4.47E-03	5.51E-03	7.77E-03	7.80E-03	6.40E-03	5.33E-03
α_4			3.16E-03	2.67E-03	3.65E-03	4.27E-03	3.87E-03
α_5				5.44E-04	1.37E-03	2.28E-03	2.69E-03
α_6					6.27E-04	7.00E-04	1.43E-03
α_7						1.16E-04	3.09E-04
α_8							4.20E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.78E-01	9.73E-01	9.74E-01	9.75E-01	9.76E-01	9.77E-01
Beta	1.61E-02	2.19E-02	2.66E-02	2.56E-02	2.49E-02	2.37E-02	2.29E-02
Gamma		2.04E-01	3.26E-01	4.30E-01	5.40E-01	5.81E-01	6.14E-01
Delta			3.65E-01	2.93E-01	4.20E-01	5.35E-01	6.21E-01
Epsilon				1.69E-01	3.54E-01	4.20E-01	5.56E-01
Mu					3.14E-01	2.64E-01	4.45E-01
Omega						1.43E-01	3.38E-01
Sigma							5.76E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.50	4.50	4.50	4.50	4.50	4.50	4.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8356283	0.9605373	0.9856045	0.9999691	9.252E+00	3.801E-01	--
α_2	3.09E-05	3.95E-02	1.44E-02	1.64E-01	3.801E-01	9.252E+00	0.667

CCCG = 3, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8539501	0.9506688	0.9652049	0.9976017	1.850E+01	9.600E-01	--
α_2	5.19E-04	3.42E-02	2.00E-02	1.17E-01	6.673E-01	1.882E+01	0.747
α_3	1.33E-06	1.51E-02	3.64E-03	6.94E-02	2.927E-01	1.911E+01	0.750

CCCG = 4, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8630580	0.9440593	0.9537280	0.9919104	2.817E+01	1.669E+00	--
α_2	2.02E-03	3.46E-02	2.49E-02	1.01E-01	1.039E+00	2.895E+01	0.790
α_3	1.14E-05	1.30E-02	4.67E-03	5.45E-02	3.887E-01	2.943E+01	0.795
α_4	9.57E-08	8.26E-03	1.37E-03	4.04E-02	2.414E-01	2.898E+01	0.811

CCCG = 5, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9035583	0.9511822	0.9553468	0.9845587	6.794E+01	3.487E+00	--
α_2	3.93E-03	2.52E-02	2.09E-02	6.12E-02	1.791E+00	6.935E+01	0.831
α_3	1.33E-03	1.67E-02	1.25E-02	4.65E-02	1.207E+00	7.101E+01	0.819
α_4	1.09E-05	6.13E-03	2.46E-03	2.47E-02	4.340E-01	7.032E+01	0.836
α_5	1.76E-26	7.92E-04	2.82E-08	4.37E-03	5.493E-02	6.926E+01	0.853

CCCG = 6, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9149433	0.9557112	0.9591217	0.9848161	8.426E+01	3.905E+00	--
α_2	1.46E-03	1.51E-02	1.16E-02	4.06E-02	1.335E+00	8.714E+01	0.832
α_3	2.11E-03	1.72E-02	1.37E-02	4.40E-02	1.531E+00	8.772E+01	0.824
α_4	1.57E-04	8.12E-03	4.83E-03	2.72E-02	7.191E-01	8.789E+01	0.830
α_5	4.09E-08	2.79E-03	4.78E-04	1.36E-02	2.467E-01	8.809E+01	0.833
α_6	1.25E-20	1.14E-03	6.86E-07	6.60E-03	7.279E-02	6.392E+01	1.150

CCCG = 7, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9306909	0.9603327	0.9624276	0.9828168	1.397E+02	5.770E+00	--
α_2	1.30E-03	1.04E-02	8.32E-03	2.67E-02	1.549E+00	1.472E+02	0.822
α_3	2.48E-03	1.39E-02	1.17E-02	3.28E-02	1.989E+00	1.411E+02	0.854
α_4	7.96E-04	8.85E-03	6.72E-03	2.42E-02	1.287E+00	1.441E+02	0.840
α_5	7.83E-05	4.69E-03	2.72E-03	1.60E-02	6.913E-01	1.466E+02	0.830
α_6	1.21E-08	1.64E-03	2.48E-04	8.13E-03	2.327E-01	1.413E+02	0.863
α_7	1.10E-64	1.61E-04	2.45E-17	4.07E-04	2.112E-02	1.308E+02	0.934

CCCG = 8, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9396390	0.9639431	0.9655230	0.9828505	1.876E+02	7.016E+00	--
α_2	1.00E-03	7.79E-03	6.24E-03	1.99E-02	1.583E+00	2.017E+02	0.802
α_3	1.84E-03	1.04E-02	8.73E-03	2.46E-02	1.986E+00	1.893E+02	0.852
α_4	1.23E-03	8.77E-03	7.12E-03	2.20E-02	1.672E+00	1.889E+02	0.855
α_5	2.74E-04	5.16E-03	3.61E-03	1.54E-02	1.011E+00	1.948E+02	0.833
α_6	2.16E-05	2.85E-03	1.45E-03	1.04E-02	5.709E-01	1.995E+02	0.815
α_7	2.32E-10	1.01E-03	7.91E-05	5.34E-03	1.809E-01	1.789E+02	0.910
α_8	1.20E-107	8.32E-05	2.52E-27	6.23E-05	1.245E-02	1.497E+02	1.089

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.61E-01	9.51E-01	9.44E-01	9.51E-01	9.56E-01	9.60E-01	9.64E-01
α_2	3.95E-02	3.42E-02	3.46E-02	2.52E-02	1.51E-02	1.04E-02	7.79E-03
α_3		1.51E-02	1.30E-02	1.67E-02	1.72E-02	1.39E-02	1.04E-02
α_4			8.26E-03	6.13E-03	8.12E-03	8.85E-03	8.77E-03
α_5				7.92E-04	2.79E-03	4.69E-03	5.16E-03
α_6					1.14E-03	1.64E-03	2.85E-03
α_7						1.61E-04	1.01E-03
α_8							8.32E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.61E-01	9.51E-01	9.44E-01	9.51E-01	9.56E-01	9.60E-01	9.64E-01
Beta	3.95E-02	4.93E-02	5.59E-02	4.88E-02	4.43E-02	3.97E-02	3.61E-02
Gamma		3.06E-01	3.81E-01	4.84E-01	6.59E-01	7.37E-01	7.84E-01
Delta			3.88E-01	2.93E-01	4.13E-01	5.25E-01	6.33E-01
Epsilon				1.14E-01	3.26E-01	4.23E-01	5.09E-01
Mu					2.89E-01	2.78E-01	4.33E-01
Omega						8.94E-02	2.77E-01
Sigma							7.61E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 4.7

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.309

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9580848	0.9892732	0.9953169	0.9999692	4.340E+01	4.706E-01	--
α_2	3.08E-05	1.07E-02	4.68E-03	4.19E-02	4.706E-01	4.340E+01	0.667

CCCG = 3, Gamma = 0.309

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9646193	0.9877018	0.9910924	0.9991958	8.854E+01	1.103E+00	--
α_2	2.60E-04	9.03E-03	5.74E-03	2.90E-02	8.104E-01	8.893E+01	0.747
α_3	2.75E-07	3.27E-03	7.67E-04	1.51E-02	2.921E-01	8.909E+01	0.750

CCCG = 4, Gamma = 0.309

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9691272	0.9870082	0.9890983	0.9977413	1.483E+02	1.953E+00	--
α_2	8.11E-04	8.69E-03	6.64E-03	2.36E-02	1.312E+00	1.496E+02	0.790
α_3	4.82E-06	2.87E-03	1.13E-03	1.16E-02	4.307E-01	1.496E+02	0.795
α_4	2.84E-09	1.43E-03	1.68E-04	7.27E-03	2.099E-01	1.468E+02	0.811

CCCG = 5, Gamma = 0.309

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9753524	0.9880833	0.9893074	0.9966308	2.576E+02	3.107E+00	--
α_2	9.15E-04	6.48E-03	5.26E-03	1.62E-02	1.684E+00	2.582E+02	0.831
α_3	1.58E-04	3.57E-03	2.42E-03	1.09E-02	9.426E-01	2.629E+02	0.819
α_4	1.11E-06	1.48E-03	5.07E-04	6.23E-03	3.816E-01	2.581E+02	0.836
α_5	1.56E-16	3.90E-04	2.13E-06	2.26E-03	9.865E-02	2.532E+02	0.853

CCCG = 6, Gamma = 0.309

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9780244	0.9887553	0.9896991	0.9962614	3.361E+02	3.822E+00	--
α_2	7.25E-04	5.01E-03	4.08E-03	1.25E-02	1.714E+00	3.405E+02	0.832
α_3	2.10E-04	3.21E-03	2.32E-03	9.26E-03	1.108E+00	3.442E+02	0.824
α_4	2.51E-05	1.90E-03	1.06E-03	6.63E-03	6.509E-01	3.421E+02	0.830
α_5	1.47E-08	7.42E-04	1.34E-04	3.58E-03	2.536E-01	3.415E+02	0.833
α_6	6.27E-17	3.87E-04	1.76E-06	2.25E-03	9.572E-02	2.475E+02	1.150

CCCG = 7, Gamma = 0.309

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9810591	0.9895217	0.9901726	0.9957612	4.906E+02	5.195E+00	--
α_2	7.91E-04	4.17E-03	3.53E-03	9.71E-03	2.105E+00	5.029E+02	0.822
α_3	2.55E-04	2.72E-03	2.07E-03	7.38E-03	1.320E+00	4.846E+02	0.854
α_4	1.03E-04	2.02E-03	1.40E-03	6.05E-03	9.967E-01	4.928E+02	0.840
α_5	5.31E-06	1.05E-03	4.99E-04	3.96E-03	5.249E-01	4.996E+02	0.830
α_6	3.02E-10	4.07E-04	3.98E-05	2.11E-03	1.956E-01	4.806E+02	0.863
α_7	3.40E-28	1.19E-04	2.70E-09	6.46E-04	5.291E-02	4.443E+02	0.934

CCCG = 8, Gamma = 0.309

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9824270	0.9900077	0.9905619	0.9956959	5.778E+02	5.832E+00	--
α_2	7.45E-04	3.68E-03	3.15E-03	8.41E-03	2.229E+00	6.042E+02	0.802
α_3	1.89E-04	2.21E-03	1.66E-03	6.10E-03	1.260E+00	5.694E+02	0.852
α_4	1.04E-04	1.83E-03	1.29E-03	5.41E-03	1.042E+00	5.676E+02	0.855
α_5	3.06E-05	1.31E-03	7.99E-04	4.31E-03	7.626E-01	5.835E+02	0.833
α_6	1.25E-07	5.48E-04	1.53E-04	2.44E-03	3.271E-01	5.967E+02	0.815
α_7	2.44E-13	2.52E-04	6.74E-06	1.41E-03	1.344E-01	5.342E+02	0.910
α_8	1.55E-20	1.72E-04	1.61E-07	9.98E-04	7.682E-02	4.467E+02	1.089

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.88E-01	9.87E-01	9.88E-01	9.89E-01	9.90E-01	9.90E-01
α_2	1.07E-02	9.03E-03	8.69E-03	6.48E-03	5.01E-03	4.17E-03	3.68E-03
α_3		3.27E-03	2.87E-03	3.57E-03	3.21E-03	2.72E-03	2.21E-03
α_4			1.43E-03	1.48E-03	1.90E-03	2.02E-03	1.83E-03
α_5				3.90E-04	7.42E-04	1.05E-03	1.31E-03
α_6					3.87E-04	4.07E-04	5.48E-04
α_7						1.19E-04	2.52E-04
α_8							1.72E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.88E-01	9.87E-01	9.88E-01	9.89E-01	9.90E-01	9.90E-01
Beta	1.07E-02	1.23E-02	1.30E-02	1.19E-02	1.12E-02	1.05E-02	9.99E-03
Gamma		2.66E-01	3.31E-01	4.56E-01	5.55E-01	6.02E-01	6.32E-01
Delta			3.32E-01	3.43E-01	4.85E-01	5.69E-01	6.50E-01
Epsilon				2.09E-01	3.73E-01	4.38E-01	5.54E-01
Mu					3.43E-01	3.34E-01	4.27E-01
Omega						2.26E-01	4.36E-01
Sigma							4.06E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.70	4.70	4.70	4.70	4.70	4.70	4.70
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 2.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.164

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9886250	0.9970496	0.9986690	0.9999892	1.667E+02	4.932E-01	--
α_2	1.08E-05	2.95E-03	1.33E-03	1.14E-02	4.932E-01	1.667E+02	0.667

CCCG = 3, Gamma = 0.164

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9907235	0.9968347	0.9977524	0.9998127	3.337E+02	1.059E+00	--
α_2	3.98E-05	2.13E-03	1.26E-03	7.19E-03	7.137E-01	3.344E+02	0.747
α_3	3.72E-07	1.04E-03	3.13E-04	4.52E-03	3.458E-01	3.335E+02	0.750

CCCG = 4, Gamma = 0.164

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9919840	0.9965557	0.9970776	0.9993433	6.118E+02	2.115E+00	--
α_2	3.11E-04	2.51E-03	2.00E-03	6.47E-03	1.549E+00	6.151E+02	0.790
α_3	1.35E-08	4.32E-04	8.44E-05	2.05E-03	2.646E-01	6.129E+02	0.795
α_4	5.53E-08	5.01E-04	1.23E-04	2.29E-03	3.010E-01	6.005E+02	0.811

CCCG = 5, Gamma = 0.164

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9943500	0.9968628	0.9970557	0.9987169	1.692E+03	5.325E+00	--
α_2	6.85E-04	2.15E-03	1.95E-03	4.27E-03	3.632E+00	1.688E+03	0.831
α_3	7.74E-05	7.88E-04	6.05E-04	2.13E-03	1.354E+00	1.716E+03	0.819
α_4	1.67E-08	1.76E-04	4.20E-05	8.08E-04	2.961E-01	1.682E+03	0.836
α_5	7.66E-35	2.57E-05	2.83E-11	1.28E-04	4.243E-02	1.648E+03	0.853

CCCG = 6, Gamma = 0.164

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940196	0.9967404	0.9969564	0.9987237	1.509E+03	4.936E+00	--
α_2	5.07E-04	1.91E-03	1.70E-03	4.03E-03	2.915E+00	1.525E+03	0.832
α_3	6.96E-05	8.16E-04	6.13E-04	2.26E-03	1.257E+00	1.540E+03	0.824
α_4	1.34E-06	3.29E-04	1.50E-04	1.26E-03	5.031E-01	1.530E+03	0.830
α_5	2.19E-15	7.57E-05	9.99E-07	4.34E-04	1.155E-01	1.525E+03	0.833
α_6	6.14E-13	1.31E-04	4.81E-06	7.27E-04	1.451E-01	1.105E+03	1.150

CCCG = 7, Gamma = 0.164

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9953426	0.9970528	0.9971534	0.9984200	3.266E+03	9.654E+00	--
α_2	5.64E-04	1.46E-03	1.36E-03	2.69E-03	4.851E+00	3.323E+03	0.822
α_3	2.24E-04	8.74E-04	7.73E-04	1.87E-03	2.800E+00	3.199E+03	0.854
α_4	4.34E-05	4.25E-04	3.28E-04	1.14E-03	1.384E+00	3.253E+03	0.840
α_5	5.26E-07	1.49E-04	6.65E-05	5.75E-04	4.902E-01	3.295E+03	0.830
α_6	8.60E-16	3.62E-05	4.58E-07	2.08E-04	1.146E-01	3.168E+03	0.863
α_7	2.63E-93	5.00E-06	5.32E-25	5.94E-06	1.464E-02	2.928E+03	0.934

CCCG = 8, Gamma = 0.164

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9951257	0.9971032	0.9972363	0.9986261	2.460E+03	7.148E+00	--
α_2	3.13E-04	1.15E-03	1.03E-03	2.43E-03	2.980E+00	2.579E+03	0.802
α_3	1.40E-04	8.07E-04	6.75E-04	1.93E-03	1.960E+00	2.427E+03	0.852
α_4	3.52E-05	4.82E-04	3.53E-04	1.37E-03	1.166E+00	2.419E+03	0.855
α_5	1.23E-06	2.16E-04	1.05E-04	8.09E-04	5.375E-01	2.486E+03	0.833
α_6	1.57E-11	7.10E-05	5.51E-06	3.75E-04	1.805E-01	2.541E+03	0.815
α_7	9.41E-36	1.82E-05	1.36E-11	8.90E-05	4.139E-02	2.275E+03	0.910
α_8	9.07E-09	1.49E-04	3.28E-05	6.93E-04	2.827E-01	1.902E+03	1.089

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	2.95E-03	2.13E-03	2.51E-03	2.15E-03	1.91E-03	1.46E-03	1.15E-03
α_3		1.04E-03	4.32E-04	7.88E-04	8.16E-04	8.74E-04	8.07E-04
α_4			5.01E-04	1.76E-04	3.29E-04	4.25E-04	4.82E-04
α_5				2.57E-05	7.57E-05	1.49E-04	2.16E-04
α_6					1.31E-04	3.62E-05	7.10E-05
α_7						5.00E-06	1.82E-05
α_8							1.49E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	2.95E-03	3.17E-03	3.44E-03	3.14E-03	3.26E-03	2.95E-03	2.90E-03
Gamma		3.27E-01	2.71E-01	3.16E-01	4.15E-01	5.05E-01	6.02E-01
Delta			5.37E-01	2.04E-01	3.96E-01	4.13E-01	5.37E-01
Epsilon				1.28E-01	3.86E-01	3.09E-01	4.85E-01
Mu					6.34E-01	2.17E-01	5.24E-01
Omega						1.21E-01	7.01E-01
Sigma							8.91E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.50	2.50	2.50	2.50	2.50	2.50	2.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.5 Check Valves

2.5.1 Pooled Check Valves

2.5.1.1 ALL-CKV-CC: All Systems Check Valves Fail to Open

Generic CCF Parameters

Component Group: Valve
Component Type: Check Valve
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9265716	0.9811696	0.9917194	0.9999431	1.0000000	2.441E+01	4.685E-01
α_2	5.35E-05	1.88E-02	8.28E-03	7.34E-02	0.00E+00	4.685E-01	2.441E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9474768	0.9815399	0.9864769	0.9987198	1.0000000	5.998E+01	1.128E+00
α_2	4.68E-04	1.39E-02	9.10E-03	4.39E-02	0.00E+00	8.512E-01	6.026E+01
α_3	2.27E-07	4.53E-03	9.72E-04	2.13E-02	0.00E+00	2.768E-01	6.083E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9521027	0.9799764	0.9832554	0.9966416	1.0000000	9.268E+01	1.894E+00
α_2	1.15E-03	1.33E-02	1.01E-02	3.66E-02	0.00E+00	1.260E+00	9.331E+01
α_3	4.63E-06	4.26E-03	1.56E-03	1.76E-02	0.00E+00	4.024E-01	9.417E+01
α_4	1.70E-08	2.45E-03	3.65E-04	1.21E-02	0.00E+00	2.315E-01	9.434E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9648968	0.9825131	0.9841236	0.9946232	1.0000000	1.928E+02	3.432E+00
α_2	1.67E-03	9.80E-03	8.20E-03	2.34E-02	0.00E+00	1.924E+00	1.943E+02
α_3	3.10E-04	5.34E-03	3.79E-03	1.57E-02	0.00E+00	1.049E+00	1.952E+02
α_4	1.48E-06	1.95E-03	6.71E-04	8.21E-03	0.00E+00	3.822E-01	1.959E+02
α_5	3.40E-20	3.91E-04	3.64E-07	2.27E-03	0.00E+00	7.674E-02	1.962E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9676555	0.9834025	0.9847752	0.9944521	1.0000000	2.272E+02	3.835E+00
α_2	1.06E-03	7.36E-03	6.00E-03	1.83E-02	0.00E+00	1.701E+00	2.294E+02
α_3	4.12E-04	5.22E-03	3.88E-03	1.46E-02	0.00E+00	1.207E+00	2.298E+02

α_4	2.36E-05	2.58E-03	1.35E-03	9.29E-03	0.00E+00	5.960E-01	2.305E+02
α_5	3.75E-09	9.57E-04	1.28E-04	4.80E-03	0.00E+00	2.211E-01	2.308E+02
α_6	3.74E-15	4.75E-04	4.81E-06	2.74E-03	0.00E+00	1.098E-01	2.309E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9733172	0.9848573	0.9856988	0.9935127	1.0000000	3.738E+02	5.747E+00
α_2	1.21E-03	5.91E-03	5.07E-03	1.35E-02	0.00E+00	2.243E+00	3.773E+02
α_3	5.76E-04	4.29E-03	3.46E-03	1.09E-02	0.00E+00	1.630E+00	3.779E+02
α_4	1.78E-04	2.85E-03	2.04E-03	8.30E-03	0.00E+00	1.083E+00	3.785E+02
α_5	1.08E-05	1.49E-03	7.51E-04	5.47E-03	0.00E+00	5.654E-01	3.790E+02
α_6	2.77E-10	5.05E-04	4.66E-05	2.63E-03	0.00E+00	1.916E-01	3.794E+02
α_7	6.28E-41	9.17E-05	3.41E-12	4.02E-04	0.00E+00	3.480E-02	3.795E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9746063	0.9856050	0.9864091	0.9938511	1.0000000	3.920E+02	5.726E+00
α_2	9.15E-04	5.07E-03	4.27E-03	1.20E-02	0.00E+00	2.018E+00	3.957E+02
α_3	3.61E-04	3.50E-03	2.71E-03	9.33E-03	0.00E+00	1.391E+00	3.964E+02
α_4	1.59E-04	2.67E-03	1.90E-03	7.82E-03	0.00E+00	1.062E+00	3.967E+02
α_5	3.12E-05	1.77E-03	1.03E-03	6.00E-03	0.00E+00	7.026E-01	3.970E+02
α_6	3.45E-07	8.79E-04	2.70E-04	3.82E-03	0.00E+00	3.497E-01	3.974E+02
α_7	1.33E-15	2.71E-04	2.49E-06	1.57E-03	0.00E+00	1.078E-01	3.976E+02
α_8	2.77E-17	2.38E-04	1.01E-06	1.39E-03	0.00E+00	9.469E-02	3.977E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.88E-02	1.39E-02	1.33E-02	9.80E-03	7.36E-03	5.91E-03	5.07E-03
α_3		4.53E-03	4.26E-03	5.34E-03	5.22E-03	4.29E-03	3.50E-03
α_4			2.45E-03	1.95E-03	2.58E-03	2.85E-03	2.67E-03
α_5				3.91E-04	9.57E-04	1.49E-03	1.77E-03
α_6					4.75E-04	5.05E-04	8.79E-04
α_7						9.17E-05	2.71E-04
α_8							2.38E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.88E-02	1.85E-02	2.00E-02	1.75E-02	1.66E-02	1.51E-02	1.44E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8827326	0.9697149	0.9864170	0.9999102	1.507E+01	4.706E-01	--
α_2	8.98E-05	3.03E-02	1.36E-02	1.17E-01	4.706E-01	1.507E+01	1.645

CCCG = 3, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9152630	0.9702788	0.9782467	0.9980244	3.599E+01	1.103E+00	--
α_2	6.65E-04	2.28E-02	1.46E-02	7.26E-02	8.104E-01	3.480E+01	1.779
α_3	5.90E-07	6.96E-03	1.65E-03	3.21E-02	2.921E-01	4.166E+01	1.510

CCCG = 4, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9248969	0.9681240	0.9730796	0.9943863	5.930E+01	1.953E+00	--
α_2	1.96E-03	2.08E-02	1.60E-02	5.61E-02	1.312E+00	6.177E+01	1.832
α_3	1.26E-05	7.43E-03	2.96E-03	3.00E-02	4.307E-01	5.757E+01	1.992
α_4	7.31E-09	3.65E-03	4.34E-04	1.86E-02	2.099E-01	5.729E+01	2.010

CCCG = 5, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9428748	0.9722114	0.9749809	0.9920773	1.087E+02	3.107E+00	--
α_2	2.10E-03	1.48E-02	1.21E-02	3.68E-02	1.684E+00	1.122E+02	1.864
α_3	3.90E-04	8.78E-03	5.98E-03	2.67E-02	9.426E-01	1.064E+02	1.978
α_4	2.63E-06	3.49E-03	1.20E-03	1.47E-02	3.816E-01	1.091E+02	1.940
α_5	2.94E-16	7.34E-04	4.03E-06	4.27E-03	9.865E-02	1.343E+02	1.580

CCCG = 6, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9496425	0.9740976	0.9762112	0.9913285	1.437E+02	3.822E+00	--
α_2	1.55E-03	1.07E-02	8.74E-03	2.65E-02	1.714E+00	1.585E+02	1.753
α_3	5.50E-04	8.35E-03	6.04E-03	2.40E-02	1.108E+00	1.316E+02	2.117
α_4	5.84E-05	4.40E-03	2.46E-03	1.54E-02	6.509E-01	1.471E+02	1.901
α_5	3.45E-08	1.74E-03	3.14E-04	8.38E-03	2.536E-01	1.456E+02	1.926
α_6	1.16E-16	7.11E-04	3.24E-06	4.15E-03	9.572E-02	1.344E+02	2.088

CCCG = 7, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1							

α_1	0.9572983	0.9762782	0.9777141	0.9903530	2.138E+02	5.195E+00	--
α_2	1.67E-03	8.78E-03	7.45E-03	2.04E-02	2.105E+00	2.377E+02	1.714
α_3	6.13E-04	6.51E-03	4.98E-03	1.76E-02	1.320E+00	2.015E+02	2.028
α_4	2.41E-04	4.72E-03	3.28E-03	1.41E-02	9.967E-01	2.102E+02	1.947
α_5	1.32E-05	2.61E-03	1.24E-03	9.85E-03	5.249E-01	2.004E+02	2.046
α_6	6.90E-10	9.28E-04	9.09E-05	4.81E-03	1.956E-01	2.106E+02	1.950
α_7	5.02E-28	1.76E-04	3.99E-09	9.56E-04	5.291E-02	3.005E+02	1.368

CCCG = 8, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9606580	0.9775457	0.9787609	0.9902828	2.539E+02	5.832E+00	--
α_2	1.57E-03	7.74E-03	6.63E-03	1.77E-02	2.229E+00	2.859E+02	1.675
α_3	4.41E-04	5.13E-03	3.86E-03	1.41E-02	1.260E+00	2.443E+02	1.965
α_4	2.41E-04	4.23E-03	2.99E-03	1.25E-02	1.042E+00	2.450E+02	1.962
α_5	7.13E-05	3.03E-03	1.86E-03	1.00E-02	7.626E-01	2.506E+02	1.921
α_6	3.57E-07	1.56E-03	4.36E-04	6.93E-03	3.271E-01	2.096E+02	2.299
α_7	4.91E-13	5.06E-04	1.36E-05	2.84E-03	1.344E-01	2.655E+02	1.817
α_8	2.31E-20	2.56E-04	2.40E-07	1.49E-03	7.682E-02	2.998E+02	1.610

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.70E-01	9.70E-01	9.68E-01	9.72E-01	9.74E-01	9.76E-01	9.78E-01
α_2	3.03E-02	2.28E-02	2.08E-02	1.48E-02	1.07E-02	8.78E-03	7.74E-03
α_3		6.96E-03	7.43E-03	8.78E-03	8.35E-03	6.51E-03	5.13E-03
α_4			3.65E-03	3.49E-03	4.40E-03	4.72E-03	4.23E-03
α_5				7.34E-04	1.74E-03	2.61E-03	3.03E-03
α_6					7.11E-04	9.28E-04	1.56E-03
α_7						1.76E-04	5.06E-04
α_8							2.56E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.70E-01	9.70E-01	9.68E-01	9.72E-01	9.74E-01	9.76E-01	9.78E-01
Beta	3.03E-02	2.97E-02	3.19E-02	2.78E-02	2.59E-02	2.37E-02	2.25E-02
Gamma		2.34E-01	3.47E-01	4.68E-01	5.87E-01	6.30E-01	6.56E-01
Delta			3.30E-01	3.25E-01	4.51E-01	5.64E-01	6.51E-01
Epsilon				1.74E-01	3.57E-01	4.40E-01	5.58E-01
Mu					2.90E-01	2.97E-01	4.33E-01
Omega						1.59E-01	3.28E-01
Sigma							3.36E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9716175	0.9926243	0.9966535	0.9999727	6.637E+01	4.932E-01	--
α_2	2.73E-05	7.38E-03	3.35E-03	2.84E-02	4.932E-01	6.637E+01	1.645

CCCG = 3, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9789447	0.9928011	0.9948754	0.9995724	1.461E+02	1.059E+00	--
α_2	9.57E-05	5.10E-03	3.02E-03	1.72E-02	7.137E-01	1.392E+02	1.779
α_3	7.56E-07	2.10E-03	6.35E-04	9.15E-03	3.458E-01	1.645E+02	1.510

CCCG = 4, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9810222	0.9918288	0.9930568	0.9984373	2.567E+02	2.115E+00	--
α_2	7.25E-04	5.84E-03	4.65E-03	1.50E-02	1.549E+00	2.636E+02	1.832
α_3	3.39E-08	1.09E-03	2.12E-04	5.16E-03	2.646E-01	2.436E+02	1.992
α_4	1.38E-07	1.25E-03	3.06E-04	5.69E-03	3.010E-01	2.414E+02	2.010

CCCG = 5, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9870761	0.9928149	0.9932533	0.9970567	7.357E+02	5.325E+00	--
α_2	1.54E-03	4.82E-03	4.39E-03	9.57E-03	3.632E+00	7.497E+02	1.864
α_3	1.87E-04	1.91E-03	1.46E-03	5.14E-03	1.354E+00	7.086E+02	1.978
α_4	3.88E-08	4.09E-04	9.76E-05	1.88E-03	2.961E-01	7.238E+02	1.940
α_5	1.42E-34	4.77E-05	5.26E-11	2.37E-04	4.243E-02	8.886E+02	1.580

CCCG = 6, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9866375	0.9927074	0.9931869	0.9971399	6.719E+02	4.936E+00	--
α_2	1.07E-03	4.03E-03	3.58E-03	8.51E-03	2.915E+00	7.209E+02	1.753
α_3	1.79E-04	2.10E-03	1.58E-03	5.79E-03	1.257E+00	5.981E+02	2.117
α_4	3.07E-06	7.54E-04	3.45E-04	2.89E-03	5.031E-01	6.670E+02	1.901
α_5	5.08E-15	1.75E-04	2.31E-06	1.01E-03	1.155E-01	6.588E+02	1.926
α_6	1.12E-12	2.39E-04	8.75E-06	1.32E-03	1.451E-01	6.076E+02	2.088

CCCG = 7, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9896365	0.9934364	0.9936587	0.9964776	1.461E+03	9.654E+00	--
α_2	1.18E-03	3.04E-03	2.84E-03	5.61E-03	4.851E+00	1.589E+03	1.714
α_3	5.33E-04	2.08E-03	1.84E-03	4.44E-03	2.800E+00	1.345E+03	2.028
α_4	1.01E-04	9.86E-04	7.62E-04	2.64E-03	1.384E+00	1.402E+03	1.947
α_5	1.30E-06	3.67E-04	1.64E-04	1.42E-03	4.902E-01	1.335E+03	2.046
α_6	1.95E-15	8.18E-05	1.04E-06	4.69E-04	1.146E-01	1.401E+03	1.950
α_7	3.85E-93	7.33E-06	7.80E-25	8.71E-06	1.464E-02	1.997E+03	1.368

CCCG = 8, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9893492	0.9936642	0.9939536	0.9969916	1.121E+03	7.148E+00	--
α_2	6.55E-04	2.41E-03	2.15E-03	5.07E-03	2.980E+00	1.232E+03	1.675
α_3	3.23E-04	1.86E-03	1.56E-03	4.44E-03	1.960E+00	1.051E+03	1.965
α_4	8.09E-05	1.11E-03	8.11E-04	3.14E-03	1.166E+00	1.053E+03	1.962
α_5	2.83E-06	4.99E-04	2.41E-04	1.87E-03	5.375E-01	1.077E+03	1.921
α_6	4.44E-11	2.01E-04	1.56E-05	1.06E-03	1.805E-01	8.997E+02	2.299
α_7	1.88E-35	3.63E-05	2.72E-11	1.78E-04	4.139E-02	1.139E+03	1.817
α_8	1.34E-08	2.20E-04	4.85E-05	1.03E-03	2.827E-01	1.285E+03	1.610

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.93E-01	9.92E-01	9.93E-01	9.93E-01	9.93E-01	9.94E-01
α_2	7.38E-03	5.10E-03	5.84E-03	4.82E-03	4.03E-03	3.04E-03	2.41E-03
α_3		2.10E-03	1.09E-03	1.91E-03	2.10E-03	2.08E-03	1.86E-03
α_4			1.25E-03	4.09E-04	7.54E-04	9.86E-04	1.11E-03
α_5				4.77E-05	1.75E-04	3.67E-04	4.99E-04
α_6					2.39E-04	8.18E-05	2.01E-04
α_7						7.33E-06	3.63E-05
α_8							2.20E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.93E-01	9.92E-01	9.93E-01	9.93E-01	9.93E-01	9.94E-01
Beta	7.38E-03	7.20E-03	8.17E-03	7.19E-03	7.29E-03	6.56E-03	6.34E-03
Gamma		2.91E-01	2.85E-01	3.29E-01	4.48E-01	5.36E-01	6.19E-01
Delta			5.34E-01	1.93E-01	3.58E-01	4.10E-01	5.25E-01
Epsilon				1.05E-01	3.55E-01	3.16E-01	4.64E-01
Mu					5.77E-01	1.95E-01	4.78E-01
Omega						8.22E-02	5.61E-01
Sigma							8.58E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.5.1.2 ALL-CKV-OO: All Systems Check Valves Fail to Close

Generic CCF Parameters

Component Group: Valve
Component Type: Check Valve
Failure Mode: Fail to Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 29.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9282511	0.9722822	0.9779869	0.9967954	0.9667774	5.151E+01	1.469E+00
α_2	3.21E-03	2.77E-02	2.20E-02	7.18E-02	3.32E-02	1.469E+00	5.151E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9527121	0.9794902	0.9824892	0.9960195	0.9776036	1.016E+02	2.128E+00
α_2	1.29E-03	1.30E-02	1.01E-02	3.49E-02	1.12E-02	1.351E+00	1.024E+02
α_3	1.88E-04	7.49E-03	4.65E-03	2.45E-02	1.12E-02	7.768E-01	1.030E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9598731	0.9809341	0.9830039	0.9949184	0.9831081	1.489E+02	2.894E+00
α_2	1.19E-03	9.95E-03	7.89E-03	2.57E-02	4.22E-03	1.510E+00	1.503E+02
α_3	2.34E-04	5.95E-03	3.96E-03	1.84E-02	8.45E-03	9.024E-01	1.509E+02
α_4	1.02E-05	3.17E-03	1.40E-03	1.23E-02	4.22E-03	4.815E-01	1.513E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9689649	0.9834634	0.9846490	0.9939029	0.9864407	2.636E+02	4.432E+00
α_2	1.41E-03	7.65E-03	6.46E-03	1.79E-02	1.69E-03	2.049E+00	2.660E+02
α_3	5.73E-04	5.31E-03	4.14E-03	1.40E-02	5.08E-03	1.424E+00	2.666E+02
α_4	6.49E-05	2.83E-03	1.72E-03	9.33E-03	5.08E-03	7.572E-01	2.673E+02
α_5	8.69E-10	7.53E-04	8.01E-05	3.87E-03	1.69E-03	2.017E-01	2.678E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9720095	0.9847649	0.9857697	0.9940762	0.9886750	3.125E+02	4.835E+00
α_2	8.38E-04	5.56E-03	4.56E-03	1.37E-02	7.08E-04	1.764E+00	3.156E+02
α_3	5.15E-04	4.59E-03	3.60E-03	1.21E-02	2.83E-03	1.457E+00	3.159E+02
α_4	1.46E-04	3.06E-03	2.10E-03	9.25E-03	4.25E-03	9.710E-01	3.164E+02
α_5	4.23E-06	1.48E-03	6.41E-04	5.82E-03	2.83E-03	4.711E-01	3.169E+02
α_6	5.67E-11	5.43E-04	3.65E-05	2.90E-03	7.08E-04	1.723E-01	3.172E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9761391	0.9859546	0.9866215	0.9934918	0.9902771	4.737E+02	6.747E+00
α_2	9.83E-04	4.73E-03	4.07E-03	1.08E-02	3.04E-04	2.274E+00	4.781E+02
α_3	5.70E-04	3.72E-03	3.06E-03	9.13E-03	1.52E-03	1.786E+00	4.786E+02
α_4	3.02E-04	2.90E-03	2.25E-03	7.74E-03	3.04E-03	1.395E+00	4.790E+02
α_5	6.63E-05	1.83E-03	1.20E-03	5.73E-03	3.04E-03	8.779E-01	4.795E+02
α_6	2.72E-07	7.24E-04	2.21E-04	3.15E-03	1.52E-03	3.478E-01	4.800E+02
α_7	2.48E-23	1.37E-04	3.42E-08	7.85E-04	3.04E-04	6.605E-02	4.803E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9777054	0.9868935	0.9875241	0.9939321	0.9914821	5.064E+02	6.726E+00
α_2	7.21E-04	3.96E-03	3.34E-03	9.33E-03	1.33E-04	2.034E+00	5.111E+02
α_3	3.34E-04	2.89E-03	2.28E-03	7.55E-03	7.99E-04	1.484E+00	5.117E+02
α_4	2.29E-04	2.53E-03	1.92E-03	6.91E-03	2.00E-03	1.296E+00	5.118E+02
α_5	1.06E-04	1.98E-03	1.38E-03	5.89E-03	2.66E-03	1.015E+00	5.121E+02
α_6	9.53E-06	1.14E-03	5.88E-04	4.13E-03	2.00E-03	5.841E-01	5.126E+02
α_7	4.48E-10	3.93E-04	4.17E-05	2.02E-03	7.99E-04	2.016E-01	5.129E+02
α_8	1.92E-15	2.15E-04	2.23E-06	1.24E-03	1.33E-04	1.103E-01	5.130E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.72E-01	9.79E-01	9.81E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01
α_2	2.77E-02	1.30E-02	9.95E-03	7.65E-03	5.56E-03	4.73E-03	3.96E-03
α_3		7.49E-03	5.95E-03	5.31E-03	4.59E-03	3.72E-03	2.89E-03
α_4			3.17E-03	2.83E-03	3.06E-03	2.90E-03	2.53E-03
α_5				7.53E-04	1.48E-03	1.83E-03	1.98E-03
α_6					5.43E-04	7.24E-04	1.14E-03
α_7						1.37E-04	3.93E-04
α_8							2.15E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.72E-01	9.79E-01	9.81E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01
Beta	2.77E-02	2.05E-02	1.91E-02	1.65E-02	1.52E-02	1.40E-02	1.31E-02
Gamma		3.65E-01	4.78E-01	5.38E-01	6.35E-01	6.63E-01	6.98E-01
Delta			3.48E-01	4.02E-01	5.26E-01	6.01E-01	6.84E-01
Epsilon				2.10E-01	3.99E-01	4.81E-01	5.96E-01
Mu					2.68E-01	3.20E-01	4.69E-01
Omega						1.60E-01	3.48E-01
Sigma							3.54E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8

Adj. Ind	29.10	43.65	58.20	72.75	87.30	101.85	116.40
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313	0.0156
N₃		0.5000	0.5000	0.3750	0.2500	0.1563	0.0938
N₄			0.2500	0.3750	0.3750	0.3125	0.2344
N₅				0.1250	0.2500	0.3125	0.3125
N₆					0.0625	0.1563	0.2344
N₇						0.0313	0.0938
N₈							0.0156

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 9.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.316

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9586653	0.9893199	0.9952204	0.9999644	4.478E+01	4.834E-01	--
α_2	3.56E-05	1.07E-02	4.78E-03	4.13E-02	4.834E-01	4.478E+01	1.189

CCCG = 3, Gamma = 0.319

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9756318	0.9912285	0.9934349	0.9992837	1.385E+02	1.226E+00	--
α_2	3.16E-04	6.50E-03	4.48E-03	1.96E-02	9.769E-01	1.492E+02	0.966
α_3	3.63E-08	2.27E-03	3.94E-04	1.10E-02	2.487E-01	1.094E+02	1.324

CCCG = 4, Gamma = 0.321

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9773171	0.9903111	0.9918023	0.9982060	2.102E+02	2.057E+00	--
α_2	6.55E-04	5.94E-03	4.65E-03	1.56E-02	1.442E+00	2.411E+02	0.837
α_3	3.15E-06	2.51E-03	9.44E-04	1.03E-02	4.114E-01	1.634E+02	1.239
α_4	1.62E-09	1.23E-03	1.35E-04	6.33E-03	2.036E-01	1.649E+02	1.229

CCCG = 5, Gamma = 0.322

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9813310	0.9905479	0.9913735	0.9969441	3.860E+02	3.683E+00	--
α_2	1.05E-03	5.16E-03	4.42E-03	1.18E-02	2.243E+00	4.327E+02	0.869
α_3	1.36E-04	2.71E-03	1.88E-03	8.14E-03	9.912E-01	3.644E+02	1.035
α_4	8.82E-07	1.29E-03	4.37E-04	5.49E-03	3.765E-01	2.906E+02	1.299
α_5	2.51E-21	2.89E-04	1.65E-07	1.67E-03	7.237E-02	2.505E+02	1.509

CCCG = 6, Gamma = 0.323

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825092	0.9908668	0.9915785	0.9967930	4.490E+02	4.139E+00	--
α_2	7.89E-04	4.11E-03	3.49E-03	9.54E-03	2.128E+00	5.160E+02	0.836
α_3	1.74E-04	2.52E-03	1.83E-03	7.21E-03	1.134E+00	4.493E+02	0.961
α_4	9.68E-06	1.48E-03	7.34E-04	5.48E-03	5.533E-01	3.731E+02	1.159
α_5	2.69E-09	6.92E-04	9.24E-05	3.47E-03	2.210E-01	3.192E+02	1.355
α_6	4.28E-16	3.36E-04	2.34E-06	1.95E-03	1.027E-01	3.057E+02	1.416

CCCG = 7, Gamma = 0.323

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9851715	0.9913790	0.9918141	0.9961008	7.397E+02	6.432E+00	--
α_2	8.87E-04	3.41E-03	3.02E-03	7.27E-03	2.840E+00	8.294E+02	0.866
α_3	3.44E-04	2.32E-03	1.89E-03	5.74E-03	1.746E+00	7.517E+02	0.957
α_4	9.90E-05	1.59E-03	1.14E-03	4.62E-03	1.084E+00	6.810E+02	1.057
α_5	5.07E-06	8.91E-04	4.31E-04	3.33E-03	5.376E-01	6.031E+02	1.194
α_6	3.17E-10	3.61E-04	3.64E-05	1.86E-03	1.979E-01	5.486E+02	1.313
α_7	1.14E-52	5.11E-05	5.12E-15	1.75E-04	2.656E-02	5.197E+02	1.387

CCCG = 8, Gamma = 0.324

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9860345	0.9919764	0.9924029	0.9964623	7.557E+02	6.112E+00	--
α_2	5.92E-04	2.73E-03	2.36E-03	6.15E-03	2.364E+00	8.621E+02	0.839
α_3	2.28E-04	1.91E-03	1.51E-03	4.97E-03	1.512E+00	7.889E+02	0.918
α_4	8.61E-05	1.47E-03	1.04E-03	4.31E-03	1.056E+00	7.182E+02	1.008
α_5	1.57E-05	1.03E-03	5.89E-04	3.57E-03	6.745E-01	6.515E+02	1.112
α_6	7.05E-08	5.25E-04	1.33E-04	2.38E-03	3.076E-01	5.861E+02	1.237
α_7	1.39E-15	1.98E-04	1.96E-06	1.14E-03	1.093E-01	5.507E+02	1.317
α_8	2.32E-18	1.51E-04	4.18E-07	8.78E-04	8.885E-02	5.900E+02	1.229

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.90E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01
α_2	1.07E-02	6.50E-03	5.94E-03	5.16E-03	4.11E-03	3.41E-03	2.73E-03
α_3		2.27E-03	2.51E-03	2.71E-03	2.52E-03	2.32E-03	1.91E-03
α_4			1.23E-03	1.29E-03	1.48E-03	1.59E-03	1.47E-03
α_5				2.89E-04	6.92E-04	8.91E-04	1.03E-03
α_6					3.36E-04	3.61E-04	5.25E-04
α_7						5.11E-05	1.98E-04
α_8							1.51E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.90E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01
Beta	1.07E-02	8.77E-03	9.69E-03	9.45E-03	9.13E-03	8.62E-03	8.02E-03
Gamma		2.59E-01	3.87E-01	4.54E-01	5.50E-01	6.04E-01	6.59E-01
Delta			3.29E-01	3.68E-01	4.99E-01	5.55E-01	6.38E-01
Epsilon				1.83E-01	4.10E-01	4.50E-01	5.65E-01
Mu					3.27E-01	3.16E-01	4.58E-01
Omega						1.24E-01	4.00E-01
Sigma							4.31E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	9.50	14.25	19.00	23.75	28.50	33.25	38.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.166

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7730125	0.9097819	0.9264681	0.9892386	1.462E+01	1.450E+00	--
α_2	1.08E-02	9.02E-02	7.35E-02	2.27E-01	1.450E+00	1.462E+01	1.189

CCCG = 3, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8750724	0.9445649	0.9519712	0.9886809	3.712E+01	2.178E+00	--
α_2	3.65E-03	3.25E-02	2.58E-02	8.46E-02	1.439E+00	4.280E+01	0.966
α_3	4.97E-04	2.29E-02	1.40E-02	7.56E-02	7.396E-01	3.154E+01	1.324

CCCG = 4, Gamma = 0.152

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8991212	0.9514788	0.9564477	0.9868294	5.684E+01	2.898E+00	--
α_2	2.60E-03	2.10E-02	1.68E-02	5.37E-02	1.535E+00	7.160E+01	0.837
α_3	7.00E-04	1.81E-02	1.21E-02	5.59E-02	8.927E-01	4.848E+01	1.239
α_4	2.71E-05	9.45E-03	4.12E-03	3.70E-02	4.707E-01	4.932E+01	1.229

CCCG = 5, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9289373	0.9616992	0.9642909	0.9856023	1.131E+02	4.506E+00	--
α_2	2.95E-03	1.53E-02	1.30E-02	3.55E-02	2.117E+00	1.361E+02	0.869
α_3	1.41E-03	1.25E-02	9.85E-03	3.28E-02	1.453E+00	1.146E+02	1.035
α_4	1.69E-04	7.98E-03	4.83E-03	2.66E-02	7.382E-01	9.172E+01	1.299
α_5	2.13E-09	2.48E-03	2.51E-04	1.28E-02	1.975E-01	7.941E+01	1.509

CCCG = 6, Gamma = 0.147

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9375970	0.9652047	0.9672628	0.9857802	1.442E+02	5.199E+00	--
α_2	2.01E-03	1.12E-02	9.45E-03	2.65E-02	2.004E+00	1.767E+02	0.836
α_3	1.31E-03	1.02E-02	8.17E-03	2.59E-02	1.582E+00	1.538E+02	0.961
α_4	3.91E-04	7.71E-03	5.35E-03	2.31E-02	9.931E-01	1.279E+02	1.159
α_5	1.41E-05	4.37E-03	1.93E-03	1.70E-02	4.813E-01	1.097E+02	1.355
α_6	2.74E-12	1.32E-03	4.14E-05	7.39E-03	1.393E-01	1.053E+02	1.416

CCCG = 7, Gamma = 0.146

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9480458	0.9688118	0.9701531	0.9849973	2.244E+02	7.223E+00	--
α_2	2.50E-03	1.01E-02	8.91E-03	2.18E-02	2.685E+00	2.628E+02	0.866
α_3	1.17E-03	7.49E-03	6.18E-03	1.83E-02	1.801E+00	2.386E+02	0.957
α_4	7.11E-04	6.56E-03	5.12E-03	1.73E-02	1.428E+00	2.162E+02	1.057
α_5	1.95E-04	4.76E-03	3.19E-03	1.47E-02	9.159E-01	1.916E+02	1.194
α_6	5.23E-07	1.91E-03	5.51E-04	8.43E-03	3.343E-01	1.747E+02	1.313
α_7	2.22E-25	3.53E-04	2.59E-08	1.97E-03	5.859E-02	1.657E+02	1.387

CCCG = 8, Gamma = 0.145

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9508254	0.9704738	0.9717439	0.9857847	2.382E+02	7.246E+00	--
α_2	2.05E-03	8.83E-03	7.71E-03	1.94E-02	2.520E+00	2.829E+02	0.839
α_3	6.92E-04	5.80E-03	4.59E-03	1.50E-02	1.513E+00	2.594E+02	0.918
α_4	4.58E-04	5.31E-03	4.00E-03	1.46E-02	1.261E+00	2.362E+02	1.008
α_5	2.79E-04	4.86E-03	3.44E-03	1.43E-02	1.046E+00	2.143E+02	1.112
α_6	3.83E-05	3.26E-03	1.79E-03	1.15E-02	6.319E-01	1.930E+02	1.237
α_7	8.50E-11	9.39E-04	6.15E-05	5.03E-03	1.708E-01	1.817E+02	1.317
α_8	7.56E-16	5.29E-04	3.78E-06	3.07E-03	1.031E-01	1.947E+02	1.229

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.10E-01	9.45E-01	9.51E-01	9.62E-01	9.65E-01	9.69E-01	9.70E-01
α_2	9.02E-02	3.25E-02	2.10E-02	1.53E-02	1.12E-02	1.01E-02	8.83E-03
α_3		2.29E-02	1.81E-02	1.25E-02	1.02E-02	7.49E-03	5.80E-03
α_4			9.45E-03	7.98E-03	7.71E-03	6.56E-03	5.31E-03
α_5				2.48E-03	4.37E-03	4.76E-03	4.86E-03
α_6					1.32E-03	1.91E-03	3.26E-03
α_7						3.53E-04	9.39E-04
α_8							5.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.10E-01	9.45E-01	9.51E-01	9.62E-01	9.65E-01	9.69E-01	9.70E-01
Beta	9.02E-02	5.54E-02	4.85E-02	3.83E-02	3.48E-02	3.12E-02	2.95E-02
Gamma		4.13E-01	5.67E-01	6.00E-01	6.78E-01	6.76E-01	7.01E-01
Delta			3.43E-01	4.55E-01	5.68E-01	6.44E-01	7.20E-01
Epsilon				2.37E-01	4.25E-01	5.17E-01	6.44E-01
Mu					2.32E-01	3.22E-01	4.93E-01
Omega						1.56E-01	3.10E-01
Sigma							3.60E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	6.00	8.00	10.00	12.00	14.00	16.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313	0.0156
N_3		0.5000	0.5000	0.3750	0.2500	0.1563	0.0938

N₄			0.2500	0.3750	0.3750	0.3125	0.2344
N₅				0.1250	0.2500	0.3125	0.3125
N₆					0.0625	0.1563	0.2344
N₇						0.0313	0.0938
N₈							0.0156

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7318089	0.9347206	0.9750791	0.9999461	5.443E+00	3.801E-01	--
α_2	5.39E-05	6.53E-02	2.49E-02	2.68E-01	3.801E-01	5.443E+00	1.189

CCCG = 3, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8084352	0.9346946	0.9534185	0.9967710	1.374E+01	9.600E-01	--
α_2	6.24E-04	4.08E-02	2.40E-02	1.38E-01	6.673E-01	1.569E+01	0.966
α_3	2.21E-06	2.45E-02	6.05E-03	1.13E-01	2.927E-01	1.165E+01	1.324

CCCG = 4, Gamma = 0.051

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8436991	0.9358887	0.9467947	0.9906706	2.437E+01	1.669E+00	--
α_2	1.97E-03	3.38E-02	2.43E-02	9.82E-02	1.039E+00	2.968E+01	0.837
α_3	1.65E-05	1.87E-02	6.78E-03	7.81E-02	3.887E-01	2.035E+01	1.239
α_4	1.35E-07	1.15E-02	1.93E-03	5.65E-02	2.414E-01	2.067E+01	1.229

CCCG = 5, Gamma = 0.051

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8900618	0.9442022	0.9488938	0.9822884	5.901E+01	3.487E+00	--
α_2	3.93E-03	2.52E-02	2.09E-02	6.11E-02	1.791E+00	6.940E+01	0.869
α_3	1.61E-03	2.02E-02	1.51E-02	5.61E-02	1.207E+00	5.859E+01	1.035
α_4	1.62E-05	9.11E-03	3.66E-03	3.67E-02	4.340E-01	4.719E+01	1.299
α_5	2.99E-26	1.34E-03	4.80E-08	7.41E-03	5.493E-02	4.095E+01	1.509

CCCG = 6, Gamma = 0.051

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9040787	0.9499495	0.9537581	0.9827938	7.411E+01	3.905E+00	--
α_2	1.40E-03	1.45E-02	1.11E-02	3.89E-02	1.335E+00	9.090E+01	0.836
α_3	2.35E-03	1.91E-02	1.53E-02	4.89E-02	1.531E+00	7.866E+01	0.961
α_4	2.10E-04	1.08E-02	6.45E-03	3.62E-02	7.191E-01	6.580E+01	1.159
α_5	6.38E-08	4.34E-03	7.45E-04	2.11E-02	2.467E-01	5.662E+01	1.355
α_6	1.48E-20	1.34E-03	8.08E-07	7.77E-03	7.279E-02	5.436E+01	1.416

CCCG = 7, Gamma = 0.051

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9204742	0.9544023	0.9567807	0.9802029	1.208E+02	5.770E+00	--
α_2	1.32E-03	1.06E-02	8.47E-03	2.72E-02	1.549E+00	1.444E+02	0.866
α_3	2.68E-03	1.51E-02	1.27E-02	3.55E-02	1.989E+00	1.302E+02	0.957
α_4	9.69E-04	1.08E-02	8.18E-03	2.94E-02	1.287E+00	1.184E+02	1.057
α_5	1.09E-04	6.53E-03	3.79E-03	2.23E-02	6.913E-01	1.052E+02	1.194
α_6	1.79E-08	2.42E-03	3.65E-04	1.20E-02	2.327E-01	9.602E+01	1.313
α_7	1.58E-64	2.32E-04	3.52E-17	5.84E-04	2.112E-02	9.114E+01	1.387

CCCG = 8, Gamma = 0.051

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9311536	0.9588147	0.9606002	0.9803767	1.633E+02	7.016E+00	--
α_2	1.02E-03	7.90E-03	6.34E-03	2.01E-02	1.583E+00	1.987E+02	0.839
α_3	1.92E-03	1.08E-02	9.12E-03	2.57E-02	1.986E+00	1.811E+02	0.918
α_4	1.41E-03	1.00E-02	8.15E-03	2.51E-02	1.672E+00	1.650E+02	1.008
α_5	3.55E-04	6.69E-03	4.68E-03	1.99E-02	1.011E+00	1.501E+02	1.112
α_6	3.19E-05	4.20E-03	2.14E-03	1.54E-02	5.709E-01	1.353E+02	1.237
α_7	3.26E-10	1.42E-03	1.11E-04	7.50E-03	1.809E-01	1.274E+02	1.317
α_8	1.32E-107	9.11E-05	2.76E-27	6.83E-05	1.245E-02	1.367E+02	1.229

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.35E-01	9.35E-01	9.36E-01	9.44E-01	9.50E-01	9.54E-01	9.59E-01
α_2	6.53E-02	4.08E-02	3.38E-02	2.52E-02	1.45E-02	1.06E-02	7.90E-03
α_3		2.45E-02	1.87E-02	2.02E-02	1.91E-02	1.51E-02	1.08E-02
α_4			1.15E-02	9.11E-03	1.08E-02	1.08E-02	1.00E-02
α_5				1.34E-03	4.34E-03	6.53E-03	6.69E-03
α_6					1.34E-03	2.42E-03	4.20E-03
α_7						2.32E-04	1.42E-03
α_8							9.11E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.35E-01	9.35E-01	9.36E-01	9.44E-01	9.50E-01	9.54E-01	9.59E-01
Beta	6.53E-02	6.53E-02	6.41E-02	5.58E-02	5.01E-02	4.56E-02	4.12E-02
Gamma		3.75E-01	4.72E-01	5.49E-01	7.11E-01	7.67E-01	8.08E-01
Delta			3.81E-01	3.41E-01	4.63E-01	5.70E-01	6.74E-01
Epsilon				1.28E-01	3.44E-01	4.60E-01	5.53E-01
Mu					2.36E-01	2.89E-01	4.60E-01
Omega						8.75E-02	2.64E-01
Sigma							6.04E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.50	2.25	3.00	3.75	4.50	5.25	6.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 10.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.336

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9370611	0.9838543	0.9928986	0.9999532	2.868E+01	4.706E-01	--
α_2	4.68E-05	1.61E-02	7.10E-03	6.29E-02	4.706E-01	2.868E+01	1.189

CCCG = 3, Gamma = 0.339

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9566379	0.9849060	0.9890491	0.9990104	7.194E+01	1.103E+00	--
α_2	2.91E-04	1.01E-02	6.43E-03	3.25E-02	8.104E-01	7.940E+01	0.966
α_3	4.21E-07	4.99E-03	1.18E-03	2.30E-02	2.921E-01	5.824E+01	1.324

CCCG = 4, Gamma = 0.341

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9666973	0.9859792	0.9882307	0.9975607	1.373E+02	1.953E+00	--
α_2	7.59E-04	8.15E-03	6.22E-03	2.21E-02	1.312E+00	1.598E+02	0.837
α_3	6.67E-06	3.96E-03	1.57E-03	1.60E-02	4.307E-01	1.083E+02	1.239
α_4	3.82E-09	1.91E-03	2.26E-04	9.74E-03	2.099E-01	1.094E+02	1.229

CCCG = 5, Gamma = 0.342

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9730522	0.9869656	0.9883017	0.9963127	2.353E+02	3.107E+00	--
α_2	8.73E-04	6.19E-03	5.03E-03	1.55E-02	1.684E+00	2.705E+02	0.869
α_3	1.82E-04	4.12E-03	2.80E-03	1.26E-02	9.426E-01	2.277E+02	1.035
α_4	1.58E-06	2.10E-03	7.21E-04	8.84E-03	3.816E-01	1.817E+02	1.299
α_5	2.52E-16	6.29E-04	3.45E-06	3.66E-03	9.865E-02	1.567E+02	1.509

CCCG = 6, Gamma = 0.343

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9765050	0.9879745	0.9889824	0.9960004	3.140E+02	3.822E+00	--
α_2	6.68E-04	4.62E-03	3.76E-03	1.15E-02	1.714E+00	3.695E+02	0.836
α_3	2.25E-04	3.43E-03	2.48E-03	9.90E-03	1.108E+00	3.217E+02	0.961
α_4	3.21E-05	2.43E-03	1.36E-03	8.48E-03	6.509E-01	2.671E+02	1.159
α_5	2.20E-08	1.11E-03	2.00E-04	5.34E-03	2.536E-01	2.286E+02	1.355
α_6	7.09E-17	4.37E-04	1.98E-06	2.54E-03	9.572E-02	2.190E+02	1.416

CCCG = 7, Gamma = 0.344

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9793315	0.9885625	0.9892717	0.9953714	4.490E+02	5.195E+00	--
α_2	7.76E-04	4.09E-03	3.47E-03	9.53E-03	2.105E+00	5.124E+02	0.866
α_3	2.66E-04	2.83E-03	2.16E-03	7.70E-03	1.320E+00	4.644E+02	0.957
α_4	1.21E-04	2.36E-03	1.64E-03	7.08E-03	9.967E-01	4.206E+02	1.057
α_5	7.12E-06	1.41E-03	6.68E-04	5.31E-03	5.249E-01	3.726E+02	1.194
α_6	4.29E-10	5.77E-04	5.64E-05	2.99E-03	1.956E-01	3.390E+02	1.313
α_7	4.70E-28	1.65E-04	3.73E-09	8.94E-04	5.291E-02	3.212E+02	1.387

CCCG = 8, Gamma = 0.344

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9811403	0.9892737	0.9898678	0.9953785	5.379E+02	5.832E+00	--
α_2	7.26E-04	3.58E-03	3.07E-03	8.20E-03	2.229E+00	6.202E+02	0.839
α_3	1.90E-04	2.21E-03	1.67E-03	6.11E-03	1.260E+00	5.678E+02	0.918
α_4	1.14E-04	2.01E-03	1.42E-03	5.94E-03	1.042E+00	5.168E+02	1.008
α_5	3.81E-05	1.62E-03	9.94E-04	5.36E-03	7.626E-01	4.688E+02	1.112
α_6	1.77E-07	7.75E-04	2.16E-04	3.45E-03	3.271E-01	4.219E+02	1.237
α_7	3.28E-13	3.39E-04	9.08E-06	1.90E-03	1.344E-01	3.964E+02	1.317
α_8	1.63E-20	1.81E-04	1.70E-07	1.05E-03	7.682E-02	4.248E+02	1.229

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01	9.89E-01
α_2	1.61E-02	1.01E-02	8.15E-03	6.19E-03	4.62E-03	4.09E-03	3.58E-03
α_3		4.99E-03	3.96E-03	4.12E-03	3.43E-03	2.83E-03	2.21E-03
α_4			1.91E-03	2.10E-03	2.43E-03	2.36E-03	2.01E-03
α_5				6.29E-04	1.11E-03	1.41E-03	1.62E-03
α_6					4.37E-04	5.77E-04	7.75E-04
α_7						1.65E-04	3.39E-04
α_8							1.81E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01	9.89E-01
Beta	1.61E-02	1.51E-02	1.40E-02	1.30E-02	1.20E-02	1.14E-02	1.07E-02
Gamma		3.31E-01	4.19E-01	5.25E-01	6.16E-01	6.42E-01	6.66E-01
Delta			3.26E-01	3.98E-01	5.37E-01	6.14E-01	6.90E-01
Epsilon				2.31E-01	3.89E-01	4.76E-01	5.92E-01
Mu					2.83E-01	3.45E-01	4.44E-01
Omega						2.22E-01	4.02E-01
Sigma							3.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	10.10	15.15	20.20	25.25	30.30	35.35	40.40
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.133

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9800074	0.9948095	0.9976517	0.9999809	9.453E+01	4.932E-01	--
α_2	1.91E-05	5.19E-03	2.35E-03	2.00E-02	4.932E-01	9.453E+01	1.189

CCCG = 3, Gamma = 0.134

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9867652	0.9954810	0.9967885	0.9997323	2.334E+02	1.059E+00	--
α_2	5.08E-05	2.72E-03	1.60E-03	9.17E-03	7.137E-01	2.621E+02	0.966
α_3	6.49E-07	1.80E-03	5.46E-04	7.87E-03	3.458E-01	1.914E+02	1.324

CCCG = 4, Gamma = 0.135

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9905872	0.9959544	0.9965668	0.9992283	5.206E+02	2.115E+00	--
α_2	3.26E-04	2.63E-03	2.09E-03	6.77E-03	1.549E+00	5.875E+02	0.837
α_3	2.08E-08	6.65E-04	1.30E-04	3.17E-03	2.646E-01	3.974E+02	1.239
α_4	8.30E-08	7.51E-04	1.84E-04	3.43E-03	3.010E-01	4.007E+02	1.229

CCCG = 5, Gamma = 0.136

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9936216	0.9964579	0.9966756	0.9985511	1.498E+03	5.325E+00	--
α_2	7.12E-04	2.23E-03	2.03E-03	4.44E-03	3.632E+00	1.623E+03	0.869
α_3	9.74E-05	9.91E-04	7.61E-04	2.67E-03	1.354E+00	1.365E+03	1.035
α_4	2.58E-08	2.72E-04	6.50E-05	1.25E-03	2.961E-01	1.088E+03	1.299
α_5	1.35E-34	4.53E-05	4.99E-11	2.24E-04	4.243E-02	9.367E+02	1.509

CCCG = 6, Gamma = 0.136

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9934229	0.9964148	0.9966521	0.9985960	1.372E+03	4.936E+00	--
α_2	5.06E-04	1.90E-03	1.69E-03	4.02E-03	2.915E+00	1.529E+03	0.836
α_3	8.05E-05	9.44E-04	7.09E-04	2.61E-03	1.257E+00	1.330E+03	0.961
α_4	1.85E-06	4.55E-04	2.08E-04	1.75E-03	5.031E-01	1.104E+03	1.159
α_5	3.54E-15	1.22E-04	1.61E-06	7.01E-04	1.155E-01	9.443E+02	1.355
α_6	7.51E-13	1.61E-04	5.88E-06	8.89E-04	1.451E-01	9.038E+02	1.416

CCCG = 7, Gamma = 0.136

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9947638	0.9966863	0.9967993	0.9982233	2.904E+03	9.654E+00	--
α_2	5.93E-04	1.53E-03	1.43E-03	2.82E-03	4.851E+00	3.166E+03	0.866
α_3	2.50E-04	9.76E-04	8.62E-04	2.09E-03	2.800E+00	2.867E+03	0.957
α_4	5.44E-05	5.33E-04	4.11E-04	1.43E-03	1.384E+00	2.597E+03	1.057
α_5	7.54E-07	2.13E-04	9.53E-05	8.25E-04	4.902E-01	2.299E+03	1.194
α_6	1.30E-15	5.48E-05	6.95E-07	3.15E-04	1.146E-01	2.090E+03	1.313
α_7	3.89E-93	7.39E-06	7.87E-25	8.79E-06	1.464E-02	1.980E+03	1.387

CCCG = 8, Gamma = 0.136

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9945938	0.9967868	0.9969344	0.9984758	2.217E+03	7.148E+00	--
α_2	3.25E-04	1.20E-03	1.07E-03	2.52E-03	2.980E+00	2.481E+03	0.839
α_3	1.50E-04	8.63E-04	7.22E-04	2.06E-03	1.960E+00	2.269E+03	0.918
α_4	4.12E-05	5.64E-04	4.14E-04	1.60E-03	1.166E+00	2.066E+03	1.008
α_5	1.63E-06	2.87E-04	1.39E-04	1.07E-03	5.375E-01	1.874E+03	1.112
α_6	2.37E-11	1.07E-04	8.31E-06	5.66E-04	1.805E-01	1.685E+03	1.237
α_7	1.35E-35	2.61E-05	1.96E-11	1.28E-04	4.139E-02	1.583E+03	1.317
α_8	1.02E-08	1.67E-04	3.68E-05	7.77E-04	2.827E-01	1.696E+03	1.229

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
α_2	5.19E-03	2.72E-03	2.63E-03	2.23E-03	1.90E-03	1.53E-03	1.20E-03
α_3		1.80E-03	6.65E-04	9.91E-04	9.44E-04	9.76E-04	8.63E-04
α_4			7.51E-04	2.72E-04	4.55E-04	5.33E-04	5.64E-04
α_5				4.53E-05	1.22E-04	2.13E-04	2.87E-04
α_6					1.61E-04	5.48E-05	1.07E-04
α_7						7.39E-06	2.61E-05
α_8							1.67E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
Beta	5.19E-03	4.52E-03	4.05E-03	3.54E-03	3.59E-03	3.31E-03	3.21E-03
Gamma		3.99E-01	3.50E-01	3.69E-01	4.69E-01	5.38E-01	6.27E-01
Delta			5.30E-01	2.43E-01	4.39E-01	4.53E-01	5.71E-01
Epsilon				1.43E-01	3.83E-01	3.41E-01	5.10E-01
Mu					5.68E-01	2.26E-01	5.11E-01
Omega						1.19E-01	6.43E-01
Sigma							8.64E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	6.00	8.00	10.00	12.00	14.00	16.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.5.1.3 ALL-CKV-LK: All Systems Check Valves Fail to Remain Closed (Leakage)

Generic CCF Parameters

Component Group: Valve
Component Type: Check Valve
Failure Mode: Leak (Internal)
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 21.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9587708	0.9894669	0.9954242	0.9999680	1.0000000	4.401E+01	4.685E-01
α_2	2.95E-05	1.05E-02	4.58E-03	4.12E-02	0.00E+00	4.685E-01	4.401E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9601459	0.9860230	0.9897844	0.9990346	1.0000000	7.958E+01	1.128E+00
α_2	3.53E-04	1.05E-02	6.87E-03	3.33E-02	0.00E+00	8.512E-01	7.986E+01
α_3	1.71E-07	3.43E-03	7.34E-04	1.61E-02	0.00E+00	2.768E-01	8.043E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9602635	0.9834140	0.9861468	0.9972247	1.0000000	1.123E+02	1.894E+00
α_2	9.53E-04	1.10E-02	8.34E-03	3.03E-02	0.00E+00	1.260E+00	1.129E+02
α_3	3.83E-06	3.52E-03	1.29E-03	1.46E-02	0.00E+00	4.024E-01	1.138E+02
α_4	1.41E-08	2.03E-03	3.02E-04	1.00E-02	0.00E+00	2.315E-01	1.139E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9680655	0.9841009	0.9855695	0.9951160	1.0000000	2.124E+02	3.432E+00
α_2	1.52E-03	8.91E-03	7.45E-03	2.13E-02	0.00E+00	1.924E+00	2.139E+02
α_3	2.81E-04	4.86E-03	3.44E-03	1.43E-02	0.00E+00	1.049E+00	2.148E+02
α_4	1.35E-06	1.77E-03	6.10E-04	7.47E-03	0.00E+00	3.822E-01	2.155E+02
α_5	3.09E-20	3.56E-04	3.31E-07	2.07E-03	0.00E+00	7.674E-02	2.158E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9701712	0.9847004	0.9859688	0.9948934	1.0000000	2.468E+02	3.835E+00
α_2	9.73E-04	6.79E-03	5.53E-03	1.69E-02	0.00E+00	1.701E+00	2.490E+02
α_3	3.80E-04	4.82E-03	3.58E-03	1.35E-02	0.00E+00	1.207E+00	2.494E+02
α_4	2.18E-05	2.38E-03	1.25E-03	8.57E-03	0.00E+00	5.960E-01	2.501E+02
α_5	3.45E-09	8.82E-04	1.18E-04	4.42E-03	0.00E+00	2.211E-01	2.504E+02
α_6	3.45E-15	4.38E-04	4.43E-06	2.53E-03	0.00E+00	1.098E-01	2.505E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9746219	0.9856009	0.9864023	0.9938371	1.0000000	3.934E+02	5.747E+00
α_2	1.15E-03	5.62E-03	4.82E-03	1.28E-02	0.00E+00	2.243E+00	3.969E+02
α_3	5.48E-04	4.08E-03	3.29E-03	1.03E-02	0.00E+00	1.630E+00	3.975E+02
α_4	1.69E-04	2.71E-03	1.94E-03	7.89E-03	0.00E+00	1.083E+00	3.981E+02
α_5	1.02E-05	1.42E-03	7.14E-04	5.20E-03	0.00E+00	5.654E-01	3.986E+02
α_6	2.64E-10	4.80E-04	4.43E-05	2.50E-03	0.00E+00	1.916E-01	3.990E+02
α_7	5.97E-41	8.72E-05	3.24E-12	3.82E-04	0.00E+00	3.480E-02	3.991E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9757939	0.9862810	0.9870485	0.9941372	1.0000000	4.116E+02	5.726E+00
α_2	8.72E-04	4.84E-03	4.07E-03	1.14E-02	0.00E+00	2.018E+00	4.153E+02
α_3	3.44E-04	3.33E-03	2.58E-03	8.89E-03	0.00E+00	1.391E+00	4.160E+02
α_4	1.51E-04	2.54E-03	1.81E-03	7.45E-03	0.00E+00	1.062E+00	4.163E+02
α_5	2.97E-05	1.68E-03	9.84E-04	5.72E-03	0.00E+00	7.026E-01	4.166E+02
α_6	3.29E-07	8.38E-04	2.57E-04	3.64E-03	0.00E+00	3.497E-01	4.170E+02
α_7	1.26E-15	2.58E-04	2.37E-06	1.49E-03	0.00E+00	1.078E-01	4.172E+02
α_8	2.64E-17	2.27E-04	9.61E-07	1.32E-03	0.00E+00	9.469E-02	4.173E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.86E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
α_2	1.05E-02	1.05E-02	1.10E-02	8.91E-03	6.79E-03	5.62E-03	4.84E-03
α_3		3.43E-03	3.52E-03	4.86E-03	4.82E-03	4.08E-03	3.33E-03
α_4			2.03E-03	1.77E-03	2.38E-03	2.71E-03	2.54E-03
α_5				3.56E-04	8.82E-04	1.42E-03	1.68E-03
α_6					4.38E-04	4.80E-04	8.38E-04
α_7						8.72E-05	2.58E-04
α_8							2.27E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.86E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
Beta	1.05E-02	1.40E-02	1.66E-02	1.59E-02	1.53E-02	1.44E-02	1.37E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8

Adj. Ind	21.60	21.60	21.60	21.60	21.60	21.60	21.60
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 7.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.347

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9741250	0.9933260	0.9970291	0.9999779	7.195E+01	4.834E-01	--
α_2	2.21E-05	6.67E-03	2.97E-03	2.59E-02	4.834E-01	7.195E+01	0.715

CCCG = 3, Gamma = 0.347

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9783150	0.9921981	0.9941636	0.9993634	1.559E+02	1.226E+00	--
α_2	3.00E-04	6.17E-03	4.26E-03	1.86E-02	9.769E-01	1.572E+02	0.875
α_3	2.60E-08	1.63E-03	2.82E-04	7.89E-03	2.487E-01	1.526E+02	0.906

CCCG = 4, Gamma = 0.347

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9760289	0.9897583	0.9913331	0.9981030	1.988E+02	2.057E+00	--
α_2	7.81E-04	7.07E-03	5.54E-03	1.86E-02	1.442E+00	2.025E+02	0.939
α_3	2.59E-06	2.07E-03	7.78E-04	8.51E-03	4.114E-01	1.983E+02	0.963
α_4	1.44E-09	1.10E-03	1.20E-04	5.64E-03	2.036E-01	1.850E+02	1.034

CCCG = 5, Gamma = 0.347

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9796547	0.9896960	0.9905946	0.9966673	3.538E+02	3.683E+00	--
α_2	1.27E-03	6.22E-03	5.33E-03	1.42E-02	2.243E+00	3.585E+02	1.003
α_3	1.42E-04	2.83E-03	1.96E-03	8.49E-03	9.912E-01	3.492E+02	1.033
α_4	7.25E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	1.021
α_5	1.68E-21	1.93E-04	1.10E-07	1.12E-03	7.237E-02	3.742E+02	0.967

CCCG = 6, Gamma = 0.347

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804414	0.9897832	0.9905777	0.9964108	4.010E+02	4.139E+00	--
α_2	9.71E-04	5.05E-03	4.29E-03	1.17E-02	2.128E+00	4.195E+02	0.977
α_3	2.01E-04	2.92E-03	2.12E-03	8.35E-03	1.134E+00	3.876E+02	1.060
α_4	9.06E-06	1.39E-03	6.87E-04	5.13E-03	5.533E-01	3.987E+02	1.032
α_5	2.11E-09	5.41E-04	7.22E-05	2.71E-03	2.210E-01	4.083E+02	1.008
α_6	4.15E-16	3.26E-04	2.27E-06	1.89E-03	1.027E-01	3.149E+02	1.308

CCCG = 7, Gamma = 0.347

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9836512	0.9904927	0.9909717	0.9956986	6.701E+02	6.432E+00	--
α_2	1.04E-03	3.98E-03	3.53E-03	8.48E-03	2.840E+00	7.103E+02	0.975
α_3	4.04E-04	2.72E-03	2.23E-03	6.73E-03	1.746E+00	6.400E+02	1.083
α_4	1.03E-04	1.65E-03	1.18E-03	4.80E-03	1.084E+00	6.564E+02	1.057
α_5	4.64E-06	8.17E-04	3.95E-04	3.06E-03	5.376E-01	6.579E+02	1.056
α_6	2.63E-10	3.00E-04	3.02E-05	1.55E-03	1.979E-01	6.601E+02	1.053
α_7	8.73E-53	3.90E-05	3.90E-15	1.33E-04	2.656E-02	6.815E+02	1.020

CCCG = 8, Gamma = 0.347

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9843212	0.9909895	0.9914674	0.9960257	6.722E+02	6.112E+00	--
α_2	7.02E-04	3.24E-03	2.80E-03	7.30E-03	2.364E+00	7.264E+02	0.953
α_3	2.76E-04	2.32E-03	1.84E-03	6.02E-03	1.512E+00	6.502E+02	1.066
α_4	9.60E-05	1.64E-03	1.16E-03	4.81E-03	1.056E+00	6.441E+02	1.077
α_5	1.53E-05	1.01E-03	5.74E-04	3.47E-03	6.745E-01	6.690E+02	1.037
α_6	6.36E-08	4.74E-04	1.20E-04	2.15E-03	3.076E-01	6.493E+02	1.069
α_7	1.18E-15	1.69E-04	1.67E-06	9.74E-04	1.093E-01	6.470E+02	1.074
α_8	2.47E-18	1.60E-04	4.44E-07	9.32E-04	8.885E-02	5.554E+02	1.251

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.92E-01	9.90E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
α_2	6.67E-03	6.17E-03	7.07E-03	6.22E-03	5.05E-03	3.98E-03	3.24E-03
α_3		1.63E-03	2.07E-03	2.83E-03	2.92E-03	2.72E-03	2.32E-03
α_4			1.10E-03	1.06E-03	1.39E-03	1.65E-03	1.64E-03
α_5				1.93E-04	5.41E-04	8.17E-04	1.01E-03
α_6					3.26E-04	3.00E-04	4.74E-04
α_7						3.90E-05	1.69E-04
α_8							1.60E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.92E-01	9.90E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01
Beta	6.67E-03	7.80E-03	1.02E-02	1.03E-02	1.02E-02	9.51E-03	9.01E-03
Gamma		2.09E-01	3.09E-01	3.97E-01	5.06E-01	5.81E-01	6.40E-01
Delta			3.47E-01	3.07E-01	4.36E-01	5.08E-01	5.98E-01
Epsilon				1.54E-01	3.85E-01	4.12E-01	5.25E-01
Mu					3.76E-01	2.93E-01	4.43E-01
Omega						1.15E-01	4.10E-01
Sigma							4.86E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.50	7.50	7.50	7.50	7.50	7.50	7.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 3.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.167

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9280668	0.9818277	0.9923237	0.9999593	2.430E+01	4.498E-01	--
α_2	4.07E-05	1.82E-02	7.68E-03	7.19E-02	4.498E-01	2.430E+01	0.715

CCCG = 3, Gamma = 0.167

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9263506	0.9736122	0.9803014	0.9979809	4.347E+01	1.178E+00	--
α_2	9.29E-04	2.09E-02	1.43E-02	6.33E-02	9.387E-01	4.404E+01	0.875
α_3	5.82E-08	5.52E-03	8.94E-04	2.71E-02	2.396E-01	4.320E+01	0.906

CCCG = 4, Gamma = 0.167

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9227692	0.9675007	0.9726863	0.9944784	5.652E+01	1.898E+00	--
α_2	1.96E-03	2.16E-02	1.65E-02	5.87E-02	1.285E+00	5.813E+01	0.939
α_3	6.28E-06	6.78E-03	2.43E-03	2.83E-02	3.927E-01	5.752E+01	0.963
α_4	1.58E-08	4.09E-03	5.49E-04	2.05E-02	2.207E-01	5.374E+01	1.034

CCCG = 5, Gamma = 0.167

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9374177	0.9684816	0.9712510	0.9900760	1.077E+02	3.506E+00	--
α_2	3.17E-03	1.77E-02	1.49E-02	4.18E-02	1.992E+00	1.104E+02	1.003
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	1.033
α_4	1.73E-06	3.29E-03	1.07E-03	1.41E-02	3.632E-01	1.100E+02	1.021
α_5	5.75E-21	6.22E-04	3.60E-07	3.60E-03	7.248E-02	1.165E+02	0.967

CCCG = 6, Gamma = 0.167

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9420713	0.9694122	0.9716660	0.9890499	1.331E+02	4.199E+00	--
α_2	2.34E-03	1.36E-02	1.14E-02	3.23E-02	1.941E+00	1.413E+02	0.977
α_3	9.69E-04	1.01E-02	7.74E-03	2.72E-02	1.332E+00	1.307E+02	1.060
α_4	4.90E-05	4.56E-03	2.46E-03	1.62E-02	6.181E-01	1.350E+02	1.032
α_5	1.14E-08	1.67E-03	2.48E-04	8.26E-03	2.313E-01	1.385E+02	1.008
α_6	6.56E-20	7.18E-04	6.78E-07	4.18E-03	7.684E-02	1.069E+02	1.308

CCCG = 7, Gamma = 0.167

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9495535	0.9707156	0.9721814	0.9868708	2.063E+02	6.223E+00	--
α_2	2.90E-03	1.18E-02	1.04E-02	2.56E-02	2.654E+00	2.216E+02	0.975
α_3	1.11E-03	8.15E-03	6.60E-03	2.05E-02	1.645E+00	2.001E+02	1.083
α_4	3.59E-04	5.39E-03	3.91E-03	1.55E-02	1.115E+00	2.056E+02	1.057
α_5	2.82E-05	2.91E-03	1.54E-03	1.05E-02	6.034E-01	2.064E+02	1.056
α_6	1.52E-10	8.57E-04	6.39E-05	4.55E-03	1.780E-01	2.074E+02	1.053
α_7	6.95E-51	1.28E-04	2.62E-14	4.51E-04	2.734E-02	2.142E+02	1.020

CCCG = 8, Gamma = 0.167

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9513745	0.9717577	0.9731692	0.9873198	2.149E+02	6.246E+00	--
α_2	2.44E-03	1.06E-02	9.22E-03	2.33E-02	2.504E+00	2.346E+02	0.953
α_3	7.18E-04	6.69E-03	5.22E-03	1.77E-02	1.419E+00	2.106E+02	1.066
α_4	2.69E-04	4.89E-03	3.44E-03	1.45E-02	1.027E+00	2.089E+02	1.077
α_5	6.95E-05	3.37E-03	2.02E-03	1.12E-02	7.337E-01	2.172E+02	1.037
α_6	1.87E-06	1.88E-03	6.79E-04	7.83E-03	3.975E-01	2.110E+02	1.069
α_7	3.66E-20	3.66E-04	3.51E-07	2.13E-03	7.703E-02	2.105E+02	1.074
α_8	4.50E-18	4.84E-04	1.21E-06	2.82E-03	8.749E-02	1.807E+02	1.251

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.74E-01	9.68E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	1.82E-02	2.09E-02	2.16E-02	1.77E-02	1.36E-02	1.18E-02	1.06E-02
α_3		5.52E-03	6.78E-03	9.88E-03	1.01E-02	8.15E-03	6.69E-03
α_4			4.09E-03	3.29E-03	4.56E-03	5.39E-03	4.89E-03
α_5				6.22E-04	1.67E-03	2.91E-03	3.37E-03
α_6					7.18E-04	8.57E-04	1.88E-03
α_7						1.28E-04	3.66E-04
α_8							4.84E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.74E-01	9.68E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	1.82E-02	2.64E-02	3.25E-02	3.15E-02	3.06E-02	2.93E-02	2.82E-02
Gamma		2.09E-01	3.35E-01	4.38E-01	5.57E-01	5.96E-01	6.26E-01
Delta			3.76E-01	2.84E-01	4.08E-01	5.33E-01	6.22E-01
Epsilon				1.59E-01	3.44E-01	4.20E-01	5.55E-01
Mu					3.01E-01	2.53E-01	4.48E-01
Omega						1.30E-01	3.11E-01
Sigma							5.70E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.60	3.60	3.60	3.60	3.60	3.60	3.60
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.023

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8093823	0.9540929	0.9830649	0.9999636	7.900E+00	3.801E-01	--
α_2	3.64E-05	4.59E-02	1.69E-02	1.91E-01	3.801E-01	7.900E+00	0.715

CCCG = 3, Gamma = 0.023

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8223646	0.9396178	0.9570792	0.9970300	1.494E+01	9.600E-01	--
α_2	6.36E-04	4.15E-02	2.44E-02	1.41E-01	6.673E-01	1.540E+01	0.875
α_3	1.67E-06	1.89E-02	4.59E-03	8.67E-02	2.927E-01	1.523E+01	0.906

CCCG = 4, Gamma = 0.023

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8323082	0.9310473	0.9426650	0.9899285	2.254E+01	1.669E+00	--
α_2	2.47E-03	4.21E-02	3.04E-02	1.22E-01	1.039E+00	2.367E+01	0.939
α_3	1.42E-05	1.61E-02	5.81E-03	6.74E-02	3.887E-01	2.369E+01	0.963
α_4	1.25E-07	1.08E-02	1.80E-03	5.27E-02	2.414E-01	2.220E+01	1.034

CCCG = 5, Gamma = 0.023

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8812397	0.9396185	0.9446469	0.9807887	5.426E+01	3.487E+00	--
α_2	4.81E-03	3.06E-02	2.55E-02	7.42E-02	1.791E+00	5.666E+01	1.003
α_3	1.70E-03	2.13E-02	1.60E-02	5.90E-02	1.207E+00	5.553E+01	1.033
α_4	1.34E-05	7.56E-03	3.03E-03	3.05E-02	4.340E-01	5.696E+01	1.021
α_5	2.02E-26	9.06E-04	3.23E-08	5.00E-03	5.493E-02	6.058E+01	0.967

CCCG = 6, Gamma = 0.023

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8949540	0.9450912	0.9492273	0.9810799	6.721E+01	3.905E+00	--
α_2	1.73E-03	1.78E-02	1.38E-02	4.79E-02	1.335E+00	7.346E+01	0.977
α_3	2.74E-03	2.22E-02	1.78E-02	5.68E-02	1.531E+00	6.743E+01	1.060
α_4	1.97E-04	1.02E-02	6.06E-03	3.41E-02	7.191E-01	7.011E+01	1.032
α_5	4.99E-08	3.40E-03	5.84E-04	1.66E-02	2.467E-01	7.221E+01	1.008
α_6	1.44E-20	1.30E-03	7.87E-07	7.57E-03	7.279E-02	5.580E+01	1.308

CCCG = 7, Gamma = 0.023

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9137989	0.9505155	0.9530755	0.9784833	1.108E+02	5.770E+00	--
α_2	1.55E-03	1.24E-02	9.92E-03	3.18E-02	1.549E+00	1.233E+02	0.975
α_3	3.16E-03	1.77E-02	1.49E-02	4.17E-02	1.989E+00	1.103E+02	1.083
α_4	1.01E-03	1.12E-02	8.50E-03	3.05E-02	1.287E+00	1.138E+02	1.057
α_5	1.00E-04	6.00E-03	3.48E-03	2.04E-02	6.913E-01	1.146E+02	1.056
α_6	1.49E-08	2.01E-03	3.04E-04	9.95E-03	2.327E-01	1.154E+02	1.053
α_7	1.20E-64	1.77E-04	2.68E-17	4.46E-04	2.112E-02	1.193E+02	1.020

CCCG = 8, Gamma = 0.023

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9250350	0.9551074	0.9570385	0.9785830	1.493E+02	7.016E+00	--
α_2	1.20E-03	9.29E-03	7.45E-03	2.37E-02	1.583E+00	1.689E+02	0.953
α_3	2.31E-03	1.30E-02	1.10E-02	3.08E-02	1.986E+00	1.505E+02	1.066
α_4	1.55E-03	1.11E-02	9.00E-03	2.77E-02	1.672E+00	1.493E+02	1.077
α_5	3.42E-04	6.45E-03	4.51E-03	1.92E-02	1.011E+00	1.557E+02	1.037
α_6	2.85E-05	3.76E-03	1.91E-03	1.37E-02	5.709E-01	1.514E+02	1.069
α_7	2.74E-10	1.20E-03	9.37E-05	6.32E-03	1.809E-01	1.512E+02	1.074
α_8	1.38E-107	9.58E-05	2.90E-27	7.18E-05	1.245E-02	1.299E+02	1.251

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.54E-01	9.40E-01	9.31E-01	9.40E-01	9.45E-01	9.51E-01	9.55E-01
α_2	4.59E-02	4.15E-02	4.21E-02	3.06E-02	1.78E-02	1.24E-02	9.29E-03
α_3		1.89E-02	1.61E-02	2.13E-02	2.22E-02	1.77E-02	1.30E-02
α_4			1.08E-02	7.56E-03	1.02E-02	1.12E-02	1.11E-02
α_5				9.06E-04	3.40E-03	6.00E-03	6.45E-03
α_6					1.30E-03	2.01E-03	3.76E-03
α_7						1.77E-04	1.20E-03
α_8							9.58E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.54E-01	9.40E-01	9.31E-01	9.40E-01	9.45E-01	9.51E-01	9.55E-01
Beta	4.59E-02	6.04E-02	6.90E-02	6.04E-02	5.49E-02	4.95E-02	4.49E-02
Gamma		3.12E-01	3.90E-01	4.93E-01	6.75E-01	7.49E-01	7.93E-01
Delta			4.00E-01	2.85E-01	4.01E-01	5.22E-01	6.34E-01
Epsilon				1.07E-01	3.17E-01	4.23E-01	5.09E-01
Mu					2.77E-01	2.67E-01	4.39E-01
Omega						8.08E-02	2.56E-01
Sigma							7.42E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.50	0.50	0.50	0.50	0.50	0.50	0.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 8.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9595853	0.9896590	0.9954877	0.9999703	4.504E+01	4.706E-01	--
α_2	2.97E-05	1.03E-02	4.51E-03	4.04E-02	4.706E-01	4.504E+01	0.715

CCCG = 3, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9602226	0.9861627	0.9899684	0.9990939	7.857E+01	1.103E+00	--
α_2	2.90E-04	1.01E-02	6.41E-03	3.24E-02	8.104E-01	7.961E+01	0.875
α_3	3.17E-07	3.76E-03	8.84E-04	1.73E-02	2.921E-01	7.738E+01	0.906

CCCG = 4, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9638947	0.9847912	0.9872283	0.9973519	1.264E+02	1.953E+00	--
α_2	9.38E-04	1.01E-02	7.68E-03	2.73E-02	1.312E+00	1.292E+02	0.939
α_3	5.69E-06	3.39E-03	1.34E-03	1.37E-02	4.307E-01	1.268E+02	0.963
α_4	3.53E-09	1.77E-03	2.09E-04	9.01E-03	2.099E-01	1.183E+02	1.034

CCCG = 5, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9703416	0.9856473	0.9871149	0.9959369	2.134E+02	3.107E+00	--
α_2	1.09E-03	7.70E-03	6.26E-03	1.92E-02	1.684E+00	2.170E+02	1.003
α_3	1.97E-04	4.44E-03	3.01E-03	1.36E-02	9.426E-01	2.113E+02	1.033
α_4	1.34E-06	1.78E-03	6.11E-04	7.50E-03	3.816E-01	2.144E+02	1.021
α_5	1.74E-16	4.35E-04	2.38E-06	2.53E-03	9.865E-02	2.268E+02	0.967

CCCG = 6, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9735424	0.9864508	0.9875832	0.9954904	2.783E+02	3.822E+00	--
α_2	8.42E-04	5.82E-03	4.74E-03	1.45E-02	1.714E+00	2.930E+02	0.977
α_3	2.68E-04	4.08E-03	2.94E-03	1.18E-02	1.108E+00	2.706E+02	1.060
α_4	3.08E-05	2.33E-03	1.30E-03	8.14E-03	6.509E-01	2.784E+02	1.032
α_5	1.76E-08	8.88E-04	1.60E-04	4.28E-03	2.536E-01	2.852E+02	1.008
α_6	7.05E-17	4.35E-04	1.98E-06	2.53E-03	9.572E-02	2.201E+02	1.308

CCCG = 7, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9768964	0.9872096	0.9880006	0.9948211	4.010E+02	5.195E+00	--
α_2	9.31E-04	4.91E-03	4.16E-03	1.14E-02	2.105E+00	4.270E+02	0.975
α_3	3.21E-04	3.42E-03	2.61E-03	9.28E-03	1.320E+00	3.848E+02	1.083
α_4	1.28E-04	2.52E-03	1.75E-03	7.55E-03	9.967E-01	3.946E+02	1.057
α_5	6.70E-06	1.32E-03	6.30E-04	5.00E-03	5.249E-01	3.956E+02	1.056
α_6	3.66E-10	4.92E-04	4.82E-05	2.55E-03	1.956E-01	3.971E+02	1.053
α_7	3.68E-28	1.29E-04	2.92E-09	7.00E-04	5.291E-02	4.100E+02	1.020

CCCG = 8, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9785702	0.9878067	0.9884801	0.9947436	4.725E+02	5.832E+00	--
α_2	8.80E-04	4.34E-03	3.72E-03	9.93E-03	2.229E+00	5.115E+02	0.953
α_3	2.35E-04	2.74E-03	2.06E-03	7.57E-03	1.260E+00	4.581E+02	1.066
α_4	1.30E-04	2.29E-03	1.62E-03	6.76E-03	1.042E+00	4.538E+02	1.077
α_5	3.79E-05	1.62E-03	9.88E-04	5.33E-03	7.626E-01	4.713E+02	1.037
α_6	1.63E-07	7.14E-04	1.99E-04	3.18E-03	3.271E-01	4.576E+02	1.069
α_7	2.85E-13	2.95E-04	7.90E-06	1.65E-03	1.344E-01	4.560E+02	1.074
α_8	1.77E-20	1.96E-04	1.84E-07	1.14E-03	7.682E-02	3.915E+02	1.251

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.86E-01	9.85E-01	9.86E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.03E-02	1.01E-02	1.01E-02	7.70E-03	5.82E-03	4.91E-03	4.34E-03
α_3		3.76E-03	3.39E-03	4.44E-03	4.08E-03	3.42E-03	2.74E-03
α_4			1.77E-03	1.78E-03	2.33E-03	2.52E-03	2.29E-03
α_5				4.35E-04	8.88E-04	1.32E-03	1.62E-03
α_6					4.35E-04	4.92E-04	7.14E-04
α_7						1.29E-04	2.95E-04
α_8							1.96E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.86E-01	9.85E-01	9.86E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.03E-02	1.38E-02	1.52E-02	1.44E-02	1.35E-02	1.28E-02	1.22E-02
Gamma		2.72E-01	3.39E-01	4.64E-01	5.71E-01	6.16E-01	6.44E-01
Delta			3.43E-01	3.32E-01	4.73E-01	5.66E-01	6.51E-01
Epsilon				1.97E-01	3.62E-01	4.36E-01	5.52E-01
Mu					3.29E-01	3.19E-01	4.27E-01
Omega						2.08E-01	4.07E-01
Sigma							4.00E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.00	8.00	8.00	8.00	8.00	8.00	8.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9877436	0.9968207	0.9985653	0.9999883	1.546E+02	4.932E-01	--
α_2	1.17E-05	3.18E-03	1.43E-03	1.23E-02	4.932E-01	1.546E+02	0.715

CCCG = 3, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9890093	0.9962487	0.9973353	0.9997779	2.814E+02	1.059E+00	--
α_2	4.67E-05	2.50E-03	1.47E-03	8.43E-03	7.137E-01	2.850E+02	0.875
α_3	4.51E-07	1.25E-03	3.79E-04	5.47E-03	3.458E-01	2.756E+02	0.906

CCCG = 4, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9903432	0.9958494	0.9964776	0.9992083	5.073E+02	2.115E+00	--
α_2	3.70E-04	2.99E-03	2.38E-03	7.69E-03	1.549E+00	5.169E+02	0.939
α_3	1.63E-08	5.24E-04	1.02E-04	2.49E-03	2.646E-01	5.051E+02	0.963
α_4	7.06E-08	6.39E-04	1.57E-04	2.92E-03	3.010E-01	4.706E+02	1.034

CCCG = 5, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931012	0.9961685	0.9964038	0.9984325	1.384E+03	5.325E+00	--
α_2	8.26E-04	2.59E-03	2.36E-03	5.15E-03	3.632E+00	1.398E+03	1.003
α_3	9.78E-05	9.95E-04	7.64E-04	2.68E-03	1.354E+00	1.359E+03	1.033
α_4	2.04E-08	2.15E-04	5.14E-05	9.88E-04	2.961E-01	1.376E+03	1.021
α_5	8.69E-35	2.92E-05	3.21E-11	1.45E-04	4.243E-02	1.454E+03	0.967

CCCG = 6, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9927705	0.9960587	0.9963195	0.9984564	1.247E+03	4.936E+00	--
α_2	5.97E-04	2.24E-03	1.99E-03	4.74E-03	2.915E+00	1.297E+03	0.977
α_3	8.95E-05	1.05E-03	7.88E-04	2.90E-03	1.257E+00	1.197E+03	1.060
α_4	1.66E-06	4.09E-04	1.87E-04	1.57E-03	5.031E-01	1.230E+03	1.032
α_5	2.66E-15	9.17E-05	1.21E-06	5.26E-04	1.155E-01	1.259E+03	1.008
α_6	6.99E-13	1.49E-04	5.47E-06	8.28E-04	1.451E-01	9.709E+02	1.308

CCCG = 7, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9942912	0.9963870	0.9965101	0.9980627	2.662E+03	9.654E+00	--
α_2	6.70E-04	1.73E-03	1.61E-03	3.19E-03	4.851E+00	2.800E+03	0.975
α_3	2.84E-04	1.11E-03	9.81E-04	2.37E-03	2.800E+00	2.521E+03	1.083
α_4	5.47E-05	5.35E-04	4.13E-04	1.43E-03	1.384E+00	2.585E+03	1.057
α_5	6.70E-07	1.89E-04	8.46E-05	7.32E-04	4.902E-01	2.589E+03	1.056
α_6	1.05E-15	4.41E-05	5.59E-07	2.53E-04	1.146E-01	2.597E+03	1.053
α_7	2.87E-93	5.46E-06	5.81E-25	6.49E-06	1.464E-02	2.681E+03	1.020

CCCG = 8, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940395	0.9964570	0.9966197	0.9983193	2.010E+03	7.148E+00	--
α_2	3.72E-04	1.37E-03	1.22E-03	2.88E-03	2.980E+00	2.169E+03	0.953
α_3	1.75E-04	1.01E-03	8.44E-04	2.41E-03	1.960E+00	1.940E+03	1.066
α_4	4.43E-05	6.07E-04	4.45E-04	1.72E-03	1.166E+00	1.921E+03	1.077
α_5	1.53E-06	2.69E-04	1.30E-04	1.01E-03	5.375E-01	1.995E+03	1.037
α_6	2.06E-11	9.32E-05	7.23E-06	4.93E-04	1.805E-01	1.936E+03	1.069
α_7	1.11E-35	2.15E-05	1.61E-11	1.05E-04	4.139E-02	1.928E+03	1.074
α_8	1.04E-08	1.71E-04	3.77E-05	7.96E-04	2.827E-01	1.655E+03	1.251

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	3.18E-03	2.50E-03	2.99E-03	2.59E-03	2.24E-03	1.73E-03	1.37E-03
α_3		1.25E-03	5.24E-04	9.95E-04	1.05E-03	1.11E-03	1.01E-03
α_4			6.39E-04	2.15E-04	4.09E-04	5.35E-04	6.07E-04
α_5				2.92E-05	9.17E-05	1.89E-04	2.69E-04
α_6					1.49E-04	4.41E-05	9.32E-05
α_7						5.46E-06	2.15E-05
α_8							1.71E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	3.18E-03	3.75E-03	4.15E-03	3.83E-03	3.94E-03	3.61E-03	3.54E-03
Gamma		3.34E-01	2.80E-01	3.24E-01	4.31E-01	5.21E-01	6.13E-01
Delta			5.50E-01	1.97E-01	3.83E-01	4.11E-01	5.35E-01
Epsilon				1.19E-01	3.71E-01	3.09E-01	4.78E-01
Mu					6.20E-01	2.08E-01	5.15E-01
Omega						1.10E-01	6.73E-01
Sigma							8.88E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.5.2 Auxiliary Feedwater Check Valves

2.5.2.1 AFW-CKV-OO: AFW Check Valves Fail to Close

Generic CCF Parameters

System Group: Clean Water
System: Auxiliary Feedwater
Component Group: Valve
Component Type: Check Valve
Failure Mode: Fail to Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 4.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9334602	0.9829511	0.9925261	0.9999484	1.0000000	2.701E+01	4.685E-01
α_2	4.83E-05	1.70E-02	7.48E-03	6.65E-02	0.00E+00	4.685E-01	2.701E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9496007	0.9822933	0.9870295	0.9987778	1.0000000	6.258E+01	1.128E+00
α_2	4.49E-04	1.34E-02	8.72E-03	4.21E-02	0.00E+00	8.512E-01	6.286E+01
α_3	2.17E-07	4.35E-03	9.32E-04	2.04E-02	0.00E+00	2.768E-01	6.343E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9533730	0.9805122	0.9837065	0.9967327	1.0000000	9.528E+01	1.894E+00
α_2	1.12E-03	1.30E-02	9.81E-03	3.56E-02	0.00E+00	1.260E+00	9.591E+01
α_3	4.50E-06	4.14E-03	1.52E-03	1.71E-02	0.00E+00	4.024E-01	9.677E+01
α_4	1.65E-08	2.38E-03	3.55E-04	1.18E-02	0.00E+00	2.315E-01	9.694E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9653528	0.9827418	0.9843318	0.9946943	1.0000000	1.954E+02	3.432E+00
α_2	1.65E-03	9.68E-03	8.09E-03	2.31E-02	0.00E+00	1.924E+00	1.969E+02
α_3	3.05E-04	5.27E-03	3.74E-03	1.55E-02	0.00E+00	1.049E+00	1.978E+02
α_4	1.46E-06	1.92E-03	6.63E-04	8.11E-03	0.00E+00	3.822E-01	1.985E+02
α_5	3.35E-20	3.86E-04	3.60E-07	2.24E-03	0.00E+00	7.674E-02	1.988E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9680133	0.9835872	0.9849451	0.9945139	1.0000000	2.298E+02	3.835E+00
α_2	1.04E-03	7.28E-03	5.93E-03	1.81E-02	0.00E+00	1.701E+00	2.320E+02

α_3	4.08E-04	5.17E-03	3.84E-03	1.45E-02	0.00E+00	1.207E+00	2.324E+02
α_4	2.34E-05	2.55E-03	1.34E-03	9.19E-03	0.00E+00	5.960E-01	2.331E+02
α_5	3.71E-09	9.46E-04	1.27E-04	4.75E-03	0.00E+00	2.211E-01	2.334E+02
α_6	3.70E-15	4.70E-04	4.76E-06	2.71E-03	0.00E+00	1.098E-01	2.335E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9735027	0.9849604	0.9857963	0.9935571	1.0000000	3.764E+02	5.747E+00
α_2	1.20E-03	5.87E-03	5.03E-03	1.34E-02	0.00E+00	2.243E+00	3.799E+02
α_3	5.72E-04	4.26E-03	3.44E-03	1.08E-02	0.00E+00	1.630E+00	3.805E+02
α_4	1.76E-04	2.83E-03	2.03E-03	8.24E-03	0.00E+00	1.083E+00	3.811E+02
α_5	1.07E-05	1.48E-03	7.46E-04	5.44E-03	0.00E+00	5.654E-01	3.816E+02
α_6	2.75E-10	5.01E-04	4.63E-05	2.61E-03	0.00E+00	1.916E-01	3.820E+02
α_7	6.24E-41	9.11E-05	3.39E-12	3.99E-04	0.00E+00	3.480E-02	3.821E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9747703	0.9856985	0.9864976	0.9938909	1.0000000	3.946E+02	5.726E+00
α_2	9.09E-04	5.04E-03	4.24E-03	1.19E-02	0.00E+00	2.018E+00	3.983E+02
α_3	3.59E-04	3.47E-03	2.69E-03	9.27E-03	0.00E+00	1.391E+00	3.990E+02
α_4	1.58E-04	2.65E-03	1.88E-03	7.77E-03	0.00E+00	1.062E+00	3.993E+02
α_5	3.10E-05	1.75E-03	1.03E-03	5.96E-03	0.00E+00	7.026E-01	3.996E+02
α_6	3.43E-07	8.74E-04	2.68E-04	3.80E-03	0.00E+00	3.497E-01	4.000E+02
α_7	1.32E-15	2.69E-04	2.47E-06	1.56E-03	0.00E+00	1.078E-01	4.002E+02
α_8	2.75E-17	2.37E-04	1.00E-06	1.38E-03	0.00E+00	9.469E-02	4.003E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.70E-02	1.34E-02	1.30E-02	9.68E-03	7.28E-03	5.87E-03	5.04E-03
α_3		4.35E-03	4.14E-03	5.27E-03	5.17E-03	4.26E-03	3.47E-03
α_4			2.38E-03	1.92E-03	2.55E-03	2.83E-03	2.65E-03
α_5				3.86E-04	9.46E-04	1.48E-03	1.75E-03
α_6					4.70E-04	5.01E-04	8.74E-04
α_7						9.11E-05	2.69E-04
α_8							2.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.82E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.70E-02	1.77E-02	1.95E-02	1.73E-02	1.64E-02	1.50E-02	1.43E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.60	4.60	4.60	4.60	4.60	4.60	4.60
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 3.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.761

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9448602	0.9857300	0.9935833	0.9999522	3.339E+01	4.834E-01	--
α_2	4.78E-05	1.43E-02	6.42E-03	5.51E-02	4.834E-01	3.339E+01	1.412

CCCG = 3, Gamma = 0.761

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9597826	0.9854820	0.9891002	0.9988084	8.319E+01	1.226E+00	--
α_2	5.53E-04	1.13E-02	7.83E-03	3.40E-02	9.769E-01	8.537E+01	1.557
α_3	5.14E-08	3.20E-03	5.58E-04	1.55E-02	2.487E-01	7.735E+01	1.732

CCCG = 4, Gamma = 0.761

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9597614	0.9827549	0.9853736	0.9967910	1.172E+02	2.057E+00	--
α_2	1.29E-03	1.16E-02	9.14E-03	3.06E-02	1.442E+00	1.224E+02	1.513
α_3	4.46E-06	3.55E-03	1.34E-03	1.46E-02	4.114E-01	1.155E+02	1.618
α_4	2.70E-09	2.05E-03	2.25E-04	1.05E-02	2.036E-01	9.898E+01	1.890

CCCG = 5, Gamma = 0.761

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9691593	0.9843506	0.9857015	0.9949254	2.317E+02	3.683E+00	--
α_2	1.86E-03	9.10E-03	7.81E-03	2.07E-02	2.243E+00	2.442E+02	1.452
α_3	2.32E-04	4.61E-03	3.19E-03	1.38E-02	9.912E-01	2.140E+02	1.664
α_4	1.12E-06	1.64E-03	5.56E-04	6.97E-03	3.765E-01	2.286E+02	1.562
α_5	2.56E-21	2.95E-04	1.68E-07	1.70E-03	7.237E-02	2.456E+02	1.456

CCCG = 6, Gamma = 0.761

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9710957	0.9848758	0.9860410	0.9946751	2.695E+02	4.139E+00	--
α_2	1.35E-03	7.00E-03	5.95E-03	1.62E-02	2.128E+00	3.020E+02	1.341
α_3	3.25E-04	4.70E-03	3.42E-03	1.34E-02	1.134E+00	2.404E+02	1.689
α_4	1.43E-05	2.18E-03	1.08E-03	8.07E-03	5.533E-01	2.531E+02	1.608
α_5	3.18E-09	8.16E-04	1.09E-04	4.10E-03	2.210E-01	2.705E+02	1.507
α_6	5.52E-16	4.33E-04	3.02E-06	2.51E-03	1.027E-01	2.369E+02	1.721

CCCG = 7, Gamma = 0.761

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9762451	0.9861687	0.9868597	0.9937327	4.586E+02	6.432E+00	--
α_2	1.44E-03	5.54E-03	4.92E-03	1.18E-02	2.840E+00	5.094E+02	1.349
α_3	5.95E-04	4.01E-03	3.28E-03	9.91E-03	1.746E+00	4.342E+02	1.585
α_4	1.56E-04	2.51E-03	1.79E-03	7.29E-03	1.084E+00	4.313E+02	1.598
α_5	7.30E-06	1.28E-03	6.22E-04	4.80E-03	5.376E-01	4.185E+02	1.649
α_6	3.81E-10	4.33E-04	4.37E-05	2.24E-03	1.979E-01	4.569E+02	1.512
α_7	1.31E-52	5.83E-05	5.85E-15	1.99E-04	2.656E-02	4.553E+02	1.518

CCCG = 8, Gamma = 0.761

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9771521	0.9868535	0.9875453	0.9941927	4.588E+02	6.112E+00	--
α_2	1.01E-03	4.65E-03	4.02E-03	1.05E-02	2.364E+00	5.057E+02	1.359
α_3	3.96E-04	3.32E-03	2.63E-03	8.61E-03	1.512E+00	4.538E+02	1.517
α_4	1.42E-04	2.42E-03	1.71E-03	7.09E-03	1.056E+00	4.362E+02	1.580
α_5	2.32E-05	1.53E-03	8.71E-04	5.27E-03	6.745E-01	4.404E+02	1.566
α_6	1.04E-07	7.77E-04	1.97E-04	3.52E-03	3.076E-01	3.957E+02	1.744
α_7	1.60E-15	2.28E-04	2.25E-06	1.32E-03	1.093E-01	4.793E+02	1.441
α_8	3.46E-18	2.24E-04	6.22E-07	1.31E-03	8.885E-02	3.968E+02	1.740

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.85E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01	9.87E-01
α_2	1.43E-02	1.13E-02	1.16E-02	9.10E-03	7.00E-03	5.54E-03	4.65E-03
α_3		3.20E-03	3.55E-03	4.61E-03	4.70E-03	4.01E-03	3.32E-03
α_4			2.05E-03	1.64E-03	2.18E-03	2.51E-03	2.42E-03
α_5				2.95E-04	8.16E-04	1.28E-03	1.53E-03
α_6					4.33E-04	4.33E-04	7.77E-04
α_7						5.83E-05	2.28E-04
α_8							2.24E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.85E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01	9.87E-01
Beta	1.43E-02	1.45E-02	1.72E-02	1.56E-02	1.51E-02	1.38E-02	1.31E-02
Gamma		2.21E-01	3.25E-01	4.19E-01	5.37E-01	5.99E-01	6.46E-01
Delta			3.66E-01	2.96E-01	4.22E-01	5.17E-01	6.09E-01
Epsilon				1.52E-01	3.64E-01	4.14E-01	5.33E-01
Mu					3.47E-01	2.77E-01	4.46E-01
Omega						1.19E-01	3.68E-01
Sigma							4.95E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.50	3.50	3.50	3.50	3.50	3.50	3.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 1.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.239

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8995317	0.9741093	0.9884585	0.9999238	1.771E+01	4.706E-01	--
α_2	7.62E-05	2.59E-02	1.15E-02	1.00E-01	4.706E-01	1.771E+01	1.412

CCCG = 3, Gamma = 0.239

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9205129	0.9721476	0.9796374	0.9981519	3.848E+01	1.103E+00	--
α_2	5.79E-04	1.99E-02	1.27E-02	6.35E-02	8.104E-01	3.996E+01	1.557
α_3	6.78E-07	7.97E-03	1.89E-03	3.68E-02	2.921E-01	3.634E+01	1.732

CCCG = 4, Gamma = 0.239

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9371212	0.9733764	0.9775557	0.9953282	7.139E+01	1.953E+00	--
α_2	1.61E-03	1.72E-02	1.32E-02	4.64E-02	1.312E+00	7.510E+01	1.513
α_3	1.02E-05	6.02E-03	2.39E-03	2.43E-02	4.307E-01	7.107E+01	1.618
α_4	6.87E-09	3.43E-03	4.07E-04	1.75E-02	2.099E-01	6.098E+01	1.890

CCCG = 5, Gamma = 0.239

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9539026	0.9776228	0.9798764	0.9936384	1.357E+02	3.107E+00	--
α_2	1.63E-03	1.15E-02	9.37E-03	2.87E-02	1.684E+00	1.447E+02	1.452
α_3	3.28E-04	7.39E-03	5.02E-03	2.25E-02	9.426E-01	1.267E+02	1.664
α_4	2.11E-06	2.81E-03	9.67E-04	1.18E-02	3.816E-01	1.356E+02	1.562
α_5	2.71E-16	6.76E-04	3.71E-06	3.94E-03	9.865E-02	1.457E+02	1.456

CCCG = 6, Gamma = 0.239

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9600434	0.9794871	0.9811786	0.9931502	1.825E+02	3.822E+00	--
α_2	1.19E-03	8.18E-03	6.68E-03	2.03E-02	1.714E+00	2.078E+02	1.341
α_3	4.38E-04	6.66E-03	4.82E-03	1.92E-02	1.108E+00	1.652E+02	1.689
α_4	4.93E-05	3.73E-03	2.08E-03	1.30E-02	6.509E-01	1.741E+02	1.608
α_5	2.70E-08	1.36E-03	2.45E-04	6.55E-03	2.536E-01	1.863E+02	1.507
α_6	9.52E-17	5.86E-04	2.67E-06	3.42E-03	9.572E-02	1.632E+02	1.721

CCCG = 7, Gamma = 0.239

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9659543	0.9811157	0.9822698	0.9923351	2.699E+02	5.195E+00	--
α_2	1.31E-03	6.90E-03	5.86E-03	1.61E-02	2.105E+00	3.028E+02	1.349
α_3	4.78E-04	5.09E-03	3.89E-03	1.38E-02	1.320E+00	2.581E+02	1.585
α_4	1.98E-04	3.87E-03	2.69E-03	1.16E-02	9.967E-01	2.563E+02	1.598
α_5	1.07E-05	2.10E-03	1.00E-03	7.94E-03	5.249E-01	2.489E+02	1.649
α_6	5.35E-10	7.19E-04	7.04E-05	3.73E-03	1.956E-01	2.719E+02	1.512
α_7	5.57E-28	1.95E-04	4.43E-09	1.06E-03	5.291E-02	2.710E+02	1.518

CCCG = 8, Gamma = 0.239

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9684607	0.9820233	0.9830049	0.9922336	3.186E+02	5.832E+00	--
α_2	1.27E-03	6.28E-03	5.38E-03	1.44E-02	2.229E+00	3.529E+02	1.359
α_3	3.40E-04	3.96E-03	2.98E-03	1.09E-02	1.260E+00	3.170E+02	1.517
α_4	1.94E-04	3.41E-03	2.41E-03	1.00E-02	1.042E+00	3.046E+02	1.580
α_5	5.81E-05	2.47E-03	1.51E-03	8.15E-03	7.626E-01	3.076E+02	1.566
α_6	2.71E-07	1.18E-03	3.30E-04	5.25E-03	3.271E-01	2.765E+02	1.744
α_7	3.89E-13	4.01E-04	1.08E-05	2.25E-03	1.344E-01	3.350E+02	1.441
α_8	2.50E-20	2.77E-04	2.60E-07	1.61E-03	7.682E-02	2.774E+02	1.740

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.74E-01	9.72E-01	9.73E-01	9.78E-01	9.79E-01	9.81E-01	9.82E-01
α_2	2.59E-02	1.99E-02	1.72E-02	1.15E-02	8.18E-03	6.90E-03	6.28E-03
α_3		7.97E-03	6.02E-03	7.39E-03	6.66E-03	5.09E-03	3.96E-03
α_4			3.43E-03	2.81E-03	3.73E-03	3.87E-03	3.41E-03
α_5				6.76E-04	1.36E-03	2.10E-03	2.47E-03
α_6					5.86E-04	7.19E-04	1.18E-03
α_7						1.95E-04	4.01E-04
α_8							2.77E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.74E-01	9.72E-01	9.73E-01	9.78E-01	9.79E-01	9.81E-01	9.82E-01
Beta	2.59E-02	2.79E-02	2.66E-02	2.24E-02	2.05E-02	1.89E-02	1.80E-02
Gamma		2.86E-01	3.55E-01	4.86E-01	6.01E-01	6.34E-01	6.51E-01
Delta			3.63E-01	3.20E-01	4.60E-01	5.75E-01	6.62E-01
Epsilon				1.94E-01	3.43E-01	4.38E-01	5.60E-01
Mu					3.01E-01	3.03E-01	4.29E-01
Omega						2.14E-01	3.65E-01
Sigma							4.08E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.10	1.10	1.10	1.10	1.10	1.10	1.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.5.3 PWR Residual Heat Removal Check Valves

2.5.3.1 PWR-RHR-CKV-OO: PWR RHR Check Valves Fail to Close

Generic CCF Parameters

Plant Type:	PWR
System Group:	Clean Water
System:	Residual Heat Removal (LCI in BWRs; LPI in PWRs)
Component Group:	Valve
Component Type:	Check Valve
Failure Mode:	Fail to Close
Date Range:	2006 through 2020
Prior:	Default 2015

Total Number of Independent Failure Events: 7.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9387663	0.9843204	0.9931392	0.9999526	1.0000000	2.941E+01	4.685E-01
α_2	4.43E-05	1.57E-02	6.86E-03	6.12E-02	0.00E+00	4.685E-01	2.941E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9514143	0.9829362	0.9875052	0.9988234	1.0000000	6.498E+01	1.128E+00
α_2	4.32E-04	1.29E-02	8.40E-03	4.06E-02	0.00E+00	8.512E-01	6.526E+01
α_3	2.09E-07	4.19E-03	8.97E-04	1.96E-02	0.00E+00	2.768E-01	6.583E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9544871	0.9809820	0.9841019	0.9968125	1.0000000	9.768E+01	1.894E+00
α_2	1.09E-03	1.27E-02	9.57E-03	3.48E-02	0.00E+00	1.260E+00	9.831E+01
α_3	4.40E-06	4.04E-03	1.49E-03	1.67E-02	0.00E+00	4.024E-01	9.917E+01
α_4	1.61E-08	2.32E-03	3.47E-04	1.15E-02	0.00E+00	2.315E-01	9.934E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9657633	0.9829476	0.9845193	0.9947582	1.0000000	1.978E+02	3.432E+00
α_2	1.63E-03	9.56E-03	7.99E-03	2.29E-02	0.00E+00	1.924E+00	1.993E+02
α_3	3.02E-04	5.21E-03	3.69E-03	1.53E-02	0.00E+00	1.049E+00	2.002E+02
α_4	1.44E-06	1.90E-03	6.55E-04	8.01E-03	0.00E+00	3.822E-01	2.009E+02
α_5	3.31E-20	3.81E-04	3.55E-07	2.22E-03	0.00E+00	7.674E-02	2.012E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9683367	0.9837541	0.9850986	0.9945699	1.0000000	2.322E+02	3.835E+00

α_2	1.03E-03	7.21E-03	5.87E-03	1.79E-02	0.00E+00	1.701E+00	2.344E+02
α_3	4.03E-04	5.11E-03	3.80E-03	1.43E-02	0.00E+00	1.207E+00	2.348E+02
α_4	2.31E-05	2.52E-03	1.33E-03	9.10E-03	0.00E+00	5.960E-01	2.355E+02
α_5	3.67E-09	9.37E-04	1.25E-04	4.70E-03	0.00E+00	2.211E-01	2.358E+02
α_6	3.66E-15	4.65E-04	4.71E-06	2.68E-03	0.00E+00	1.098E-01	2.359E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9736667	0.9850542	0.9858851	0.9935977	1.0000000	3.788E+02	5.747E+00
α_2	1.19E-03	5.83E-03	5.00E-03	1.33E-02	0.00E+00	2.243E+00	3.823E+02
α_3	5.69E-04	4.24E-03	3.42E-03	1.07E-02	0.00E+00	1.630E+00	3.829E+02
α_4	1.75E-04	2.82E-03	2.02E-03	8.19E-03	0.00E+00	1.083E+00	3.835E+02
α_5	1.06E-05	1.47E-03	7.41E-04	5.40E-03	0.00E+00	5.654E-01	3.840E+02
α_6	2.74E-10	4.98E-04	4.60E-05	2.60E-03	0.00E+00	1.916E-01	3.844E+02
α_7	6.20E-41	9.05E-05	3.37E-12	3.97E-04	0.00E+00	3.480E-02	3.845E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9749198	0.9857837	0.9865782	0.9939228	1.0000000	3.970E+02	5.726E+00
α_2	9.03E-04	5.01E-03	4.22E-03	1.18E-02	0.00E+00	2.018E+00	4.007E+02
α_3	3.57E-04	3.45E-03	2.67E-03	9.21E-03	0.00E+00	1.391E+00	4.014E+02
α_4	1.57E-04	2.64E-03	1.87E-03	7.72E-03	0.00E+00	1.062E+00	4.017E+02
α_5	3.08E-05	1.74E-03	1.02E-03	5.92E-03	0.00E+00	7.026E-01	4.020E+02
α_6	3.41E-07	8.68E-04	2.67E-04	3.78E-03	0.00E+00	3.497E-01	4.024E+02
α_7	1.31E-15	2.68E-04	2.46E-06	1.55E-03	0.00E+00	1.078E-01	4.026E+02
α_8	2.74E-17	2.35E-04	9.96E-07	1.37E-03	0.00E+00	9.469E-02	4.027E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.83E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.57E-02	1.29E-02	1.27E-02	9.56E-03	7.21E-03	5.83E-03	5.01E-03
α_3		4.19E-03	4.04E-03	5.21E-03	5.11E-03	4.24E-03	3.45E-03
α_4			2.32E-03	1.90E-03	2.52E-03	2.82E-03	2.64E-03
α_5				3.81E-04	9.37E-04	1.47E-03	1.74E-03
α_6					4.65E-04	4.98E-04	8.68E-04
α_7						9.05E-05	2.68E-04
α_8							2.35E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.83E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.57E-02	1.71E-02	1.90E-02	1.71E-02	1.62E-02	1.49E-02	1.42E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.00	7.00	7.00	7.00	7.00	7.00	7.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9583201	0.9892302	0.9951797	0.9999641	4.440E+01	4.834E-01	--
α_2	3.59E-05	1.08E-02	4.82E-03	4.17E-02	4.834E-01	4.440E+01	1.032

CCCG = 3, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9710275	0.9895625	0.9921810	0.9991464	1.162E+02	1.226E+00	--
α_2	4.02E-04	8.25E-03	5.70E-03	2.48E-02	9.769E-01	1.175E+02	1.122
α_3	3.50E-08	2.19E-03	3.80E-04	1.06E-02	2.487E-01	1.134E+02	1.170

CCCG = 4, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9693219	0.9868761	0.9888838	0.9975645	1.547E+02	2.057E+00	--
α_2	9.94E-04	9.00E-03	7.05E-03	2.36E-02	1.442E+00	1.589E+02	1.160
α_3	3.36E-06	2.68E-03	1.01E-03	1.10E-02	4.114E-01	1.530E+02	1.212
α_4	1.90E-09	1.45E-03	1.58E-04	7.42E-03	2.036E-01	1.405E+02	1.321

CCCG = 5, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9756308	0.9876491	0.9887220	0.9960013	2.945E+02	3.683E+00	--
α_2	1.52E-03	7.41E-03	6.36E-03	1.69E-02	2.243E+00	3.004E+02	1.177
α_3	1.73E-04	3.44E-03	2.38E-03	1.03E-02	9.912E-01	2.872E+02	1.236
α_4	8.74E-07	1.28E-03	4.33E-04	5.43E-03	3.765E-01	2.935E+02	1.212
α_5	1.90E-21	2.19E-04	1.25E-07	1.27E-03	7.237E-02	3.304E+02	1.078

CCCG = 6, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9768585	0.9879038	0.9888411	0.9957470	3.380E+02	4.139E+00	--
α_2	1.13E-03	5.86E-03	4.98E-03	1.36E-02	2.128E+00	3.611E+02	1.119
α_3	2.46E-04	3.56E-03	2.59E-03	1.02E-02	1.134E+00	3.171E+02	1.277
α_4	1.08E-05	1.66E-03	8.22E-04	6.13E-03	5.533E-01	3.334E+02	1.217
α_5	2.50E-09	6.42E-04	8.57E-05	3.22E-03	2.210E-01	3.440E+02	1.181
α_6	4.78E-16	3.75E-04	2.61E-06	2.17E-03	1.027E-01	2.739E+02	1.484

CCCG = 7, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9811224	0.9890175	0.9895692	0.9950286	5.792E+02	6.432E+00	--
α_2	1.16E-03	4.47E-03	3.97E-03	9.52E-03	2.840E+00	6.319E+02	1.086
α_3	4.79E-04	3.22E-03	2.64E-03	7.98E-03	1.746E+00	5.397E+02	1.274
α_4	1.20E-04	1.93E-03	1.38E-03	5.62E-03	1.084E+00	5.604E+02	1.228
α_5	5.47E-06	9.62E-04	4.66E-04	3.60E-03	5.376E-01	5.585E+02	1.233
α_6	3.07E-10	3.50E-04	3.53E-05	1.81E-03	1.979E-01	5.654E+02	1.219
α_7	9.21E-53	4.11E-05	4.12E-15	1.41E-04	2.656E-02	6.456E+02	1.068

CCCG = 8, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9819755	0.9896373	0.9901856	0.9954270	5.837E+02	6.112E+00	--
α_2	7.82E-04	3.61E-03	3.12E-03	8.12E-03	2.364E+00	6.520E+02	1.053
α_3	3.24E-04	2.72E-03	2.15E-03	7.06E-03	1.512E+00	5.541E+02	1.240
α_4	1.13E-04	1.93E-03	1.37E-03	5.66E-03	1.056E+00	5.468E+02	1.258
α_5	1.77E-05	1.17E-03	6.66E-04	4.03E-03	6.745E-01	5.762E+02	1.195
α_6	7.62E-08	5.67E-04	1.44E-04	2.57E-03	3.076E-01	5.420E+02	1.271
α_7	1.37E-15	1.96E-04	1.94E-06	1.13E-03	1.093E-01	5.565E+02	1.238
α_8	2.60E-18	1.68E-04	4.67E-07	9.81E-04	8.885E-02	5.282E+02	1.305

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.90E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01	9.90E-01
α_2	1.08E-02	8.25E-03	9.00E-03	7.41E-03	5.86E-03	4.47E-03	3.61E-03
α_3		2.19E-03	2.68E-03	3.44E-03	3.56E-03	3.22E-03	2.72E-03
α_4			1.45E-03	1.28E-03	1.66E-03	1.93E-03	1.93E-03
α_5				2.19E-04	6.42E-04	9.62E-04	1.17E-03
α_6					3.75E-04	3.50E-04	5.67E-04
α_7						4.11E-05	1.96E-04
α_8							1.68E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.90E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01	9.90E-01
Beta	1.08E-02	1.04E-02	1.31E-02	1.24E-02	1.21E-02	1.10E-02	1.04E-02
Gamma		2.10E-01	3.15E-01	4.00E-01	5.16E-01	5.93E-01	6.51E-01
Delta			3.50E-01	3.04E-01	4.29E-01	5.04E-01	5.97E-01
Epsilon				1.46E-01	3.80E-01	4.12E-01	5.22E-01
Mu					3.69E-01	2.89E-01	4.43E-01
Omega						1.05E-01	3.91E-01
Sigma							4.61E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8790954	0.9692772	0.9867846	0.9999297	1.419E+01	4.498E-01	--
α_2	7.03E-05	3.07E-02	1.32E-02	1.21E-01	4.498E-01	1.419E+01	1.032

CCCG = 3, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8992154	0.9637022	0.9727515	0.9971974	3.128E+01	1.178E+00	--
α_2	1.29E-03	2.87E-02	1.98E-02	8.65E-02	9.387E-01	3.180E+01	1.122
α_3	8.09E-08	7.63E-03	1.24E-03	3.74E-02	2.396E-01	3.117E+01	1.170

CCCG = 4, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8995707	0.9575419	0.9641914	0.9927359	4.281E+01	1.898E+00	--
α_2	2.55E-03	2.80E-02	2.15E-02	7.59E-02	1.285E+00	4.456E+01	1.160
α_3	8.32E-06	8.95E-03	3.22E-03	3.73E-02	3.927E-01	4.349E+01	1.212
α_4	2.13E-08	5.48E-03	7.39E-04	2.75E-02	2.207E-01	4.003E+01	1.321

CCCG = 5, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9245143	0.9618892	0.9651943	0.9879608	8.848E+01	3.506E+00	--
α_2	3.82E-03	2.13E-02	1.80E-02	5.01E-02	1.992E+00	9.153E+01	1.177
α_3	7.52E-04	1.21E-02	8.70E-03	3.51E-02	1.078E+00	8.800E+01	1.236
α_4	2.11E-06	4.00E-03	1.30E-03	1.72E-02	3.632E-01	9.045E+01	1.212
α_5	6.57E-21	7.10E-04	4.11E-07	4.11E-03	7.248E-02	1.021E+02	1.078

CCCG = 6, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9309995	0.9634909	0.9661491	0.9868951	1.108E+02	4.199E+00	--
α_2	2.73E-03	1.58E-02	1.33E-02	3.76E-02	1.941E+00	1.208E+02	1.119
α_3	1.19E-03	1.24E-02	9.52E-03	3.34E-02	1.332E+00	1.062E+02	1.277
α_4	5.89E-05	5.48E-03	2.96E-03	1.95E-02	6.181E-01	1.122E+02	1.217
α_5	1.37E-08	1.99E-03	2.96E-04	9.85E-03	2.313E-01	1.160E+02	1.181
α_6	7.59E-20	8.30E-04	7.84E-07	4.83E-03	7.684E-02	9.247E+01	1.484

CCCG = 7, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9415389	0.9660160	0.9677008	0.9847376	1.769E+02	6.223E+00	--
α_2	3.27E-03	1.34E-02	1.18E-02	2.89E-02	2.654E+00	1.961E+02	1.086
α_3	1.33E-03	9.70E-03	7.85E-03	2.44E-02	1.645E+00	1.679E+02	1.274
α_4	4.23E-04	6.34E-03	4.60E-03	1.82E-02	1.115E+00	1.747E+02	1.228
α_5	3.34E-05	3.45E-03	1.83E-03	1.24E-02	6.034E-01	1.745E+02	1.233
α_6	1.79E-10	1.01E-03	7.50E-05	5.33E-03	1.780E-01	1.769E+02	1.219
α_7	7.37E-51	1.35E-04	2.78E-14	4.78E-04	2.734E-02	2.022E+02	1.068

CCCG = 8, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9439693	0.9674151	0.9690292	0.9853469	1.854E+02	6.246E+00	--
α_2	2.73E-03	1.18E-02	1.03E-02	2.60E-02	2.504E+00	2.096E+02	1.053
α_3	8.46E-04	7.88E-03	6.15E-03	2.08E-02	1.419E+00	1.787E+02	1.240
α_4	3.18E-04	5.78E-03	4.06E-03	1.71E-02	1.027E+00	1.766E+02	1.258
α_5	8.10E-05	3.92E-03	2.35E-03	1.31E-02	7.337E-01	1.863E+02	1.195
α_6	2.26E-06	2.26E-03	8.17E-04	9.41E-03	3.975E-01	1.754E+02	1.271
α_7	4.27E-20	4.27E-04	4.10E-07	2.48E-03	7.703E-02	1.804E+02	1.238
α_8	4.75E-18	5.11E-04	1.28E-06	2.98E-03	8.749E-02	1.712E+02	1.305

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.69E-01	9.64E-01	9.58E-01	9.62E-01	9.63E-01	9.66E-01	9.67E-01
α_2	3.07E-02	2.87E-02	2.80E-02	2.13E-02	1.58E-02	1.34E-02	1.18E-02
α_3		7.63E-03	8.95E-03	1.21E-02	1.24E-02	9.70E-03	7.88E-03
α_4			5.48E-03	4.00E-03	5.48E-03	6.34E-03	5.78E-03
α_5				7.10E-04	1.99E-03	3.45E-03	3.92E-03
α_6					8.30E-04	1.01E-03	2.26E-03
α_7						1.35E-04	4.27E-04
α_8							5.11E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.69E-01	9.64E-01	9.58E-01	9.62E-01	9.63E-01	9.66E-01	9.67E-01
Beta	3.07E-02	3.63E-02	4.25E-02	3.81E-02	3.65E-02	3.40E-02	3.26E-02
Gamma		2.10E-01	3.40E-01	4.41E-01	5.67E-01	6.07E-01	6.38E-01
Delta			3.80E-01	2.80E-01	4.01E-01	5.30E-01	6.21E-01
Epsilon				1.51E-01	3.40E-01	4.20E-01	5.52E-01
Mu					2.94E-01	2.49E-01	4.49E-01
Omega						1.19E-01	2.93E-01
Sigma							5.45E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.429

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9313509	0.9823776	0.9922335	0.9999488	2.623E+01	4.706E-01	--
α_2	5.12E-05	1.76E-02	7.77E-03	6.86E-02	4.706E-01	2.623E+01	1.032

CCCG = 3, Gamma = 0.429

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9451175	0.9808561	0.9860772	0.9987401	5.649E+01	1.103E+00	--
α_2	4.03E-04	1.39E-02	8.88E-03	4.46E-02	8.104E-01	5.742E+01	1.122
α_3	4.42E-07	5.23E-03	1.23E-03	2.41E-02	2.921E-01	5.558E+01	1.170

CCCG = 4, Gamma = 0.429

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9532152	0.9802524	0.9833912	0.9965510	9.693E+01	1.953E+00	--
α_2	1.21E-03	1.29E-02	9.91E-03	3.51E-02	1.312E+00	1.000E+02	1.160
α_3	7.48E-06	4.44E-03	1.76E-03	1.80E-02	4.307E-01	9.656E+01	1.212
α_4	4.71E-09	2.36E-03	2.79E-04	1.20E-02	2.099E-01	8.875E+01	1.321

CCCG = 5, Gamma = 0.429

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9642033	0.9826568	0.9844202	0.9950826	1.760E+02	3.107E+00	--
α_2	1.31E-03	9.25E-03	7.53E-03	2.31E-02	1.684E+00	1.803E+02	1.177
α_3	2.41E-04	5.44E-03	3.69E-03	1.66E-02	9.426E-01	1.724E+02	1.236
α_4	1.62E-06	2.16E-03	7.43E-04	9.11E-03	3.816E-01	1.764E+02	1.212
α_5	1.98E-16	4.96E-04	2.72E-06	2.89E-03	9.865E-02	1.987E+02	1.078

CCCG = 6, Gamma = 0.429

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9685093	0.9838585	0.9852008	0.9946210	2.330E+02	3.822E+00	--
α_2	9.82E-04	6.78E-03	5.53E-03	1.68E-02	1.714E+00	2.511E+02	1.119
α_3	3.29E-04	5.00E-03	3.61E-03	1.44E-02	1.108E+00	2.204E+02	1.277
α_4	3.70E-05	2.80E-03	1.56E-03	9.77E-03	6.509E-01	2.318E+02	1.217
α_5	2.10E-08	1.06E-03	1.91E-04	5.10E-03	2.536E-01	2.393E+02	1.181
α_6	8.14E-17	5.02E-04	2.28E-06	2.92E-03	9.572E-02	1.906E+02	1.484

CCCG = 7, Gamma = 0.429

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9732008	0.9851540	0.9860685	0.9939839	3.447E+02	5.195E+00	--
α_2	1.05E-03	5.53E-03	4.70E-03	1.29E-02	2.105E+00	3.782E+02	1.086
α_3	3.82E-04	4.07E-03	3.11E-03	1.10E-02	1.320E+00	3.231E+02	1.274
α_4	1.51E-04	2.96E-03	2.05E-03	8.87E-03	9.967E-01	3.355E+02	1.228
α_5	7.93E-06	1.57E-03	7.45E-04	5.91E-03	5.249E-01	3.345E+02	1.233
α_6	4.29E-10	5.77E-04	5.65E-05	2.99E-03	1.956E-01	3.387E+02	1.219
α_7	3.90E-28	1.37E-04	3.10E-09	7.42E-04	5.291E-02	3.868E+02	1.068

CCCG = 8, Gamma = 0.429

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9753041	0.9859404	0.9867140	0.9939348	4.090E+02	5.832E+00	--
α_2	9.83E-04	4.84E-03	4.15E-03	1.11E-02	2.229E+00	4.580E+02	1.053
α_3	2.77E-04	3.22E-03	2.43E-03	8.90E-03	1.260E+00	3.895E+02	1.240
α_4	1.54E-04	2.70E-03	1.91E-03	7.97E-03	1.042E+00	3.842E+02	1.258
α_5	4.41E-05	1.88E-03	1.15E-03	6.20E-03	7.626E-01	4.049E+02	1.195
α_6	1.96E-07	8.58E-04	2.39E-04	3.81E-03	3.271E-01	3.811E+02	1.271
α_7	3.33E-13	3.43E-04	9.20E-06	1.93E-03	1.344E-01	3.913E+02	1.238
α_8	1.86E-20	2.07E-04	1.94E-07	1.20E-03	7.682E-02	3.715E+02	1.305

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.81E-01	9.80E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.76E-02	1.39E-02	1.29E-02	9.25E-03	6.78E-03	5.53E-03	4.84E-03
α_3		5.23E-03	4.44E-03	5.44E-03	5.00E-03	4.07E-03	3.22E-03
α_4			2.36E-03	2.16E-03	2.80E-03	2.96E-03	2.70E-03
α_5				4.96E-04	1.06E-03	1.57E-03	1.88E-03
α_6					5.02E-04	5.77E-04	8.58E-04
α_7						1.37E-04	3.43E-04
α_8							2.07E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.81E-01	9.80E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.76E-02	1.91E-02	1.97E-02	1.73E-02	1.61E-02	1.48E-02	1.41E-02
Gamma		2.73E-01	3.44E-01	4.67E-01	5.80E-01	6.27E-01	6.56E-01
Delta			3.47E-01	3.28E-01	4.66E-01	5.63E-01	6.50E-01
Epsilon				1.87E-01	3.58E-01	4.35E-01	5.49E-01
Mu					3.22E-01	3.13E-01	4.28E-01
Omega						1.92E-01	3.91E-01
Sigma							3.76E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9821712	0.9953724	0.9979079	0.9999830	1.061E+02	4.932E-01	--
α_2	1.70E-05	4.63E-03	2.09E-03	1.78E-02	4.932E-01	1.061E+02	1.032

CCCG = 3, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9858201	0.9951576	0.9965579	0.9997130	2.177E+02	1.059E+00	--
α_2	6.02E-05	3.22E-03	1.90E-03	1.09E-02	7.137E-01	2.211E+02	1.122
α_3	5.85E-07	1.62E-03	4.92E-04	7.09E-03	3.458E-01	2.125E+02	1.170

CCCG = 4, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9879591	0.9948223	0.9956046	0.9990117	4.063E+02	2.115E+00	--
α_2	4.58E-04	3.70E-03	2.95E-03	9.52E-03	1.549E+00	4.172E+02	1.160
α_3	2.06E-08	6.60E-04	1.29E-04	3.14E-03	2.646E-01	4.006E+02	1.212
α_4	9.05E-08	8.19E-04	2.01E-04	3.74E-03	3.010E-01	3.674E+02	1.321

CCCG = 5, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9918543	0.9954751	0.9957526	0.9981483	1.171E+03	5.325E+00	--
α_2	9.71E-04	3.04E-03	2.77E-03	6.05E-03	3.632E+00	1.189E+03	1.177
α_3	1.17E-04	1.19E-03	9.15E-04	3.21E-03	1.354E+00	1.135E+03	1.236
α_4	2.43E-08	2.56E-04	6.10E-05	1.17E-03	2.961E-01	1.158E+03	1.212
α_5	9.70E-35	3.26E-05	3.59E-11	1.61E-04	4.243E-02	1.303E+03	1.078

CCCG = 6, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9915723	0.9954045	0.9957082	0.9981997	1.069E+03	4.936E+00	--
α_2	6.84E-04	2.57E-03	2.28E-03	5.43E-03	2.915E+00	1.131E+03	1.119
α_3	1.08E-04	1.27E-03	9.51E-04	3.50E-03	1.257E+00	9.922E+02	1.277
α_4	1.96E-06	4.82E-04	2.21E-04	1.85E-03	5.031E-01	1.042E+03	1.217
α_5	3.11E-15	1.07E-04	1.42E-06	6.16E-04	1.155E-01	1.075E+03	1.181
α_6	7.93E-13	1.70E-04	6.21E-06	9.40E-04	1.451E-01	8.552E+02	1.484

CCCG = 7, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9934696	0.9958665	0.9960072	0.9977833	2.326E+03	9.654E+00	--
α_2	7.47E-04	1.93E-03	1.80E-03	3.55E-03	4.851E+00	2.511E+03	1.086
α_3	3.34E-04	1.30E-03	1.15E-03	2.79E-03	2.800E+00	2.143E+03	1.274
α_4	6.36E-05	6.22E-04	4.80E-04	1.66E-03	1.384E+00	2.224E+03	1.228
α_5	7.83E-07	2.21E-04	9.89E-05	8.56E-04	4.902E-01	2.215E+03	1.233
α_6	1.22E-15	5.11E-05	6.48E-07	2.93E-04	1.146E-01	2.241E+03	1.219
α_7	3.01E-93	5.72E-06	6.09E-25	6.80E-06	1.464E-02	2.559E+03	1.068

CCCG = 8, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9932292	0.9959749	0.9961595	0.9980902	1.769E+03	7.148E+00	--
α_2	4.11E-04	1.52E-03	1.35E-03	3.19E-03	2.980E+00	1.962E+03	1.053
α_3	2.04E-04	1.17E-03	9.83E-04	2.80E-03	1.960E+00	1.666E+03	1.240
α_4	5.18E-05	7.09E-04	5.20E-04	2.01E-03	1.166E+00	1.644E+03	1.258
α_5	1.76E-06	3.10E-04	1.50E-04	1.16E-03	5.375E-01	1.731E+03	1.195
α_6	2.45E-11	1.11E-04	8.60E-06	5.86E-04	1.805E-01	1.628E+03	1.271
α_7	1.28E-35	2.48E-05	1.85E-11	1.21E-04	4.139E-02	1.671E+03	1.238
α_8	1.09E-08	1.78E-04	3.93E-05	8.31E-04	2.827E-01	1.586E+03	1.305

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
α_2	4.63E-03	3.22E-03	3.70E-03	3.04E-03	2.57E-03	1.93E-03	1.52E-03
α_3		1.62E-03	6.60E-04	1.19E-03	1.27E-03	1.30E-03	1.17E-03
α_4			8.19E-04	2.56E-04	4.82E-04	6.22E-04	7.09E-04
α_5				3.26E-05	1.07E-04	2.21E-04	3.10E-04
α_6					1.70E-04	5.11E-05	1.11E-04
α_7						5.72E-06	2.48E-05
α_8							1.78E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
Beta	4.63E-03	4.84E-03	5.18E-03	4.52E-03	4.60E-03	4.13E-03	4.03E-03
Gamma		3.36E-01	2.86E-01	3.27E-01	4.41E-01	5.33E-01	6.23E-01
Delta			5.54E-01	1.95E-01	3.75E-01	4.08E-01	5.32E-01
Epsilon				1.13E-01	3.65E-01	3.09E-01	4.68E-01
Mu					6.12E-01	2.04E-01	5.03E-01
Omega						1.01E-01	6.47E-01
Sigma							8.78E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.5.4 High Pressure Coolant Injection and Reactor Core Isolation Cooling Check Valves

2.5.4.1 HCI-RCI-CKV-OO: HPCI and RCIC Check Valves Fail to Close

Generic CCF Parameters

System Group: Clean Water
System: High Pressure Coolant Injection, Reactor Core Isolation
Component Group: Valve
Component Type: Check Valve
Failure Mode: Fail to Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 6.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9377318	0.9840536	0.9930199	0.9999518	1.0000000	2.891E+01	4.685E-01
α_2	4.51E-05	1.59E-02	6.98E-03	6.23E-02	0.00E+00	4.685E-01	2.891E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9510473	0.9828061	0.9874090	0.9988142	1.0000000	6.448E+01	1.128E+00
α_2	4.35E-04	1.30E-02	8.47E-03	4.09E-02	0.00E+00	8.512E-01	6.476E+01
α_3	2.11E-07	4.22E-03	9.04E-04	1.98E-02	0.00E+00	2.768E-01	6.533E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9542594	0.9808860	0.9840211	0.9967962	1.0000000	9.718E+01	1.894E+00
α_2	1.10E-03	1.27E-02	9.62E-03	3.49E-02	0.00E+00	1.260E+00	9.781E+01
α_3	4.42E-06	4.06E-03	1.49E-03	1.68E-02	0.00E+00	4.024E-01	9.867E+01
α_4	1.62E-08	2.34E-03	3.48E-04	1.16E-02	0.00E+00	2.315E-01	9.884E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9656786	0.9829051	0.9844806	0.9947450	1.0000000	1.973E+02	3.432E+00
α_2	1.63E-03	9.58E-03	8.01E-03	2.29E-02	0.00E+00	1.924E+00	1.988E+02
α_3	3.03E-04	5.22E-03	3.70E-03	1.54E-02	0.00E+00	1.049E+00	1.997E+02
α_4	1.45E-06	1.90E-03	6.56E-04	8.03E-03	0.00E+00	3.822E-01	2.004E+02
α_5	3.32E-20	3.82E-04	3.56E-07	2.22E-03	0.00E+00	7.674E-02	2.007E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9682699	0.9837196	0.9850668	0.9945583	1.0000000	2.317E+02	3.835E+00

α_2	1.04E-03	7.22E-03	5.88E-03	1.80E-02	0.00E+00	1.701E+00	2.339E+02
α_3	4.04E-04	5.12E-03	3.81E-03	1.43E-02	0.00E+00	1.207E+00	2.343E+02
α_4	2.32E-05	2.53E-03	1.33E-03	9.12E-03	0.00E+00	5.960E-01	2.350E+02
α_5	3.68E-09	9.39E-04	1.26E-04	4.71E-03	0.00E+00	2.211E-01	2.353E+02
α_6	3.67E-15	4.66E-04	4.72E-06	2.69E-03	0.00E+00	1.098E-01	2.354E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9736327	0.9850348	0.9858667	0.9935893	1.0000000	3.783E+02	5.747E+00
α_2	1.19E-03	5.84E-03	5.01E-03	1.33E-02	0.00E+00	2.243E+00	3.818E+02
α_3	5.69E-04	4.24E-03	3.42E-03	1.07E-02	0.00E+00	1.630E+00	3.824E+02
α_4	1.75E-04	2.82E-03	2.02E-03	8.20E-03	0.00E+00	1.083E+00	3.830E+02
α_5	1.06E-05	1.47E-03	7.42E-04	5.41E-03	0.00E+00	5.654E-01	3.835E+02
α_6	2.74E-10	4.99E-04	4.61E-05	2.60E-03	0.00E+00	1.916E-01	3.839E+02
α_7	6.21E-41	9.06E-05	3.37E-12	3.97E-04	0.00E+00	3.480E-02	3.840E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9748888	0.9857660	0.9865615	0.9939151	1.0000000	3.965E+02	5.726E+00
α_2	9.05E-04	5.02E-03	4.22E-03	1.18E-02	0.00E+00	2.018E+00	4.002E+02
α_3	3.57E-04	3.46E-03	2.68E-03	9.22E-03	0.00E+00	1.391E+00	4.009E+02
α_4	1.57E-04	2.64E-03	1.88E-03	7.73E-03	0.00E+00	1.062E+00	4.012E+02
α_5	3.08E-05	1.75E-03	1.02E-03	5.93E-03	0.00E+00	7.026E-01	4.015E+02
α_6	3.41E-07	8.69E-04	2.67E-04	3.78E-03	0.00E+00	3.497E-01	4.019E+02
α_7	1.31E-15	2.68E-04	2.46E-06	1.55E-03	0.00E+00	1.078E-01	4.021E+02
α_8	2.74E-17	2.35E-04	9.97E-07	1.37E-03	0.00E+00	9.469E-02	4.022E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.83E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.59E-02	1.30E-02	1.27E-02	9.58E-03	7.22E-03	5.84E-03	5.02E-03
α_3		4.22E-03	4.06E-03	5.22E-03	5.12E-03	4.24E-03	3.46E-03
α_4			2.34E-03	1.90E-03	2.53E-03	2.82E-03	2.64E-03
α_5				3.82E-04	9.39E-04	1.47E-03	1.75E-03
α_6					4.66E-04	4.99E-04	8.69E-04
α_7						9.06E-05	2.68E-04
α_8							2.35E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.83E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.59E-02	1.72E-02	1.91E-02	1.71E-02	1.63E-02	1.50E-02	1.42E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.50	6.50	6.50	6.50	6.50	6.50	6.50
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 1.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.231

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9707102	0.9924424	0.9966318	0.9999749	6.348E+01	4.834E-01	--
α_2	2.51E-05	7.56E-03	3.37E-03	2.93E-02	4.834E-01	6.348E+01	0.716

CCCG = 3, Gamma = 0.231

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9807539	0.9930786	0.9948248	0.9994357	1.758E+02	1.226E+00	--
α_2	2.74E-04	5.63E-03	3.88E-03	1.70E-02	9.769E-01	1.725E+02	0.763
α_3	2.06E-08	1.29E-03	2.24E-04	6.26E-03	2.487E-01	1.924E+02	0.687

CCCG = 4, Gamma = 0.231

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9798672	0.9914044	0.9927300	0.9984096	2.373E+02	2.057E+00	--
α_2	6.73E-04	6.10E-03	4.77E-03	1.61E-02	1.442E+00	2.350E+02	0.784
α_3	2.09E-06	1.67E-03	6.27E-04	6.87E-03	4.114E-01	2.458E+02	0.753
α_4	1.08E-09	8.25E-04	8.99E-05	4.23E-03	2.036E-01	2.465E+02	0.752

CCCG = 5, Gamma = 0.231

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9836215	0.9917110	0.9924366	0.9973216	4.407E+02	3.683E+00	--
α_2	1.05E-03	5.15E-03	4.42E-03	1.18E-02	2.243E+00	4.331E+02	0.817
α_3	1.08E-04	2.14E-03	1.48E-03	6.43E-03	9.912E-01	4.619E+02	0.769
α_4	5.57E-07	8.18E-04	2.76E-04	3.47E-03	3.765E-01	4.601E+02	0.773
α_5	1.54E-21	1.77E-04	1.01E-07	1.03E-03	7.237E-02	4.077E+02	0.872

CCCG = 6, Gamma = 0.231

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9839015	0.9915958	0.9922517	0.9970500	4.884E+02	4.139E+00	--
α_2	8.66E-04	4.51E-03	3.83E-03	1.05E-02	2.128E+00	4.701E+02	0.860
α_3	1.47E-04	2.14E-03	1.55E-03	6.12E-03	1.134E+00	5.297E+02	0.765
α_4	6.86E-06	1.05E-03	5.21E-04	3.89E-03	5.533E-01	5.261E+02	0.771
α_5	1.67E-09	4.29E-04	5.72E-05	2.15E-03	2.210E-01	5.151E+02	0.788
α_6	3.59E-16	2.82E-04	1.96E-06	1.63E-03	1.027E-01	3.646E+02	1.113

CCCG = 7, Gamma = 0.231

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9867275	0.9922856	0.9926757	0.9965120	8.273E+02	6.432E+00	--
α_2	9.43E-04	3.63E-03	3.21E-03	7.72E-03	2.840E+00	7.801E+02	0.880
α_3	2.95E-04	1.99E-03	1.63E-03	4.92E-03	1.746E+00	8.759E+02	0.785
α_4	7.67E-05	1.23E-03	8.81E-04	3.59E-03	1.084E+00	8.787E+02	0.783
α_5	3.44E-06	6.05E-04	2.93E-04	2.26E-03	5.376E-01	8.887E+02	0.775
α_6	1.97E-10	2.24E-04	2.26E-05	1.16E-03	1.979E-01	8.818E+02	0.781
α_7	8.21E-53	3.67E-05	3.67E-15	1.25E-04	2.656E-02	7.246E+02	0.951

CCCG = 8, Gamma = 0.231

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9870824	0.9925798	0.9929746	0.9967290	8.176E+02	6.112E+00	--
α_2	6.60E-04	3.05E-03	2.63E-03	6.86E-03	2.364E+00	7.732E+02	0.888
α_3	2.10E-04	1.76E-03	1.39E-03	4.58E-03	1.512E+00	8.562E+02	0.803
α_4	7.00E-05	1.19E-03	8.46E-04	3.51E-03	1.056E+00	8.827E+02	0.779
α_5	1.17E-05	7.74E-04	4.41E-04	2.67E-03	6.745E-01	8.709E+02	0.790
α_6	4.59E-08	3.42E-04	8.67E-05	1.55E-03	3.076E-01	9.003E+02	0.765
α_7	8.53E-16	1.22E-04	1.20E-06	7.03E-04	1.093E-01	8.963E+02	0.768
α_8	2.73E-18	1.77E-04	4.91E-07	1.03E-03	8.885E-02	5.021E+02	1.371

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.93E-01	9.91E-01	9.92E-01	9.92E-01	9.92E-01	9.93E-01
α_2	7.56E-03	5.63E-03	6.10E-03	5.15E-03	4.51E-03	3.63E-03	3.05E-03
α_3		1.29E-03	1.67E-03	2.14E-03	2.14E-03	1.99E-03	1.76E-03
α_4			8.25E-04	8.18E-04	1.05E-03	1.23E-03	1.19E-03
α_5				1.77E-04	4.29E-04	6.05E-04	7.74E-04
α_6					2.82E-04	2.24E-04	3.42E-04
α_7						3.67E-05	1.22E-04
α_8							1.77E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.93E-01	9.91E-01	9.92E-01	9.92E-01	9.92E-01	9.93E-01
Beta	7.56E-03	6.92E-03	8.60E-03	8.29E-03	8.40E-03	7.71E-03	7.42E-03
Gamma		1.86E-01	2.90E-01	3.78E-01	4.64E-01	5.30E-01	5.89E-01
Delta			3.31E-01	3.17E-01	4.52E-01	5.13E-01	5.97E-01
Epsilon				1.78E-01	4.03E-01	4.13E-01	5.42E-01
Mu					3.96E-01	3.02E-01	4.53E-01
Omega						1.40E-01	4.67E-01
Sigma							5.92E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.50	1.50	1.50	1.50	1.50	1.50	1.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9156991	0.9786731	0.9909502	0.9999520	2.064E+01	4.498E-01	--
α_2	4.80E-05	2.13E-02	9.05E-03	8.43E-02	4.498E-01	2.064E+01	0.716

CCCG = 3, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9329926	0.9760218	0.9821244	0.9981693	4.796E+01	1.178E+00	--
α_2	8.67E-04	1.95E-02	1.33E-02	5.91E-02	9.387E-01	4.721E+01	0.763
α_3	4.71E-08	4.48E-03	7.24E-04	2.20E-02	2.396E-01	5.323E+01	0.687

CCCG = 4, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9341872	0.9723676	0.9768163	0.9953212	6.680E+01	1.898E+00	--
α_2	1.71E-03	1.90E-02	1.45E-02	5.15E-02	1.285E+00	6.652E+01	0.784
α_3	5.14E-06	5.56E-03	1.99E-03	2.32E-02	3.927E-01	7.021E+01	0.753
α_4	1.20E-08	3.12E-03	4.18E-04	1.57E-02	2.207E-01	7.053E+01	0.752

CCCG = 5, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9493838	0.9745657	0.9768274	0.9920159	1.343E+02	3.506E+00	--
α_2	2.64E-03	1.48E-02	1.25E-02	3.49E-02	1.992E+00	1.327E+02	0.817
α_3	4.65E-04	7.52E-03	5.39E-03	2.19E-02	1.078E+00	1.422E+02	0.769
α_4	1.34E-06	2.55E-03	8.25E-04	1.09E-02	3.632E-01	1.421E+02	0.773
α_5	5.31E-21	5.74E-04	3.33E-07	3.32E-03	7.248E-02	1.261E+02	0.872

CCCG = 6, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9525752	0.9750070	0.9768691	0.9910753	1.638E+02	4.199E+00	--
α_2	2.10E-03	1.22E-02	1.02E-02	2.89E-02	1.941E+00	1.578E+02	0.860
α_3	7.11E-04	7.42E-03	5.69E-03	2.00E-02	1.332E+00	1.782E+02	0.765
α_4	3.72E-05	3.47E-03	1.87E-03	1.23E-02	6.181E-01	1.775E+02	0.771
α_5	9.10E-09	1.33E-03	1.97E-04	6.57E-03	2.313E-01	1.741E+02	0.788
α_6	5.69E-20	6.23E-04	5.87E-07	3.62E-03	7.684E-02	1.233E+02	1.113

CCCG = 7, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9589827	0.9762279	0.9774311	0.9893635	2.555E+02	6.223E+00	--
α_2	2.65E-03	1.08E-02	9.52E-03	2.34E-02	2.654E+00	2.427E+02	0.880
α_3	8.15E-04	5.98E-03	4.83E-03	1.51E-02	1.645E+00	2.734E+02	0.785
α_4	2.69E-04	4.04E-03	2.93E-03	1.16E-02	1.115E+00	2.746E+02	0.783
α_5	2.09E-05	2.17E-03	1.15E-03	7.77E-03	6.034E-01	2.781E+02	0.775
α_6	1.14E-10	6.44E-04	4.80E-05	3.42E-03	1.780E-01	2.762E+02	0.781
α_7	6.56E-51	1.20E-04	2.47E-14	4.25E-04	2.734E-02	2.270E+02	0.951

CCCG = 8, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9596719	0.9766103	0.9777908	0.9895170	2.608E+02	6.246E+00	--
α_2	2.30E-03	9.95E-03	8.69E-03	2.19E-02	2.504E+00	2.491E+02	0.888
α_3	5.46E-04	5.10E-03	3.97E-03	1.35E-02	1.419E+00	2.769E+02	0.803
α_4	1.97E-04	3.58E-03	2.51E-03	1.06E-02	1.027E+00	2.857E+02	0.779
α_5	5.35E-05	2.59E-03	1.56E-03	8.67E-03	7.337E-01	2.820E+02	0.790
α_6	1.35E-06	1.36E-03	4.91E-04	5.66E-03	3.975E-01	2.918E+02	0.765
α_7	2.65E-20	2.65E-04	2.54E-07	1.54E-03	7.703E-02	2.908E+02	0.768
α_8	4.99E-18	5.37E-04	1.34E-06	3.13E-03	8.749E-02	1.628E+02	1.371

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.79E-01	9.76E-01	9.72E-01	9.75E-01	9.75E-01	9.76E-01	9.77E-01
α_2	2.13E-02	1.95E-02	1.90E-02	1.48E-02	1.22E-02	1.08E-02	9.95E-03
α_3		4.48E-03	5.56E-03	7.52E-03	7.42E-03	5.98E-03	5.10E-03
α_4			3.12E-03	2.55E-03	3.47E-03	4.04E-03	3.58E-03
α_5				5.74E-04	1.33E-03	2.17E-03	2.59E-03
α_6					6.23E-04	6.44E-04	1.36E-03
α_7						1.20E-04	2.65E-04
α_8							5.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.79E-01	9.76E-01	9.72E-01	9.75E-01	9.75E-01	9.76E-01	9.77E-01
Beta	2.13E-02	2.40E-02	2.76E-02	2.54E-02	2.50E-02	2.38E-02	2.34E-02
Gamma		1.87E-01	3.14E-01	4.19E-01	5.14E-01	5.45E-01	5.75E-01
Delta			3.59E-01	2.93E-01	4.22E-01	5.38E-01	6.21E-01
Epsilon				1.84E-01	3.60E-01	4.20E-01	5.70E-01
Mu					3.19E-01	2.61E-01	4.55E-01
Omega						1.58E-01	3.71E-01
Sigma							6.70E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8236857	0.9576110	0.9844583	0.9999666	8.587E+00	3.801E-01	--
α_2	3.34E-05	4.24E-02	1.55E-02	1.76E-01	3.801E-01	8.587E+00	0.716

CCCG = 3, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8554852	0.9512020	0.9655939	0.9976289	1.871E+01	9.600E-01	--
α_2	5.31E-04	3.50E-02	2.05E-02	1.19E-01	6.673E-01	1.841E+01	0.763
α_3	1.21E-06	1.38E-02	3.33E-03	6.36E-02	2.927E-01	2.089E+01	0.687

CCCG = 4, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8667199	0.9455969	0.9550276	0.9921420	2.901E+01	1.669E+00	--
α_2	2.00E-03	3.44E-02	2.47E-02	9.98E-02	1.039E+00	2.917E+01	0.784
α_3	1.08E-05	1.24E-02	4.42E-03	5.16E-02	3.887E-01	3.107E+01	0.753
α_4	8.86E-08	7.66E-03	1.27E-03	3.75E-02	2.414E-01	3.128E+01	0.752

CCCG = 5, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9072094	0.9530639	0.9570835	0.9851680	7.080E+01	3.487E+00	--
α_2	3.87E-03	2.48E-02	2.05E-02	6.02E-02	1.791E+00	7.054E+01	0.817
α_3	1.25E-03	1.57E-02	1.17E-02	4.37E-02	1.207E+00	7.571E+01	0.769
α_4	1.00E-05	5.67E-03	2.27E-03	2.29E-02	4.340E-01	7.608E+01	0.773
α_5	1.80E-26	8.11E-04	2.89E-08	4.47E-03	5.493E-02	6.770E+01	0.872

CCCG = 6, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9177785	0.9572107	0.9605158	0.9853406	8.735E+01	3.905E+00	--
α_2	1.51E-03	1.56E-02	1.20E-02	4.19E-02	1.335E+00	8.425E+01	0.860
α_3	1.95E-03	1.59E-02	1.27E-02	4.09E-02	1.531E+00	9.467E+01	0.765
α_4	1.46E-04	7.53E-03	4.49E-03	2.53E-02	7.191E-01	9.473E+01	0.771
α_5	3.87E-08	2.64E-03	4.52E-04	1.28E-02	2.467E-01	9.315E+01	0.788
α_6	1.21E-20	1.10E-03	6.64E-07	6.39E-03	7.279E-02	6.603E+01	1.113

CCCG = 7, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9331778	0.9617729	0.9637977	0.9834498	1.452E+02	5.770E+00	--
α_2	1.39E-03	1.12E-02	8.91E-03	2.86E-02	1.549E+00	1.373E+02	0.880
α_3	2.27E-03	1.28E-02	1.08E-02	3.02E-02	1.989E+00	1.536E+02	0.785
α_4	7.42E-04	8.25E-03	6.27E-03	2.25E-02	1.287E+00	1.547E+02	0.783
α_5	7.31E-05	4.38E-03	2.54E-03	1.50E-02	6.913E-01	1.570E+02	0.775
α_6	1.10E-08	1.49E-03	2.24E-04	7.36E-03	2.327E-01	1.562E+02	0.781
α_7	1.12E-64	1.64E-04	2.49E-17	4.14E-04	2.112E-02	1.285E+02	0.951

CCCG = 8, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9414990	0.9650652	0.9665996	0.9833906	1.938E+02	7.016E+00	--
α_2	1.11E-03	8.62E-03	6.92E-03	2.20E-02	1.583E+00	1.820E+02	0.888
α_3	1.73E-03	9.78E-03	8.23E-03	2.32E-02	1.986E+00	2.010E+02	0.803
α_4	1.12E-03	7.99E-03	6.49E-03	2.00E-02	1.672E+00	2.075E+02	0.779
α_5	2.60E-04	4.90E-03	3.42E-03	1.46E-02	1.011E+00	2.053E+02	0.790
α_6	2.03E-05	2.68E-03	1.36E-03	9.80E-03	5.709E-01	2.126E+02	0.765
α_7	1.96E-10	8.53E-04	6.68E-05	4.51E-03	1.809E-01	2.120E+02	0.768
α_8	1.51E-107	1.05E-04	3.17E-27	7.86E-05	1.245E-02	1.189E+02	1.371

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.58E-01	9.51E-01	9.46E-01	9.53E-01	9.57E-01	9.62E-01	9.65E-01
α_2	4.24E-02	3.50E-02	3.44E-02	2.48E-02	1.56E-02	1.12E-02	8.62E-03
α_3		1.38E-02	1.24E-02	1.57E-02	1.59E-02	1.28E-02	9.78E-03
α_4			7.66E-03	5.67E-03	7.53E-03	8.25E-03	7.99E-03
α_5				8.11E-04	2.64E-03	4.38E-03	4.90E-03
α_6					1.10E-03	1.49E-03	2.68E-03
α_7						1.64E-04	8.53E-04
α_8							1.05E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.58E-01	9.51E-01	9.46E-01	9.53E-01	9.57E-01	9.62E-01	9.65E-01
Beta	4.24E-02	4.88E-02	5.44E-02	4.69E-02	4.28E-02	3.82E-02	3.49E-02
Gamma		2.83E-01	3.68E-01	4.72E-01	6.35E-01	7.08E-01	7.53E-01
Delta			3.83E-01	2.92E-01	4.15E-01	5.28E-01	6.28E-01
Epsilon				1.25E-01	3.32E-01	4.23E-01	5.16E-01
Mu					2.94E-01	2.74E-01	4.26E-01
Omega						9.95E-02	2.63E-01
Sigma							1.09E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.308

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9504423	0.9873065	0.9944433	0.9999634	3.660E+01	4.706E-01	--
α_2	3.66E-05	1.27E-02	5.56E-03	4.96E-02	4.706E-01	3.660E+01	0.716

CCCG = 3, Gamma = 0.308

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9633862	0.9872704	0.9907775	0.9991673	8.551E+01	1.103E+00	--
α_2	2.77E-04	9.61E-03	6.11E-03	3.09E-02	8.104E-01	8.351E+01	0.763
α_3	2.62E-07	3.12E-03	7.32E-04	1.44E-02	2.921E-01	9.336E+01	0.687

CCCG = 4, Gamma = 0.308

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9691843	0.9870324	0.9891186	0.9977455	1.486E+02	1.953E+00	--
α_2	8.23E-04	8.83E-03	6.74E-03	2.40E-02	1.312E+00	1.473E+02	0.784
α_3	4.68E-06	2.78E-03	1.10E-03	1.13E-02	4.307E-01	1.543E+02	0.753
α_4	2.69E-09	1.35E-03	1.60E-04	6.89E-03	2.099E-01	1.548E+02	0.752

CCCG = 5, Gamma = 0.308

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9759335	0.9883655	0.9895612	0.9967111	2.639E+02	3.107E+00	--
α_2	9.11E-04	6.45E-03	5.24E-03	1.61E-02	1.684E+00	2.593E+02	0.817
α_3	1.50E-04	3.40E-03	2.30E-03	1.04E-02	9.426E-01	2.766E+02	0.769
α_4	1.04E-06	1.38E-03	4.75E-04	5.83E-03	3.816E-01	2.757E+02	0.773
α_5	1.61E-16	4.03E-04	2.21E-06	2.35E-03	9.865E-02	2.444E+02	0.872

CCCG = 6, Gamma = 0.308

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9783090	0.9889015	0.9898333	0.9963103	3.406E+02	3.822E+00	--
α_2	7.57E-04	5.23E-03	4.26E-03	1.30E-02	1.714E+00	3.262E+02	0.860
α_3	1.97E-04	3.01E-03	2.17E-03	8.67E-03	1.108E+00	3.675E+02	0.765
α_4	2.35E-05	1.78E-03	9.92E-04	6.21E-03	6.509E-01	3.651E+02	0.771
α_5	1.40E-08	7.09E-04	1.28E-04	3.42E-03	2.536E-01	3.576E+02	0.788
α_6	6.13E-17	3.78E-04	1.72E-06	2.20E-03	9.572E-02	2.532E+02	1.113

CCCG = 7, Gamma = 0.308

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9812334	0.9896184	0.9902635	0.9958005	4.952E+02	5.195E+00	--
α_2	8.53E-04	4.49E-03	3.81E-03	1.05E-02	2.105E+00	4.663E+02	0.880
α_3	2.36E-04	2.51E-03	1.92E-03	6.83E-03	1.320E+00	5.237E+02	0.785
α_4	9.65E-05	1.89E-03	1.31E-03	5.67E-03	9.967E-01	5.253E+02	0.783
α_5	4.99E-06	9.87E-04	4.69E-04	3.72E-03	5.249E-01	5.315E+02	0.775
α_6	2.75E-10	3.71E-04	3.63E-05	1.92E-03	1.956E-01	5.275E+02	0.781
α_7	3.48E-28	1.22E-04	2.77E-09	6.62E-04	5.291E-02	4.334E+02	0.951

CCCG = 8, Gamma = 0.308

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9823147	0.9899437	0.9905014	0.9956683	5.741E+02	5.832E+00	--
α_2	8.30E-04	4.09E-03	3.50E-03	9.37E-03	2.229E+00	5.425E+02	0.888
α_3	1.79E-04	2.09E-03	1.57E-03	5.77E-03	1.260E+00	6.012E+02	0.803
α_4	9.54E-05	1.68E-03	1.18E-03	4.95E-03	1.042E+00	6.197E+02	0.779
α_5	2.92E-05	1.25E-03	7.62E-04	4.11E-03	7.626E-01	6.114E+02	0.790
α_6	1.18E-07	5.17E-04	1.44E-04	2.30E-03	3.271E-01	6.323E+02	0.765
α_7	2.07E-13	2.13E-04	5.72E-06	1.20E-03	1.344E-01	6.295E+02	0.768
α_8	1.96E-20	2.18E-04	2.04E-07	1.26E-03	7.682E-02	3.526E+02	1.371

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01	9.90E-01	9.90E-01
α_2	1.27E-02	9.61E-03	8.83E-03	6.45E-03	5.23E-03	4.49E-03	4.09E-03
α_3		3.12E-03	2.78E-03	3.40E-03	3.01E-03	2.51E-03	2.09E-03
α_4			1.35E-03	1.38E-03	1.78E-03	1.89E-03	1.68E-03
α_5				4.03E-04	7.09E-04	9.87E-04	1.25E-03
α_6					3.78E-04	3.71E-04	5.17E-04
α_7						1.22E-04	2.13E-04
α_8							2.18E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01	9.90E-01	9.90E-01
Beta	1.27E-02	1.27E-02	1.30E-02	1.16E-02	1.11E-02	1.04E-02	1.01E-02
Gamma		2.45E-01	3.19E-01	4.45E-01	5.29E-01	5.67E-01	5.93E-01
Delta			3.27E-01	3.45E-01	4.88E-01	5.73E-01	6.49E-01
Epsilon				2.26E-01	3.79E-01	4.39E-01	5.67E-01
Mu					3.48E-01	3.33E-01	4.32E-01
Omega						2.48E-01	4.55E-01
Sigma							5.05E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9876163	0.9967876	0.9985504	0.9999882	1.530E+02	4.932E-01	--
α_2	1.18E-05	3.21E-03	1.45E-03	1.24E-02	4.932E-01	1.530E+02	0.716

CCCG = 3, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9907895	0.9968573	0.9977684	0.9998140	3.361E+02	1.059E+00	--
α_2	4.09E-05	2.19E-03	1.29E-03	7.39E-03	7.137E-01	3.255E+02	0.763
α_3	3.43E-07	9.55E-04	2.89E-04	4.17E-03	3.458E-01	3.619E+02	0.687

CCCG = 4, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9921402	0.9966229	0.9971347	0.9993561	6.240E+02	2.115E+00	--
α_2	3.10E-04	2.50E-03	1.99E-03	6.44E-03	1.549E+00	6.178E+02	0.784
α_3	1.28E-08	4.10E-04	8.02E-05	1.95E-03	2.646E-01	6.446E+02	0.753
α_4	5.14E-08	4.66E-04	1.14E-04	2.13E-03	3.010E-01	6.460E+02	0.752

CCCG = 5, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9945175	0.9969559	0.9971431	0.9987550	1.744E+03	5.325E+00	--
α_2	6.74E-04	2.11E-03	1.92E-03	4.20E-03	3.632E+00	1.715E+03	0.817
α_3	7.28E-05	7.41E-04	5.69E-04	2.00E-03	1.354E+00	1.826E+03	0.769
α_4	1.55E-08	1.63E-04	3.89E-05	7.48E-04	2.961E-01	1.817E+03	0.773
α_5	7.85E-35	2.64E-05	2.90E-11	1.31E-04	4.243E-02	1.610E+03	0.872

CCCG = 6, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940610	0.9967630	0.9969774	0.9987325	1.520E+03	4.936E+00	--
α_2	5.25E-04	1.97E-03	1.76E-03	4.18E-03	2.915E+00	1.473E+03	0.860
α_3	6.46E-05	7.58E-04	5.69E-04	2.09E-03	1.257E+00	1.658E+03	0.765
α_4	1.24E-06	3.06E-04	1.40E-04	1.17E-03	5.031E-01	1.646E+03	0.771
α_5	2.08E-15	7.17E-05	9.46E-07	4.11E-04	1.155E-01	1.611E+03	0.788
α_6	5.95E-13	1.27E-04	4.66E-06	7.05E-04	1.451E-01	1.140E+03	1.113

CCCG = 7, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9953536	0.9970598	0.9971601	0.9984238	3.274E+03	9.654E+00	--
α_2	6.05E-04	1.56E-03	1.46E-03	2.88E-03	4.851E+00	3.100E+03	0.880
α_3	2.06E-04	8.04E-04	7.11E-04	1.72E-03	2.800E+00	3.478E+03	0.785
α_4	4.05E-05	3.97E-04	3.06E-04	1.06E-03	1.384E+00	3.488E+03	0.783
α_5	4.92E-07	1.39E-04	6.21E-05	5.38E-04	4.902E-01	3.526E+03	0.775
α_6	7.79E-16	3.28E-05	4.15E-07	1.88E-04	1.146E-01	3.498E+03	0.781
α_7	2.68E-93	5.09E-06	5.42E-25	6.05E-06	1.464E-02	2.874E+03	0.951

CCCG = 8, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9950305	0.9970466	0.9971823	0.9985992	2.413E+03	7.148E+00	--
α_2	3.47E-04	1.28E-03	1.14E-03	2.69E-03	2.980E+00	2.327E+03	0.888
α_3	1.32E-04	7.61E-04	6.36E-04	1.82E-03	1.960E+00	2.575E+03	0.803
α_4	3.21E-05	4.39E-04	3.22E-04	1.25E-03	1.166E+00	2.654E+03	0.779
α_5	1.17E-06	2.05E-04	9.93E-05	7.68E-04	5.375E-01	2.618E+03	0.790
α_6	1.47E-11	6.67E-05	5.17E-06	3.53E-04	1.805E-01	2.706E+03	0.765
α_7	7.95E-36	1.54E-05	1.15E-11	7.52E-05	4.139E-02	2.693E+03	0.768
α_8	1.14E-08	1.87E-04	4.13E-05	8.73E-04	2.827E-01	1.508E+03	1.371

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	3.21E-03	2.19E-03	2.50E-03	2.11E-03	1.97E-03	1.56E-03	1.28E-03
α_3		9.55E-04	4.10E-04	7.41E-04	7.58E-04	8.04E-04	7.61E-04
α_4			4.66E-04	1.63E-04	3.06E-04	3.97E-04	4.39E-04
α_5				2.64E-05	7.17E-05	1.39E-04	2.05E-04
α_6					1.27E-04	3.28E-05	6.67E-05
α_7						5.09E-06	1.54E-05
α_8							1.87E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	3.21E-03	3.14E-03	3.38E-03	3.04E-03	3.24E-03	2.94E-03	2.95E-03
Gamma		3.04E-01	2.59E-01	3.06E-01	3.90E-01	4.69E-01	5.67E-01
Delta			5.32E-01	2.03E-01	4.00E-01	4.16E-01	5.46E-01
Epsilon				1.39E-01	3.94E-01	3.08E-01	5.19E-01
Mu					6.40E-01	2.14E-01	5.68E-01
Omega						1.35E-01	7.52E-01
Sigma							9.24E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.6 Strainers, Trash Racks, and Filters

2.6.1 Pooled Strainers

2.6.1.1 ALL-TSA-PG: All Systems Travelling Screens Plug

Generic CCF Parameters

Component Group: Filter
Component Type: Strainer
Component Subtype: Traveling Screen
Failure Mode: Plug
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 22.0

Total Number of Common-Cause Failure Events: 8

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.7554971	0.8543446	0.8601619	0.9332881	0.6940299	3.481E+01	5.935E+00
α_2	6.67E-02	1.46E-01	1.40E-01	2.45E-01	3.06E-01	5.935E+00	3.481E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.8553917	0.9115046	0.9148095	0.9563119	0.7383966	7.548E+01	7.328E+00
α_2	6.76E-03	2.96E-02	2.59E-02	6.51E-02	6.75E-02	2.451E+00	8.036E+01
α_3	2.34E-02	5.89E-02	5.54E-02	1.06E-01	1.94E-01	4.877E+00	7.793E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.8847987	0.9270035	0.9293329	0.9612477	0.7608200	1.129E+02	8.894E+00
α_2	7.27E-03	2.55E-02	2.30E-02	5.25E-02	6.32E-02	3.110E+00	1.187E+02
α_3	5.97E-03	2.30E-02	2.04E-02	4.88E-02	8.20E-02	2.802E+00	1.190E+02
α_4	6.72E-03	2.45E-02	2.19E-02	5.10E-02	9.40E-02	2.981E+00	1.189E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9261891	0.9515205	0.9528285	0.9723772	0.7788462	2.178E+02	1.110E+01
α_2	5.30E-03	1.62E-02	1.48E-02	3.19E-02	5.17E-02	3.716E+00	2.252E+02
α_3	4.00E-03	1.39E-02	1.25E-02	2.85E-02	6.13E-02	3.174E+00	2.258E+02
α_4	3.06E-03	1.20E-02	1.07E-02	2.58E-02	6.85E-02	2.757E+00	2.262E+02
α_5	7.08E-04	6.34E-03	4.97E-03	1.67E-02	3.97E-02	1.452E+00	2.275E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9337404	0.9560130	0.9571370	0.9744405	0.8000000	2.572E+02	1.183E+01

α_2	2.61E-03	1.03E-02	9.09E-03	2.20E-02	2.66E-02	2.764E+00	2.663E+02
α_3	4.75E-03	1.42E-02	1.31E-02	2.78E-02	6.56E-02	3.832E+00	2.652E+02
α_4	1.88E-03	8.72E-03	7.54E-03	1.96E-02	4.38E-02	2.346E+00	2.667E+02
α_5	1.47E-03	7.79E-03	6.61E-03	1.81E-02	4.69E-02	2.096E+00	2.670E+02
α_6	8.05E-05	2.96E-03	1.86E-03	9.61E-03	1.72E-02	7.973E-01	2.683E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9521749	0.9674912	0.9682232	0.9802961	0.8235294	4.091E+02	1.375E+01
α_2	2.03E-03	7.27E-03	6.51E-03	1.51E-02	1.83E-02	3.074E+00	4.198E+02
α_3	2.41E-03	7.98E-03	7.22E-03	1.61E-02	3.85E-02	3.373E+00	4.195E+02
α_4	2.03E-03	7.26E-03	6.50E-03	1.51E-02	4.38E-02	3.070E+00	4.198E+02
α_5	1.23E-03	5.62E-03	4.87E-03	1.26E-02	4.00E-02	2.378E+00	4.205E+02
α_6	3.97E-04	3.48E-03	2.74E-03	9.11E-03	2.83E-02	1.473E+00	4.214E+02
α_7	6.34E-07	8.95E-04	3.04E-04	3.79E-03	7.58E-03	3.786E-01	4.225E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9547435	0.9692536	0.9699547	0.9813806	0.8421053	4.327E+02	1.373E+01
α_2	1.47E-03	5.99E-03	5.27E-03	1.30E-02	1.29E-02	2.674E+00	4.437E+02
α_3	1.41E-03	5.86E-03	5.14E-03	1.28E-02	2.42E-02	2.618E+00	4.438E+02
α_4	1.64E-03	6.33E-03	5.61E-03	1.35E-02	3.48E-02	2.828E+00	4.436E+02
α_5	1.31E-03	5.65E-03	4.93E-03	1.24E-02	3.59E-02	2.523E+00	4.439E+02
α_6	7.07E-04	4.25E-03	3.53E-03	1.02E-02	3.05E-02	1.897E+00	4.445E+02
α_7	8.53E-05	2.06E-03	1.38E-03	6.35E-03	1.60E-02	9.203E-01	4.455E+02
α_8	2.01E-08	5.97E-04	1.18E-04	2.83E-03	3.39E-03	2.666E-01	4.461E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	8.54E-01	9.12E-01	9.27E-01	9.52E-01	9.56E-01	9.67E-01	9.69E-01
α_2	1.46E-01	2.96E-02	2.55E-02	1.62E-02	1.03E-02	7.27E-03	5.99E-03
α_3		5.89E-02	2.30E-02	1.39E-02	1.42E-02	7.98E-03	5.86E-03
α_4			2.45E-02	1.20E-02	8.72E-03	7.26E-03	6.33E-03
α_5				6.34E-03	7.79E-03	5.62E-03	5.65E-03
α_6					2.96E-03	3.48E-03	4.25E-03
α_7						8.95E-04	2.06E-03
α_8							5.97E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	8.54E-01	9.12E-01	9.27E-01	9.52E-01	9.56E-01	9.67E-01	9.69E-01
Beta	1.46E-01	8.85E-02	7.30E-02	4.85E-02	4.40E-02	3.25E-02	3.07E-02
Gamma		6.66E-01	6.50E-01	6.65E-01	7.66E-01	7.76E-01	8.05E-01
Delta			5.15E-01	5.70E-01	5.78E-01	6.84E-01	7.63E-01
Epsilon				3.45E-01	5.52E-01	5.79E-01	6.65E-01
Mu					2.76E-01	4.38E-01	5.50E-01
Omega						2.04E-01	3.85E-01

Sigma							2.25E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	10.67	16.00	21.33	26.67	32.00	37.33	42.67
N₁	1.7333	1.5000	0.9333	0.3333	0.0000	0.0000	0.0000
N₂	5.4667	1.6000	1.8500	1.7917	1.0625	0.8313	0.6556
N₃		4.6000	2.4000	2.1250	2.6250	1.7438	1.2275
N₄			2.7500	2.3750	1.7500	1.9875	1.7656
N₅				1.3750	1.8750	1.8125	1.8200
N₆					0.6875	1.2813	1.5469
N₇						0.3438	0.8125
N₈							0.1719

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.027

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9289862	0.9820618	0.9924251	0.9999598	2.463E+01	4.498E-01	--
α_2	4.02E-05	1.79E-02	7.57E-03	7.10E-02	4.498E-01	2.463E+01	0.582

CCCG = 3, Gamma = 0.031

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9565676	0.9845253	0.9885187	0.9988276	7.497E+01	1.178E+00	--
α_2	5.52E-04	1.25E-02	8.52E-03	3.81E-02	9.387E-01	7.416E+01	0.486
α_3	3.12E-08	2.98E-03	4.79E-04	1.46E-02	2.396E-01	8.029E+01	0.453

CCCG = 4, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9614809	0.9839122	0.9865567	0.9972976	1.161E+02	1.898E+00	--
α_2	9.97E-04	1.11E-02	8.44E-03	3.03E-02	1.285E+00	1.145E+02	0.459
α_3	2.94E-06	3.20E-03	1.14E-03	1.34E-02	3.927E-01	1.224E+02	0.433
α_4	6.86E-09	1.79E-03	2.39E-04	8.97E-03	2.207E-01	1.233E+02	0.430

CCCG = 5, Gamma = 0.035

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738791	0.9869341	0.9881239	0.9959234	2.648E+02	3.506E+00	--
α_2	1.36E-03	7.63E-03	6.42E-03	1.81E-02	1.992E+00	2.589E+02	0.423
α_3	2.36E-04	3.82E-03	2.73E-03	1.11E-02	1.078E+00	2.811E+02	0.391
α_4	6.99E-07	1.33E-03	4.31E-04	5.73E-03	3.632E-01	2.719E+02	0.405
α_5	2.55E-21	2.76E-04	1.59E-07	1.60E-03	7.248E-02	2.625E+02	0.420

CCCG = 6, Gamma = 0.036

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9745671	0.9866503	0.9876677	0.9952578	3.104E+02	4.199E+00	--
α_2	1.17E-03	6.79E-03	5.68E-03	1.62E-02	1.941E+00	2.838E+02	0.482
α_3	3.62E-04	3.78E-03	2.90E-03	1.02E-02	1.332E+00	3.507E+02	0.391
α_4	1.94E-05	1.81E-03	9.76E-04	6.45E-03	6.181E-01	3.402E+02	0.404
α_5	4.85E-09	7.09E-04	1.05E-04	3.51E-03	2.313E-01	3.262E+02	0.422
α_6	2.28E-20	2.50E-04	2.35E-07	1.45E-03	7.684E-02	3.074E+02	0.448

CCCG = 7, Gamma = 0.037

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9786731	0.9876810	0.9883189	0.9945109	4.989E+02	6.223E+00	--
α_2	1.51E-03	6.20E-03	5.45E-03	1.35E-02	2.654E+00	4.252E+02	0.506
α_3	3.73E-04	2.74E-03	2.21E-03	6.92E-03	1.645E+00	5.981E+02	0.361
α_4	1.29E-04	1.93E-03	1.40E-03	5.57E-03	1.115E+00	5.752E+02	0.376
α_5	1.03E-05	1.06E-03	5.62E-04	3.82E-03	6.034E-01	5.668E+02	0.382
α_6	5.72E-11	3.23E-04	2.40E-05	1.71E-03	1.780E-01	5.517E+02	0.393
α_7	2.88E-51	5.29E-05	1.09E-14	1.87E-04	2.734E-02	5.168E+02	0.419

CCCG = 8, Gamma = 0.038

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9771506	0.9867870	0.9874675	0.9940998	4.664E+02	6.246E+00	--
α_2	1.45E-03	6.28E-03	5.48E-03	1.39E-02	2.504E+00	3.962E+02	0.563
α_3	2.66E-04	2.49E-03	1.94E-03	6.60E-03	1.419E+00	5.689E+02	0.393
α_4	1.00E-04	1.83E-03	1.28E-03	5.42E-03	1.027E+00	5.609E+02	0.399
α_5	2.92E-05	1.42E-03	8.48E-04	4.74E-03	7.337E-01	5.172E+02	0.433
α_6	7.69E-07	7.73E-04	2.79E-04	3.22E-03	3.975E-01	5.136E+02	0.437
α_7	1.56E-20	1.56E-04	1.49E-07	9.04E-04	7.703E-02	4.948E+02	0.453
α_8	2.52E-18	2.72E-04	6.79E-07	1.59E-03	8.749E-02	3.216E+02	0.698

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.85E-01	9.84E-01	9.87E-01	9.87E-01	9.88E-01	9.87E-01
α_2	1.79E-02	1.25E-02	1.11E-02	7.63E-03	6.79E-03	6.20E-03	6.28E-03
α_3		2.98E-03	3.20E-03	3.82E-03	3.78E-03	2.74E-03	2.49E-03
α_4			1.79E-03	1.33E-03	1.81E-03	1.93E-03	1.83E-03
α_5				2.76E-04	7.09E-04	1.06E-03	1.42E-03
α_6					2.50E-04	3.23E-04	7.73E-04
α_7						5.29E-05	1.56E-04
α_8							2.72E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.85E-01	9.84E-01	9.87E-01	9.87E-01	9.88E-01	9.87E-01
Beta	1.79E-02	1.55E-02	1.61E-02	1.31E-02	1.33E-02	1.23E-02	1.32E-02
Gamma		1.92E-01	3.10E-01	4.16E-01	4.91E-01	4.96E-01	5.25E-01
Delta			3.58E-01	2.96E-01	4.23E-01	5.52E-01	6.41E-01
Epsilon				1.71E-01	3.46E-01	4.27E-01	5.89E-01
Mu					2.61E-01	2.61E-01	4.59E-01
Omega						1.41E-01	3.56E-01
Sigma							6.36E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.48	0.73	0.97	1.21	1.45	1.70	1.94
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 21.0

Total Number of Common-Cause Failure Events: 8

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.973

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7490025	0.8507820	0.8567712	0.9320555	3.334E+01	5.847E+00	--
α_2	6.79E-02	1.49E-01	1.43E-01	2.51E-01	5.847E+00	3.334E+01	0.582

CCCG = 3, Gamma = 0.969

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8509934	0.9091929	0.9126473	0.9555834	7.169E+01	7.160E+00	--
α_2	6.34E-03	3.01E-02	2.61E-02	6.79E-02	2.267E+00	7.295E+01	0.486
α_3	2.42E-02	6.07E-02	5.71E-02	1.09E-01	4.893E+00	7.576E+01	0.453

CCCG = 4, Gamma = 0.967

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8811840	0.9250533	0.9274977	0.9605714	1.070E+02	8.669E+00	--
α_2	6.95E-03	2.60E-02	2.32E-02	5.46E-02	2.889E+00	1.082E+02	0.459
α_3	6.12E-03	2.37E-02	2.10E-02	5.03E-02	2.789E+00	1.150E+02	0.433
α_4	6.96E-03	2.52E-02	2.26E-02	5.25E-02	2.991E+00	1.155E+02	0.430

CCCG = 5, Gamma = 0.965

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9243281	0.9502374	0.9515726	0.9715875	2.130E+02	1.115E+01	--
α_2	5.26E-03	1.65E-02	1.51E-02	3.28E-02	3.583E+00	2.130E+02	0.423
α_3	4.27E-03	1.42E-02	1.29E-02	2.88E-02	3.332E+00	2.309E+02	0.391
α_4	3.21E-03	1.24E-02	1.10E-02	2.65E-02	2.809E+00	2.231E+02	0.405
α_5	7.13E-04	6.56E-03	5.13E-03	1.73E-02	1.430E+00	2.165E+02	0.420

CCCG = 6, Gamma = 0.964

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9320852	0.9548568	0.9560033	0.9737142	2.518E+02	1.190E+01	--
α_2	2.30E-03	1.04E-02	9.02E-03	2.32E-02	2.398E+00	2.281E+02	0.482
α_3	5.17E-03	1.46E-02	1.35E-02	2.79E-02	4.156E+00	2.798E+02	0.391
α_4	2.04E-03	8.98E-03	7.82E-03	1.99E-02	2.469E+00	2.725E+02	0.404
α_5	1.55E-03	8.06E-03	6.85E-03	1.87E-02	2.122E+00	2.612E+02	0.422
α_6	7.14E-05	3.07E-03	1.88E-03	1.01E-02	7.603E-01	2.472E+02	0.448

CCCG = 7, Gamma = 0.963

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9510433	0.9667060	0.9674560	0.9798086	3.998E+02	1.377E+01	--
α_2	1.60E-03	7.31E-03	6.33E-03	1.64E-02	2.380E+00	3.232E+02	0.506
α_3	2.67E-03	8.18E-03	7.47E-03	1.61E-02	3.733E+00	4.526E+02	0.361
α_4	2.20E-03	7.47E-03	6.73E-03	1.52E-02	3.275E+00	4.352E+02	0.376
α_5	1.34E-03	5.80E-03	5.06E-03	1.28E-02	2.504E+00	4.292E+02	0.382
α_6	4.31E-04	3.61E-03	2.85E-03	9.35E-03	1.514E+00	4.184E+02	0.393
α_7	5.03E-07	9.28E-04	3.01E-04	3.98E-03	3.649E-01	3.928E+02	0.419

CCCG = 8, Gamma = 0.962

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9544129	0.9685558	0.9692080	0.9804725	4.625E+02	1.502E+01	--
α_2	1.22E-03	5.98E-03	5.12E-03	1.37E-02	2.239E+00	3.723E+02	0.563
α_3	1.74E-03	6.00E-03	5.40E-03	1.23E-02	3.214E+00	5.325E+02	0.393
α_4	2.00E-03	6.51E-03	5.90E-03	1.31E-02	3.438E+00	5.243E+02	0.399
α_5	1.51E-03	5.82E-03	5.16E-03	1.24E-02	2.831E+00	4.837E+02	0.433
α_6	8.38E-04	4.39E-03	3.72E-03	1.02E-02	2.118E+00	4.806E+02	0.437
α_7	1.08E-04	2.14E-03	1.48E-03	6.41E-03	9.934E-01	4.638E+02	0.453
α_8	1.87E-10	6.10E-04	5.05E-05	3.21E-03	1.843E-01	3.020E+02	0.698

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	8.51E-01	9.09E-01	9.25E-01	9.50E-01	9.55E-01	9.67E-01	9.69E-01
α_2	1.49E-01	3.01E-02	2.60E-02	1.65E-02	1.04E-02	7.31E-03	5.98E-03
α_3		6.07E-02	2.37E-02	1.42E-02	1.46E-02	8.18E-03	6.00E-03
α_4			2.52E-02	1.24E-02	8.98E-03	7.47E-03	6.51E-03
α_5				6.56E-03	8.06E-03	5.80E-03	5.82E-03
α_6					3.07E-03	3.61E-03	4.39E-03
α_7						9.28E-04	2.14E-03
α_8							6.10E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	8.51E-01	9.09E-01	9.25E-01	9.50E-01	9.55E-01	9.67E-01	9.69E-01
Beta	1.49E-01	9.08E-02	7.49E-02	4.98E-02	4.51E-02	3.33E-02	3.14E-02
Gamma		6.68E-01	6.53E-01	6.68E-01	7.70E-01	7.80E-01	8.10E-01
Delta			5.16E-01	5.72E-01	5.79E-01	6.85E-01	7.64E-01
Epsilon				3.45E-01	5.53E-01	5.81E-01	6.65E-01
Mu					2.76E-01	4.39E-01	5.51E-01
Omega						2.05E-01	3.85E-01
Sigma							2.22E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	10.18	15.27	20.36	25.45	30.55	35.64	40.73
N_1	1.7333	1.5000	0.9333	0.3333	0.0000	0.0000	0.0000
N_2	5.4667	1.6000	1.8500	1.7917	1.0625	0.8313	0.6556
N_3		4.6000	2.4000	2.1250	2.6250	1.7438	1.2275

N₄			2.7500	2.3750	1.7500	1.9875	1.7656
N₅				1.3750	1.8750	1.8125	1.8200
N₆					0.6875	1.2813	1.5469
N₇						0.3438	0.8125
N₈							0.1719

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9254105	0.9808392	0.9915376	0.9999442	2.409E+01	4.706E-01	--
α_2	5.58E-05	1.92E-02	8.46E-03	7.46E-02	4.706E-01	2.409E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9492792	0.9823211	0.9871539	0.9988381	6.126E+01	1.103E+00	--
α_2	3.76E-04	1.30E-02	8.28E-03	4.17E-02	8.104E-01	6.155E+01	--
α_3	3.95E-07	4.68E-03	1.10E-03	2.16E-02	2.921E-01	6.207E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9595678	0.9829546	0.9856771	0.9970284	1.126E+02	1.953E+00	--
α_2	1.07E-03	1.15E-02	8.76E-03	3.10E-02	1.312E+00	1.132E+02	--
α_3	6.33E-06	3.76E-03	1.49E-03	1.52E-02	4.307E-01	1.141E+02	--
α_4	3.65E-09	1.83E-03	2.17E-04	9.33E-03	2.099E-01	1.143E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9696218	0.9852970	0.9867994	0.9958370	2.082E+02	3.107E+00	--
α_2	1.13E-03	7.97E-03	6.48E-03	1.99E-02	1.684E+00	2.096E+02	--
α_3	1.97E-04	4.46E-03	3.03E-03	1.36E-02	9.426E-01	2.104E+02	--
α_4	1.36E-06	1.81E-03	6.21E-04	7.62E-03	3.816E-01	2.109E+02	--
α_5	1.87E-16	4.67E-04	2.56E-06	2.72E-03	9.865E-02	2.112E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9733376	0.9863454	0.9874863	0.9954551	2.761E+02	3.822E+00	--
α_2	8.87E-04	6.12E-03	4.99E-03	1.52E-02	1.714E+00	2.782E+02	--
α_3	2.60E-04	3.96E-03	2.86E-03	1.14E-02	1.108E+00	2.788E+02	--
α_4	3.07E-05	2.33E-03	1.30E-03	8.12E-03	6.509E-01	2.793E+02	--
α_5	1.79E-08	9.06E-04	1.63E-04	4.37E-03	2.536E-01	2.797E+02	--
α_6	5.54E-17	3.42E-04	1.55E-06	1.99E-03	9.572E-02	2.798E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9771222	0.9873350	0.9881185	0.9948722	4.050E+02	5.195E+00	--
α_2	9.74E-04	5.13E-03	4.35E-03	1.20E-02	2.105E+00	4.081E+02	--
α_3	3.02E-04	3.22E-03	2.46E-03	8.74E-03	1.320E+00	4.089E+02	--
α_4	1.24E-04	2.43E-03	1.68E-03	7.28E-03	9.967E-01	4.092E+02	--
α_5	6.47E-06	1.28E-03	6.08E-04	4.83E-03	5.249E-01	4.097E+02	--
α_6	3.54E-10	4.77E-04	4.66E-05	2.47E-03	1.956E-01	4.100E+02	--
α_7	3.68E-28	1.29E-04	2.92E-09	7.00E-04	5.291E-02	4.101E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787229	0.9878938	0.9885625	0.9947813	4.759E+02	5.832E+00	--
α_2	9.39E-04	4.63E-03	3.96E-03	1.06E-02	2.229E+00	4.795E+02	--
α_3	2.24E-04	2.62E-03	1.97E-03	7.22E-03	1.260E+00	4.805E+02	--
α_4	1.23E-04	2.16E-03	1.53E-03	6.38E-03	1.042E+00	4.807E+02	--
α_5	3.72E-05	1.58E-03	9.69E-04	5.22E-03	7.626E-01	4.810E+02	--
α_6	1.55E-07	6.79E-04	1.90E-04	3.02E-03	3.271E-01	4.814E+02	--
α_7	2.70E-13	2.79E-04	7.48E-06	1.57E-03	1.344E-01	4.816E+02	--
α_8	1.44E-20	1.59E-04	1.50E-07	9.26E-04	7.682E-02	4.817E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.92E-02	1.30E-02	1.15E-02	7.97E-03	6.12E-03	5.13E-03	4.63E-03
α_3		4.68E-03	3.76E-03	4.46E-03	3.96E-03	3.22E-03	2.62E-03
α_4			1.83E-03	1.81E-03	2.33E-03	2.43E-03	2.16E-03
α_5				4.67E-04	9.06E-04	1.28E-03	1.58E-03
α_6					3.42E-04	4.77E-04	6.79E-04
α_7						1.29E-04	2.79E-04
α_8							1.59E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.92E-02	1.77E-02	1.70E-02	1.47E-02	1.37E-02	1.27E-02	1.21E-02
Gamma		2.65E-01	3.28E-01	4.58E-01	5.52E-01	5.95E-01	6.18E-01
Delta			3.28E-01	3.38E-01	4.74E-01	5.73E-01	6.50E-01
Epsilon				2.05E-01	3.49E-01	4.37E-01	5.55E-01
Mu					2.74E-01	3.21E-01	4.14E-01
Omega						2.13E-01	3.92E-01
Sigma							3.64E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.6.1.2 ALL-TSA-PG-EE: All Systems Travelling Screens Plug Extreme Environmental

Generic CCF Parameters

Component Group: Filter
 Component Type: Strainer
 Component Subtype: Traveling Screen
 Failure Mode: Plug
 Date Range: 2006 through 2020
 Cause Group: Environment
 Cause: EE
 Prior: Default 2015

Total Number of Independent Failure Events: 18.0

Total Number of Common-Cause Failure Events: 8

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.7438971	0.8470657	0.8530518	0.9297435	0.6567732	3.287E+01	5.935E+00
α_2	7.03E-02	1.53E-01	1.47E-01	2.56E-01	3.43E-01	5.935E+00	3.287E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.8502655	0.9082825	0.9116818	0.9546742	0.7017927	7.257E+01	7.328E+00
α_2	7.01E-03	3.07E-02	2.68E-02	6.75E-02	7.70E-02	2.451E+00	7.745E+01
α_3	2.43E-02	6.10E-02	5.74E-02	1.10E-01	2.21E-01	4.877E+00	7.502E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.8810816	0.9246032	0.9269958	0.9599437	0.7242779	1.091E+02	8.894E+00
α_2	7.52E-03	2.64E-02	2.37E-02	5.42E-02	7.29E-02	3.110E+00	1.148E+02
α_3	6.17E-03	2.38E-02	2.11E-02	5.04E-02	9.45E-02	2.802E+00	1.152E+02
α_4	6.95E-03	2.53E-02	2.26E-02	5.26E-02	1.08E-01	2.981E+00	1.150E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9246106	0.9504715	0.9518048	0.9717669	0.7428862	2.130E+02	1.110E+01
α_2	5.41E-03	1.66E-02	1.52E-02	3.26E-02	6.01E-02	3.716E+00	2.204E+02
α_3	4.08E-03	1.42E-02	1.27E-02	2.91E-02	7.13E-02	3.174E+00	2.209E+02
α_4	3.13E-03	1.23E-02	1.09E-02	2.63E-02	7.96E-02	2.757E+00	2.213E+02
α_5	7.23E-04	6.48E-03	5.08E-03	1.70E-02	4.61E-02	1.452E+00	2.226E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9322911	0.9550407	0.9561871	0.9738683	0.7659574	2.514E+02	1.183E+01
α_2	2.67E-03	1.05E-02	9.29E-03	2.25E-02	3.11E-02	2.764E+00	2.605E+02
α_3	4.86E-03	1.46E-02	1.33E-02	2.84E-02	7.68E-02	3.832E+00	2.594E+02

α_4	1.92E-03	8.91E-03	7.70E-03	2.00E-02	5.12E-02	2.346E+00	2.609E+02
α_5	1.51E-03	7.96E-03	6.76E-03	1.85E-02	5.49E-02	2.096E+00	2.611E+02
α_6	8.23E-05	3.03E-03	1.90E-03	9.82E-03	2.01E-02	7.973E-01	2.624E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9514001	0.9669608	0.9677043	0.9799722	0.7924528	4.023E+02	1.375E+01
α_2	2.07E-03	7.39E-03	6.62E-03	1.54E-02	2.16E-02	3.074E+00	4.130E+02
α_3	2.45E-03	8.11E-03	7.33E-03	1.64E-02	4.52E-02	3.373E+00	4.127E+02
α_4	2.06E-03	7.38E-03	6.61E-03	1.53E-02	5.16E-02	3.070E+00	4.130E+02
α_5	1.25E-03	5.71E-03	4.94E-03	1.28E-02	4.70E-02	2.378E+00	4.137E+02
α_6	4.04E-04	3.54E-03	2.78E-03	9.26E-03	3.32E-02	1.473E+00	4.146E+02
α_7	6.45E-07	9.10E-04	3.09E-04	3.85E-03	8.92E-03	3.786E-01	4.157E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9539436	0.9687099	0.9694182	0.9810489	0.8135593	4.249E+02	1.373E+01
α_2	1.50E-03	6.10E-03	5.36E-03	1.32E-02	1.53E-02	2.674E+00	4.360E+02
α_3	1.44E-03	5.97E-03	5.24E-03	1.30E-02	2.86E-02	2.618E+00	4.360E+02
α_4	1.67E-03	6.45E-03	5.71E-03	1.37E-02	4.11E-02	2.828E+00	4.358E+02
α_5	1.33E-03	5.75E-03	5.02E-03	1.27E-02	4.24E-02	2.523E+00	4.361E+02
α_6	7.20E-04	4.32E-03	3.60E-03	1.04E-02	3.61E-02	1.897E+00	4.368E+02
α_7	8.69E-05	2.10E-03	1.41E-03	6.47E-03	1.89E-02	9.203E-01	4.377E+02
α_8	2.05E-08	6.08E-04	1.21E-04	2.88E-03	4.01E-03	2.666E-01	4.384E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	8.47E-01	9.08E-01	9.25E-01	9.50E-01	9.55E-01	9.67E-01	9.69E-01
α_2	1.53E-01	3.07E-02	2.64E-02	1.66E-02	1.05E-02	7.39E-03	6.10E-03
α_3		6.10E-02	2.38E-02	1.42E-02	1.46E-02	8.11E-03	5.97E-03
α_4			2.53E-02	1.23E-02	8.91E-03	7.38E-03	6.45E-03
α_5				6.48E-03	7.96E-03	5.71E-03	5.75E-03
α_6					3.03E-03	3.54E-03	4.32E-03
α_7						9.10E-04	2.10E-03
α_8							6.08E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	8.47E-01	9.08E-01	9.25E-01	9.50E-01	9.55E-01	9.67E-01	9.69E-01
Beta	1.53E-01	9.17E-02	7.54E-02	4.95E-02	4.50E-02	3.30E-02	3.13E-02
Gamma		6.66E-01	6.50E-01	6.65E-01	7.66E-01	7.76E-01	8.05E-01
Delta			5.15E-01	5.70E-01	5.78E-01	6.84E-01	7.63E-01
Epsilon				3.45E-01	5.52E-01	5.79E-01	6.65E-01
Mu					2.76E-01	4.38E-01	5.50E-01
Omega						2.04E-01	3.85E-01
Sigma							2.25E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.73	13.09	17.45	21.82	26.18	30.55	34.91
N₁	1.7333	1.5000	0.9333	0.3333	0.0000	0.0000	0.0000
N₂	5.4667	1.6000	1.8500	1.7917	1.0625	0.8313	0.6556
N₃		4.6000	2.4000	2.1250	2.6250	1.7438	1.2275
N₄			2.7500	2.3750	1.7500	1.9875	1.7656
N₅				1.3750	1.8750	1.8125	1.8200
N₆					0.6875	1.2813	1.5469
N₇						0.3438	0.8125
N₈							0.1719

Component Causal CCF Parameters

Not applicable as this CCF template is for the extreme environmental cause only.

Design Causal CCF Parameters

Not applicable as this CCF template is for the extreme environmental cause only.

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 18.0

Total Number of Common-Cause Failure Events: 8

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7430710	0.8470657	0.8531412	0.9302577	3.238E+01	5.847E+00	--
α_2	6.97E-02	1.53E-01	1.47E-01	2.57E-01	5.847E+00	3.238E+01	0.558

CCCG = 3, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8495393	0.9082825	0.9117640	0.9551238	7.091E+01	7.160E+00	--
α_2	6.45E-03	3.07E-02	2.65E-02	6.91E-02	2.267E+00	7.164E+01	0.465
α_3	2.44E-02	6.10E-02	5.74E-02	1.10E-01	4.893E+00	7.527E+01	0.429

CCCG = 4, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8804845	0.9246032	0.9270597	0.9603289	1.063E+02	8.669E+00	--
α_2	7.05E-03	2.64E-02	2.35E-02	5.54E-02	2.889E+00	1.067E+02	0.439
α_3	6.14E-03	2.38E-02	2.11E-02	5.04E-02	2.789E+00	1.146E+02	0.410
α_4	6.97E-03	2.53E-02	2.26E-02	5.26E-02	2.991E+00	1.154E+02	0.406

CCCG = 5, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9246801	0.9504715	0.9518012	0.9717230	2.140E+02	1.115E+01	--
α_2	5.27E-03	1.66E-02	1.51E-02	3.29E-02	3.583E+00	2.125E+02	0.407
α_3	4.25E-03	1.42E-02	1.28E-02	2.87E-02	3.332E+00	2.319E+02	0.374
α_4	3.18E-03	1.23E-02	1.09E-02	2.62E-02	2.809E+00	2.255E+02	0.385
α_5	7.04E-04	6.48E-03	5.06E-03	1.71E-02	1.430E+00	2.193E+02	0.398

CCCG = 6, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9323591	0.9550407	0.9561830	0.9738225	2.529E+02	1.190E+01	--
α_2	2.32E-03	1.05E-02	9.11E-03	2.34E-02	2.398E+00	2.260E+02	0.467
α_3	5.14E-03	1.46E-02	1.34E-02	2.78E-02	4.156E+00	2.813E+02	0.374
α_4	2.03E-03	8.91E-03	7.76E-03	1.97E-02	2.469E+00	2.746E+02	0.385
α_5	1.53E-03	7.96E-03	6.77E-03	1.85E-02	2.122E+00	2.643E+02	0.401
α_6	7.05E-05	3.03E-03	1.85E-03	9.99E-03	7.603E-01	2.503E+02	0.425

CCCG = 7, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9514155	0.9669608	0.9677055	0.9799644	4.030E+02	1.377E+01	--
α_2	1.61E-03	7.39E-03	6.40E-03	1.66E-02	2.380E+00	3.198E+02	0.496
α_3	2.65E-03	8.11E-03	7.41E-03	1.60E-02	3.733E+00	4.567E+02	0.347
α_4	2.17E-03	7.38E-03	6.65E-03	1.51E-02	3.275E+00	4.405E+02	0.360
α_5	1.32E-03	5.71E-03	4.98E-03	1.26E-02	2.504E+00	4.356E+02	0.365
α_6	4.23E-04	3.54E-03	2.80E-03	9.18E-03	1.514E+00	4.262E+02	0.373
α_7	4.93E-07	9.10E-04	2.95E-04	3.90E-03	3.649E-01	4.007E+02	0.398

CCCG = 8, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9546349	0.9687099	0.9693591	0.9805689	4.649E+02	1.502E+01	--
α_2	1.24E-03	6.10E-03	5.23E-03	1.39E-02	2.239E+00	3.650E+02	0.558
α_3	1.73E-03	5.97E-03	5.37E-03	1.23E-02	3.214E+00	5.352E+02	0.381
α_4	1.97E-03	6.45E-03	5.84E-03	1.30E-02	3.438E+00	5.298E+02	0.384
α_5	1.49E-03	5.75E-03	5.10E-03	1.22E-02	2.831E+00	4.895E+02	0.416
α_6	8.26E-04	4.32E-03	3.67E-03	1.01E-02	2.118E+00	4.877E+02	0.418
α_7	1.06E-04	2.10E-03	1.45E-03	6.29E-03	9.934E-01	4.725E+02	0.433
α_8	1.86E-10	6.08E-04	5.03E-05	3.20E-03	1.843E-01	3.031E+02	0.676

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	8.47E-01	9.08E-01	9.25E-01	9.50E-01	9.55E-01	9.67E-01	9.69E-01
α_2	1.53E-01	3.07E-02	2.64E-02	1.66E-02	1.05E-02	7.39E-03	6.10E-03
α_3		6.10E-02	2.38E-02	1.42E-02	1.46E-02	8.11E-03	5.97E-03
α_4			2.53E-02	1.23E-02	8.91E-03	7.38E-03	6.45E-03
α_5				6.48E-03	7.96E-03	5.71E-03	5.75E-03
α_6					3.03E-03	3.54E-03	4.32E-03
α_7						9.10E-04	2.10E-03
α_8							6.08E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	8.47E-01	9.08E-01	9.25E-01	9.50E-01	9.55E-01	9.67E-01	9.69E-01
Beta	1.53E-01	9.17E-02	7.54E-02	4.95E-02	4.50E-02	3.30E-02	3.13E-02
Gamma		6.66E-01	6.50E-01	6.65E-01	7.66E-01	7.76E-01	8.05E-01
Delta			5.15E-01	5.70E-01	5.78E-01	6.84E-01	7.63E-01
Epsilon				3.45E-01	5.52E-01	5.79E-01	6.65E-01
Mu					2.76E-01	4.38E-01	5.50E-01
Omega						2.04E-01	3.85E-01
Sigma							2.25E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.73	13.09	17.45	21.82	26.18	30.55	34.91
N_1	1.7333	1.5000	0.9333	0.3333	0.0000	0.0000	0.0000
N_2	5.4667	1.6000	1.8500	1.7917	1.0625	0.8313	0.6556
N_3		4.6000	2.4000	2.1250	2.6250	1.7438	1.2275

N₄			2.7500	2.3750	1.7500	1.9875	1.7656
N₅				1.3750	1.8750	1.8125	1.8200
N₆					0.6875	1.2813	1.5469
N₇						0.3438	0.8125
N₈							0.1719

Human Causal CCF Parameters

Not applicable as this CCF template is for the extreme environmental cause only.

Other/Unknown Causal CCF Parameters

Not applicable as this CCF template is for the extreme environmental cause only.

2.6.1.3 ALL-TSA-PG-NE: All Systems Travelling Screens Plug Non-Environmental

Generic CCF Parameters

Component Group: Filter
Component Type: Strainer
Component Subtype: Traveling Screen
Failure Mode: Plug
Date Range: 2006 through 2020
Cause Group: Component, Design, Environment, Human, Other, Unknown
Cause: IW, IC, IQ, DC, DE, DM, EA, IE, HA, HP, HM, PA, OT, EC, OK
Prior: Default 2015

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9319869	0.9825706	0.9923504	0.9999473	1.0000000	2.641E+01	4.685E-01
α_2	4.94E-05	1.74E-02	7.65E-03	6.80E-02	0.00E+00	4.685E-01	2.641E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9491259	0.9821250	0.9869099	0.9987658	1.0000000	6.198E+01	1.128E+00
α_2	4.53E-04	1.35E-02	8.81E-03	4.25E-02	0.00E+00	8.512E-01	6.226E+01
α_3	2.19E-07	4.39E-03	9.41E-04	2.06E-02	0.00E+00	2.768E-01	6.283E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9530858	0.9803911	0.9836046	0.9967121	1.0000000	9.468E+01	1.894E+00
α_2	1.13E-03	1.30E-02	9.87E-03	3.58E-02	0.00E+00	1.260E+00	9.531E+01
α_3	4.53E-06	4.17E-03	1.53E-03	1.73E-02	0.00E+00	4.024E-01	9.617E+01
α_4	1.66E-08	2.40E-03	3.58E-04	1.19E-02	0.00E+00	2.315E-01	9.634E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9652486	0.9826895	0.9842843	0.9946781	1.0000000	1.948E+02	3.432E+00
α_2	1.65E-03	9.70E-03	8.11E-03	2.32E-02	0.00E+00	1.924E+00	1.963E+02
α_3	3.06E-04	5.29E-03	3.75E-03	1.55E-02	0.00E+00	1.049E+00	1.972E+02
α_4	1.47E-06	1.93E-03	6.65E-04	8.13E-03	0.00E+00	3.822E-01	1.979E+02
α_5	3.36E-20	3.87E-04	3.61E-07	2.25E-03	0.00E+00	7.674E-02	1.982E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9679315	0.9835450	0.9849062	0.9944998	1.0000000	2.292E+02	3.835E+00
α_2	1.05E-03	7.30E-03	5.95E-03	1.82E-02	0.00E+00	1.701E+00	2.314E+02
α_3	4.09E-04	5.18E-03	3.85E-03	1.45E-02	0.00E+00	1.207E+00	2.318E+02

α_4	2.34E-05	2.56E-03	1.34E-03	9.21E-03	0.00E+00	5.960E-01	2.325E+02
α_5	3.71E-09	9.49E-04	1.27E-04	4.76E-03	0.00E+00	2.211E-01	2.328E+02
α_6	3.71E-15	4.71E-04	4.77E-06	2.72E-03	0.00E+00	1.098E-01	2.329E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9734614	0.9849367	0.9857739	0.9935469	1.0000000	3.758E+02	5.747E+00
α_2	1.20E-03	5.88E-03	5.04E-03	1.34E-02	0.00E+00	2.243E+00	3.793E+02
α_3	5.73E-04	4.27E-03	3.44E-03	1.08E-02	0.00E+00	1.630E+00	3.799E+02
α_4	1.77E-04	2.84E-03	2.03E-03	8.26E-03	0.00E+00	1.083E+00	3.805E+02
α_5	1.07E-05	1.48E-03	7.47E-04	5.44E-03	0.00E+00	5.654E-01	3.810E+02
α_6	2.76E-10	5.02E-04	4.64E-05	2.62E-03	0.00E+00	1.916E-01	3.814E+02
α_7	6.25E-41	9.12E-05	3.39E-12	4.00E-04	0.00E+00	3.480E-02	3.815E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9747326	0.9856770	0.9864773	0.9938818	1.0000000	3.940E+02	5.726E+00
α_2	9.10E-04	5.05E-03	4.25E-03	1.19E-02	0.00E+00	2.018E+00	3.977E+02
α_3	3.59E-04	3.48E-03	2.69E-03	9.28E-03	0.00E+00	1.391E+00	3.984E+02
α_4	1.58E-04	2.66E-03	1.89E-03	7.78E-03	0.00E+00	1.062E+00	3.987E+02
α_5	3.10E-05	1.76E-03	1.03E-03	5.97E-03	0.00E+00	7.026E-01	3.990E+02
α_6	3.44E-07	8.75E-04	2.69E-04	3.80E-03	0.00E+00	3.497E-01	3.994E+02
α_7	1.32E-15	2.70E-04	2.48E-06	1.56E-03	0.00E+00	1.078E-01	3.996E+02
α_8	2.76E-17	2.37E-04	1.00E-06	1.38E-03	0.00E+00	9.469E-02	3.997E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.82E-01	9.80E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.74E-02	1.35E-02	1.30E-02	9.70E-03	7.30E-03	5.88E-03	5.05E-03
α_3		4.39E-03	4.17E-03	5.29E-03	5.18E-03	4.27E-03	3.48E-03
α_4			2.40E-03	1.93E-03	2.56E-03	2.84E-03	2.66E-03
α_5				3.87E-04	9.49E-04	1.48E-03	1.76E-03
α_6					4.71E-04	5.02E-04	8.75E-04
α_7						9.12E-05	2.70E-04
α_8							2.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.82E-01	9.80E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.74E-02	1.79E-02	1.96E-02	1.73E-02	1.65E-02	1.51E-02	1.43E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9501285	0.9874317	0.9947333	0.9999721	3.534E+01	4.498E-01	--
α_2	2.79E-05	1.26E-02	5.27E-03	4.99E-02	4.498E-01	3.534E+01	0.422

CCCG = 3, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9681251	0.9886668	0.9916109	0.9991445	1.028E+02	1.178E+00	--
α_2	4.14E-04	9.41E-03	6.40E-03	2.87E-02	9.387E-01	9.880E+01	0.368
α_3	2.01E-08	1.92E-03	3.09E-04	9.42E-03	2.396E-01	1.245E+02	0.295

CCCG = 4, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9706658	0.9877697	0.9897938	0.9979510	1.533E+02	1.898E+00	--
α_2	7.77E-04	8.67E-03	6.58E-03	2.37E-02	1.285E+00	1.470E+02	0.359
α_3	2.14E-06	2.33E-03	8.31E-04	9.75E-03	3.927E-01	1.679E+02	0.316
α_4	4.72E-09	1.23E-03	1.64E-04	6.18E-03	2.207E-01	1.791E+02	0.297

CCCG = 5, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9780639	0.9890358	0.9900382	0.9965827	3.162E+02	3.506E+00	--
α_2	1.18E-03	6.63E-03	5.57E-03	1.57E-02	1.992E+00	2.987E+02	0.366
α_3	1.85E-04	3.00E-03	2.14E-03	8.74E-03	1.078E+00	3.581E+02	0.307
α_4	5.42E-07	1.03E-03	3.34E-04	4.44E-03	3.632E-01	3.509E+02	0.313
α_5	2.80E-21	3.04E-04	1.76E-07	1.76E-03	7.248E-02	2.385E+02	0.462

CCCG = 6, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9785401	0.9887438	0.9896050	0.9960052	3.689E+02	4.199E+00	--
α_2	1.06E-03	6.15E-03	5.14E-03	1.47E-02	1.941E+00	3.137E+02	0.435
α_3	2.72E-04	2.85E-03	2.18E-03	7.72E-03	1.332E+00	4.658E+02	0.294
α_4	1.49E-05	1.39E-03	7.50E-04	4.96E-03	6.181E-01	4.430E+02	0.310
α_5	3.81E-09	5.57E-04	8.25E-05	2.76E-03	2.313E-01	4.151E+02	0.331
α_6	2.78E-20	3.06E-04	2.88E-07	1.78E-03	7.684E-02	2.513E+02	0.546

CCCG = 7, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9810396	0.9890524	0.9896207	0.9951244	5.622E+02	6.223E+00	--
α_2	1.42E-03	5.81E-03	5.11E-03	1.26E-02	2.654E+00	4.538E+02	0.473
α_3	3.18E-04	2.34E-03	1.89E-03	5.90E-03	1.645E+00	7.020E+02	0.307
α_4	1.07E-04	1.62E-03	1.17E-03	4.66E-03	1.115E+00	6.885E+02	0.313
α_5	8.20E-06	8.50E-04	4.49E-04	3.05E-03	6.034E-01	7.096E+02	0.304
α_6	4.55E-11	2.57E-04	1.91E-05	1.36E-03	1.780E-01	6.928E+02	0.312
α_7	3.95E-51	7.25E-05	1.49E-14	2.56E-04	2.734E-02	3.769E+02	0.573

CCCG = 8, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9802459	0.9885829	0.9891729	0.9949051	5.408E+02	6.246E+00	--
α_2	1.30E-03	5.66E-03	4.93E-03	1.25E-02	2.504E+00	4.399E+02	0.505
α_3	2.23E-04	2.08E-03	1.62E-03	5.52E-03	1.419E+00	6.804E+02	0.328
α_4	7.66E-05	1.40E-03	9.79E-04	4.14E-03	1.027E+00	7.347E+02	0.304
α_5	2.19E-05	1.07E-03	6.38E-04	3.56E-03	7.337E-01	6.878E+02	0.325
α_6	5.09E-07	5.12E-04	1.85E-04	2.13E-03	3.975E-01	7.759E+02	0.288
α_7	1.02E-20	1.02E-04	9.81E-08	5.94E-04	7.703E-02	7.523E+02	0.297
α_8	5.58E-18	6.00E-04	1.50E-06	3.51E-03	8.749E-02	1.456E+02	1.533

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.89E-01	9.88E-01	9.89E-01	9.89E-01	9.89E-01	9.89E-01
α_2	1.26E-02	9.41E-03	8.67E-03	6.63E-03	6.15E-03	5.81E-03	5.66E-03
α_3		1.92E-03	2.33E-03	3.00E-03	2.85E-03	2.34E-03	2.08E-03
α_4			1.23E-03	1.03E-03	1.39E-03	1.62E-03	1.40E-03
α_5				3.04E-04	5.57E-04	8.50E-04	1.07E-03
α_6					3.06E-04	2.57E-04	5.12E-04
α_7						7.25E-05	1.02E-04
α_8							6.00E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.89E-01	9.88E-01	9.89E-01	9.89E-01	9.89E-01	9.89E-01
Beta	1.26E-02	1.13E-02	1.22E-02	1.10E-02	1.13E-02	1.09E-02	1.14E-02
Gamma		1.70E-01	2.91E-01	3.96E-01	4.54E-01	4.69E-01	5.04E-01
Delta			3.45E-01	3.08E-01	4.42E-01	5.45E-01	6.39E-01
Epsilon				2.27E-01	3.82E-01	4.22E-01	6.20E-01
Mu					3.54E-01	2.79E-01	5.33E-01
Omega						2.20E-01	5.78E-01
Sigma							8.54E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.750

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9199647	0.9809502	0.9932891	0.9999856	1.957E+01	3.801E-01	--
α_2	1.44E-05	1.90E-02	6.71E-03	8.00E-02	3.801E-01	1.957E+01	0.422

CCCG = 3, Gamma = 0.750

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9396666	0.9799444	0.9861382	0.9990540	4.691E+01	9.600E-01	--
α_2	2.20E-04	1.48E-02	8.51E-03	5.10E-02	6.673E-01	4.428E+01	0.368
α_3	4.48E-07	5.21E-03	1.23E-03	2.40E-02	2.927E-01	5.591E+01	0.295

CCCG = 4, Gamma = 0.750

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9450801	0.9779316	0.9819916	0.9968892	7.396E+01	1.669E+00	--
α_2	8.28E-04	1.45E-02	1.03E-02	4.26E-02	1.039E+00	7.060E+01	0.359
α_3	4.11E-06	4.78E-03	1.69E-03	2.00E-02	3.887E-01	8.095E+01	0.316
α_4	3.18E-08	2.79E-03	4.56E-04	1.36E-02	2.414E-01	8.641E+01	0.297

CCCG = 5, Gamma = 0.750

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9611984	0.9805741	0.9823309	0.9939452	1.760E+02	3.487E+00	--
α_2	1.66E-03	1.07E-02	8.85E-03	2.62E-02	1.791E+00	1.651E+02	0.366
α_3	4.78E-04	6.05E-03	4.50E-03	1.69E-02	1.207E+00	1.982E+02	0.307
α_4	3.92E-06	2.23E-03	8.86E-04	8.98E-03	4.340E-01	1.945E+02	0.313
α_5	9.18E-27	4.15E-04	1.47E-08	2.28E-03	5.493E-02	1.324E+02	0.462

CCCG = 6, Gamma = 0.750

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9647425	0.9818120	0.9832873	0.9938404	2.108E+02	3.905E+00	--
α_2	7.39E-04	7.68E-03	5.89E-03	2.07E-02	1.335E+00	1.724E+02	0.435
α_3	7.25E-04	5.95E-03	4.73E-03	1.54E-02	1.531E+00	2.556E+02	0.294
α_4	5.66E-05	2.95E-03	1.75E-03	9.91E-03	7.191E-01	2.435E+02	0.310
α_5	1.57E-08	1.08E-03	1.84E-04	5.25E-03	2.467E-01	2.283E+02	0.331
α_6	5.77E-21	5.26E-04	3.16E-07	3.05E-03	7.279E-02	1.383E+02	0.546

CCCG = 7, Gamma = 0.750

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9710798	0.9835648	0.9844745	0.9929431	3.453E+02	5.770E+00	--
α_2	7.33E-04	5.90E-03	4.70E-03	1.52E-02	1.549E+00	2.610E+02	0.473
α_3	8.70E-04	4.92E-03	4.13E-03	1.17E-02	1.989E+00	4.027E+02	0.307
α_4	2.90E-04	3.25E-03	2.46E-03	8.89E-03	1.287E+00	3.953E+02	0.313
α_5	2.81E-05	1.69E-03	9.79E-04	5.78E-03	6.913E-01	4.078E+02	0.304
α_6	4.30E-09	5.84E-04	8.77E-05	2.89E-03	2.327E-01	3.983E+02	0.312
α_7	6.61E-65	9.74E-05	1.47E-17	2.45E-04	2.112E-02	2.167E+02	0.573

CCCG = 8, Gamma = 0.750

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9742521	0.9847084	0.9854072	0.9927783	4.518E+02	7.016E+00	--
α_2	6.22E-04	4.84E-03	3.88E-03	1.24E-02	1.583E+00	3.252E+02	0.505
α_3	6.96E-04	3.94E-03	3.31E-03	9.36E-03	1.986E+00	5.015E+02	0.328
α_4	4.29E-04	3.08E-03	2.49E-03	7.72E-03	1.672E+00	5.417E+02	0.304
α_5	1.05E-04	1.99E-03	1.39E-03	5.93E-03	1.011E+00	5.075E+02	0.325
α_6	7.52E-06	9.96E-04	5.06E-04	3.65E-03	5.709E-01	5.727E+02	0.288
α_7	7.46E-11	3.26E-04	2.54E-05	1.72E-03	1.809E-01	5.555E+02	0.297
α_8	1.67E-107	1.16E-04	3.51E-27	8.68E-05	1.245E-02	1.076E+02	1.533

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.80E-01	9.78E-01	9.81E-01	9.82E-01	9.84E-01	9.85E-01
α_2	1.90E-02	1.48E-02	1.45E-02	1.07E-02	7.68E-03	5.90E-03	4.84E-03
α_3		5.21E-03	4.78E-03	6.05E-03	5.95E-03	4.92E-03	3.94E-03
α_4			2.79E-03	2.23E-03	2.95E-03	3.25E-03	3.08E-03
α_5				4.15E-04	1.08E-03	1.69E-03	1.99E-03
α_6					5.26E-04	5.84E-04	9.96E-04
α_7						9.74E-05	3.26E-04
α_8							1.16E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.80E-01	9.78E-01	9.81E-01	9.82E-01	9.84E-01	9.85E-01
Beta	1.90E-02	2.01E-02	2.21E-02	1.94E-02	1.82E-02	1.64E-02	1.53E-02
Gamma		2.60E-01	3.43E-01	4.48E-01	5.78E-01	6.41E-01	6.83E-01
Delta			3.68E-01	3.04E-01	4.33E-01	5.33E-01	6.22E-01
Epsilon				1.57E-01	3.53E-01	4.22E-01	5.27E-01
Mu					3.28E-01	2.87E-01	4.20E-01
Omega						1.43E-01	3.07E-01
Sigma							2.62E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9254105	0.9808392	0.9915376	0.9999442	2.409E+01	4.706E-01	--
α_2	5.58E-05	1.92E-02	8.46E-03	7.46E-02	4.706E-01	2.409E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9492792	0.9823211	0.9871539	0.9988381	6.126E+01	1.103E+00	--
α_2	3.76E-04	1.30E-02	8.28E-03	4.17E-02	8.104E-01	6.155E+01	--
α_3	3.95E-07	4.68E-03	1.10E-03	2.16E-02	2.921E-01	6.207E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9595678	0.9829546	0.9856771	0.9970284	1.126E+02	1.953E+00	--
α_2	1.07E-03	1.15E-02	8.76E-03	3.10E-02	1.312E+00	1.132E+02	--
α_3	6.33E-06	3.76E-03	1.49E-03	1.52E-02	4.307E-01	1.141E+02	--
α_4	3.65E-09	1.83E-03	2.17E-04	9.33E-03	2.099E-01	1.143E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9696218	0.9852970	0.9867994	0.9958370	2.082E+02	3.107E+00	--
α_2	1.13E-03	7.97E-03	6.48E-03	1.99E-02	1.684E+00	2.096E+02	--
α_3	1.97E-04	4.46E-03	3.03E-03	1.36E-02	9.426E-01	2.104E+02	--
α_4	1.36E-06	1.81E-03	6.21E-04	7.62E-03	3.816E-01	2.109E+02	--
α_5	1.87E-16	4.67E-04	2.56E-06	2.72E-03	9.865E-02	2.112E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9733376	0.9863454	0.9874863	0.9954551	2.761E+02	3.822E+00	--
α_2	8.87E-04	6.12E-03	4.99E-03	1.52E-02	1.714E+00	2.782E+02	--
α_3	2.60E-04	3.96E-03	2.86E-03	1.14E-02	1.108E+00	2.788E+02	--
α_4	3.07E-05	2.33E-03	1.30E-03	8.12E-03	6.509E-01	2.793E+02	--
α_5	1.79E-08	9.06E-04	1.63E-04	4.37E-03	2.536E-01	2.797E+02	--
α_6	5.54E-17	3.42E-04	1.55E-06	1.99E-03	9.572E-02	2.798E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9771222	0.9873350	0.9881185	0.9948722	4.050E+02	5.195E+00	--
α_2	9.74E-04	5.13E-03	4.35E-03	1.20E-02	2.105E+00	4.081E+02	--
α_3	3.02E-04	3.22E-03	2.46E-03	8.74E-03	1.320E+00	4.089E+02	--
α_4	1.24E-04	2.43E-03	1.68E-03	7.28E-03	9.967E-01	4.092E+02	--
α_5	6.47E-06	1.28E-03	6.08E-04	4.83E-03	5.249E-01	4.097E+02	--
α_6	3.54E-10	4.77E-04	4.66E-05	2.47E-03	1.956E-01	4.100E+02	--
α_7	3.68E-28	1.29E-04	2.92E-09	7.00E-04	5.291E-02	4.101E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787229	0.9878938	0.9885625	0.9947813	4.759E+02	5.832E+00	--
α_2	9.39E-04	4.63E-03	3.96E-03	1.06E-02	2.229E+00	4.795E+02	--
α_3	2.24E-04	2.62E-03	1.97E-03	7.22E-03	1.260E+00	4.805E+02	--
α_4	1.23E-04	2.16E-03	1.53E-03	6.38E-03	1.042E+00	4.807E+02	--
α_5	3.72E-05	1.58E-03	9.69E-04	5.22E-03	7.626E-01	4.810E+02	--
α_6	1.55E-07	6.79E-04	1.90E-04	3.02E-03	3.271E-01	4.814E+02	--
α_7	2.70E-13	2.79E-04	7.48E-06	1.57E-03	1.344E-01	4.816E+02	--
α_8	1.44E-20	1.59E-04	1.50E-07	9.26E-04	7.682E-02	4.817E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.92E-02	1.30E-02	1.15E-02	7.97E-03	6.12E-03	5.13E-03	4.63E-03
α_3		4.68E-03	3.76E-03	4.46E-03	3.96E-03	3.22E-03	2.62E-03
α_4			1.83E-03	1.81E-03	2.33E-03	2.43E-03	2.16E-03
α_5				4.67E-04	9.06E-04	1.28E-03	1.58E-03
α_6					3.42E-04	4.77E-04	6.79E-04
α_7						1.29E-04	2.79E-04
α_8							1.59E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.92E-02	1.77E-02	1.70E-02	1.47E-02	1.37E-02	1.27E-02	1.21E-02
Gamma		2.65E-01	3.28E-01	4.58E-01	5.52E-01	5.95E-01	6.18E-01
Delta			3.28E-01	3.38E-01	4.74E-01	5.73E-01	6.50E-01
Epsilon				2.05E-01	3.49E-01	4.37E-01	5.55E-01
Mu					2.74E-01	3.21E-01	4.14E-01
Omega						2.13E-01	3.92E-01
Sigma							3.64E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.6.1.4 ALL-TSA-FO-NE: All Systems Travelling Screens Fail to Operate Non-Environmental

Generic CCF Parameters

Component Group: Filter
Component Type: Strainer
Component Subtype: Traveling Screen
Failure Mode: Fail to Operate
Date Range: 2006 through 2020
Cause Group: Component, Design, Environment, Human, Other, Unknown
Cause: IW, IC, IQ, DC, DE, DM, EA, IE, HA, HP, HM, PA, OT, EC, OK
Prior: Default 2015

Total Number of Independent Failure Events: 36.5

Total Number of Common-Cause Failure Events: 4

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9049147	0.9611818	0.9679526	0.9942573	0.9413617	4.235E+01	1.710E+00
α_2	5.74E-03	3.88E-02	3.20E-02	9.51E-02	5.86E-02	1.710E+00	4.235E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9333465	0.9683020	0.9717075	0.9915993	0.9441748	8.715E+01	2.853E+00
α_2	4.36E-03	2.31E-02	1.96E-02	5.35E-02	3.96E-02	2.076E+00	8.793E+01
α_3	2.17E-04	8.63E-03	5.37E-03	2.82E-02	1.62E-02	7.768E-01	8.923E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9387016	0.9673296	0.9696462	0.9880292	0.9393314	1.286E+02	4.344E+00
α_2	6.07E-03	2.23E-02	1.99E-02	4.65E-02	4.21E-02	2.960E+00	1.300E+02
α_3	2.68E-04	6.79E-03	4.53E-03	2.10E-02	1.24E-02	9.024E-01	1.321E+02
α_4	1.17E-05	3.62E-03	1.60E-03	1.41E-02	6.19E-03	4.815E-01	1.325E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9567011	0.9750134	0.9763030	0.9889290	0.9464659	2.380E+02	6.099E+00
α_2	4.11E-03	1.37E-02	1.24E-02	2.77E-02	2.84E-02	3.341E+00	2.407E+02
α_3	1.14E-03	7.37E-03	6.08E-03	1.80E-02	1.51E-02	1.799E+00	2.423E+02
α_4	7.13E-05	3.10E-03	1.89E-03	1.02E-02	7.53E-03	7.572E-01	2.433E+02
α_5	9.54E-10	8.27E-04	8.79E-05	4.25E-03	2.51E-03	2.017E-01	2.439E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9602977	0.9765649	0.9776620	0.9890970	0.9506658	2.815E+02	6.755E+00
α_2	2.92E-03	1.05E-02	9.43E-03	2.19E-02	2.26E-02	3.038E+00	2.852E+02

α_3	1.22E-03	6.89E-03	5.78E-03	1.63E-02	1.31E-02	1.985E+00	2.863E+02
α_4	2.38E-04	3.78E-03	2.71E-03	1.10E-02	8.33E-03	1.089E+00	2.872E+02
α_5	4.66E-06	1.63E-03	7.05E-04	6.41E-03	4.22E-03	4.711E-01	2.878E+02
α_6	6.24E-11	5.98E-04	4.02E-05	3.20E-03	1.06E-03	1.723E-01	2.881E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9682156	0.9801511	0.9808625	0.9896515	0.9546685	4.372E+02	8.854E+00
α_2	2.42E-03	7.81E-03	7.08E-03	1.57E-02	1.81E-02	3.482E+00	4.426E+02
α_3	1.19E-03	5.39E-03	4.67E-03	1.20E-02	1.13E-02	2.405E+00	4.437E+02
α_4	4.96E-04	3.67E-03	2.96E-03	9.27E-03	8.09E-03	1.637E+00	4.444E+02
α_5	8.39E-05	2.05E-03	1.37E-03	6.34E-03	5.12E-03	9.161E-01	4.452E+02
α_6	2.93E-07	7.80E-04	2.38E-04	3.40E-03	2.28E-03	3.478E-01	4.457E+02
α_7	2.67E-23	1.48E-04	3.68E-08	8.46E-04	4.56E-04	6.605E-02	4.460E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9696088	0.9809506	0.9816214	0.9899994	0.9576625	4.646E+02	9.022E+00
α_2	1.97E-03	6.79E-03	6.11E-03	1.39E-02	1.54E-02	3.217E+00	4.704E+02
α_3	8.77E-04	4.53E-03	3.85E-03	1.05E-02	9.67E-03	2.143E+00	4.715E+02
α_4	4.65E-04	3.45E-03	2.78E-03	8.72E-03	7.36E-03	1.635E+00	4.720E+02
α_5	1.58E-04	2.36E-03	1.71E-03	6.79E-03	5.34E-03	1.118E+00	4.725E+02
α_6	1.16E-05	1.26E-03	6.61E-04	4.54E-03	3.17E-03	5.967E-01	4.730E+02
α_7	4.86E-10	4.26E-04	4.51E-05	2.19E-03	1.20E-03	2.016E-01	4.734E+02
α_8	2.08E-15	2.33E-04	2.42E-06	1.34E-03	2.01E-04	1.103E-01	4.735E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.61E-01	9.68E-01	9.67E-01	9.75E-01	9.77E-01	9.80E-01	9.81E-01
α_2	3.88E-02	2.31E-02	2.23E-02	1.37E-02	1.05E-02	7.81E-03	6.79E-03
α_3		8.63E-03	6.79E-03	7.37E-03	6.89E-03	5.39E-03	4.53E-03
α_4			3.62E-03	3.10E-03	3.78E-03	3.67E-03	3.45E-03
α_5				8.27E-04	1.63E-03	2.05E-03	2.36E-03
α_6					5.98E-04	7.80E-04	1.26E-03
α_7						1.48E-04	4.26E-04
α_8							2.33E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.61E-01	9.68E-01	9.67E-01	9.75E-01	9.77E-01	9.80E-01	9.81E-01
Beta	3.88E-02	3.17E-02	3.27E-02	2.50E-02	2.34E-02	1.98E-02	1.90E-02
Gamma		2.72E-01	3.19E-01	4.52E-01	5.50E-01	6.07E-01	6.43E-01
Delta			3.48E-01	3.48E-01	4.66E-01	5.52E-01	6.31E-01
Epsilon				2.10E-01	3.71E-01	4.48E-01	5.53E-01
Mu					2.68E-01	3.11E-01	4.48E-01
Omega						1.60E-01	3.43E-01
Sigma							3.54E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	18.25	27.38	36.50	45.63	54.75	63.88	73.00
N₁	1.6833	1.8000	1.4333	1.5208	1.5208	1.5564	1.5623
N₂	1.2417	1.2250	1.7000	1.4167	1.3368	1.2392	1.1990
N₃		0.5000	0.5000	0.7500	0.7778	0.7751	0.7528
N₄			0.2500	0.3750	0.4931	0.5544	0.5728
N₅				0.1250	0.2500	0.3507	0.4155
N₆					0.0625	0.1563	0.2469
N₇						0.0313	0.0938
N₈							0.0156

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 16.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.378

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9621064	0.9902128	0.9956252	0.9999674	4.891E+01	4.834E-01	--
α_2	3.26E-05	9.79E-03	4.37E-03	3.79E-02	4.834E-01	4.891E+01	1.059

CCCG = 3, Gamma = 0.388

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9731555	0.9903329	0.9927611	0.9992099	1.256E+02	1.226E+00	--
α_2	3.85E-04	7.90E-03	5.46E-03	2.38E-02	9.769E-01	1.226E+02	1.156
α_3	2.82E-08	1.76E-03	3.06E-04	8.55E-03	2.487E-01	1.408E+02	1.013

CCCG = 4, Gamma = 0.396

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9711134	0.9876467	0.9895391	0.9977087	1.645E+02	2.057E+00	--
α_2	1.02E-03	9.20E-03	7.21E-03	2.42E-02	1.442E+00	1.553E+02	1.276
α_3	2.66E-06	2.12E-03	7.96E-04	8.71E-03	4.114E-01	1.937E+02	1.030
α_4	1.36E-09	1.03E-03	1.13E-04	5.30E-03	2.036E-01	1.969E+02	1.014

CCCG = 5, Gamma = 0.402

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9775760	0.9886390	0.9896278	0.9963236	3.205E+02	3.683E+00	--
α_2	1.45E-03	7.06E-03	6.06E-03	1.61E-02	2.243E+00	3.153E+02	1.179
α_3	1.46E-04	2.91E-03	2.01E-03	8.73E-03	9.912E-01	3.396E+02	1.099
α_4	7.68E-07	1.13E-03	3.81E-04	4.78E-03	3.765E-01	3.337E+02	1.120
α_5	2.27E-21	2.62E-04	1.49E-07	1.51E-03	7.237E-02	2.766E+02	1.353

CCCG = 6, Gamma = 0.405

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9780182	0.9885124	0.9894036	0.9959620	3.562E+02	4.139E+00	--
α_2	1.19E-03	6.20E-03	5.27E-03	1.44E-02	2.128E+00	3.412E+02	1.248
α_3	2.01E-04	2.91E-03	2.12E-03	8.32E-03	1.134E+00	3.888E+02	1.099
α_4	9.50E-06	1.45E-03	7.21E-04	5.38E-03	5.533E-01	3.802E+02	1.125
α_5	2.39E-09	6.15E-04	8.21E-05	3.09E-03	2.210E-01	3.590E+02	1.193
α_6	3.99E-16	3.14E-04	2.18E-06	1.82E-03	1.027E-01	3.275E+02	1.308

CCCG = 7, Gamma = 0.409

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9824268	0.9897786	0.9902929	0.9953744	6.228E+02	6.432E+00	--
α_2	1.24E-03	4.76E-03	4.22E-03	1.01E-02	2.840E+00	5.943E+02	1.198
α_3	3.92E-04	2.64E-03	2.16E-03	6.54E-03	1.746E+00	6.585E+02	1.084
α_4	1.02E-04	1.63E-03	1.17E-03	4.75E-03	1.084E+00	6.628E+02	1.078
α_5	4.67E-06	8.22E-04	3.98E-04	3.07E-03	5.376E-01	6.537E+02	1.094
α_6	2.78E-10	3.17E-04	3.20E-05	1.64E-03	1.979E-01	6.242E+02	1.146
α_7	1.11E-52	4.98E-05	4.99E-15	1.70E-04	2.656E-02	5.337E+02	1.341

CCCG = 8, Gamma = 0.411

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9827110	0.9900614	0.9905876	0.9956149	6.089E+02	6.112E+00	--
α_2	8.75E-04	4.04E-03	3.49E-03	9.09E-03	2.364E+00	5.822E+02	1.230
α_3	2.83E-04	2.38E-03	1.88E-03	6.17E-03	1.512E+00	6.342E+02	1.131
α_4	9.47E-05	1.62E-03	1.15E-03	4.75E-03	1.056E+00	6.524E+02	1.101
α_5	1.59E-05	1.05E-03	6.00E-04	3.63E-03	6.745E-01	6.401E+02	1.122
α_6	6.62E-08	4.92E-04	1.25E-04	2.23E-03	3.076E-01	6.243E+02	1.151
α_7	1.26E-15	1.80E-04	1.78E-06	1.04E-03	1.093E-01	6.069E+02	1.185
α_8	2.71E-18	1.75E-04	4.87E-07	1.02E-03	8.885E-02	5.064E+02	1.420

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.90E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01
α_2	9.79E-03	7.90E-03	9.20E-03	7.06E-03	6.20E-03	4.76E-03	4.04E-03
α_3		1.76E-03	2.12E-03	2.91E-03	2.91E-03	2.64E-03	2.38E-03
α_4			1.03E-03	1.13E-03	1.45E-03	1.63E-03	1.62E-03
α_5				2.62E-04	6.15E-04	8.22E-04	1.05E-03
α_6					3.14E-04	3.17E-04	4.92E-04
α_7						4.98E-05	1.80E-04
α_8							1.75E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.90E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01
Beta	9.79E-03	9.67E-03	1.24E-02	1.14E-02	1.15E-02	1.02E-02	9.94E-03
Gamma		1.82E-01	2.55E-01	3.78E-01	4.60E-01	5.35E-01	5.93E-01
Delta			3.28E-01	3.23E-01	4.50E-01	5.16E-01	5.97E-01
Epsilon				1.88E-01	3.90E-01	4.21E-01	5.40E-01
Mu					3.38E-01	3.09E-01	4.46E-01
Omega						1.36E-01	4.19E-01
Sigma							4.93E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.00	12.00	16.00	20.00	24.00	28.00	32.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8595037	0.9587488	0.9759214	0.9994014	1.530E+01	6.581E-01	--
α_2	5.99E-04	4.13E-02	2.41E-02	1.40E-01	6.581E-01	1.530E+01	1.059

CCCG = 3, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8761128	0.9482370	0.9566067	0.9916752	3.303E+01	1.803E+00	--
α_2	5.93E-03	4.56E-02	3.71E-02	1.15E-01	1.564E+00	3.270E+01	1.156
α_3	6.47E-08	6.13E-03	9.95E-04	3.01E-02	2.396E-01	3.886E+01	1.013

CCCG = 4, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8632364	0.9321584	0.9383097	0.9800174	4.326E+01	3.148E+00	--
α_2	1.37E-02	5.68E-02	5.03E-02	1.22E-01	2.535E+00	4.209E+01	1.276
α_3	6.58E-06	7.10E-03	2.55E-03	2.96E-02	3.927E-01	5.489E+01	1.030
α_4	1.52E-08	3.93E-03	5.28E-04	1.97E-02	2.207E-01	5.590E+01	1.014

CCCG = 5, Gamma = 0.113

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9116543	0.9513685	0.9543698	0.9808225	9.466E+01	4.839E+00	--
α_2	8.27E-03	3.03E-02	2.71E-02	6.32E-02	2.950E+00	9.439E+01	1.179
α_3	1.56E-03	1.39E-02	1.10E-02	3.64E-02	1.453E+00	1.029E+02	1.099
α_4	1.87E-06	3.55E-03	1.15E-03	1.52E-02	3.632E-01	1.020E+02	1.120
α_5	7.92E-21	8.55E-04	4.96E-07	4.95E-03	7.248E-02	8.474E+01	1.353

CCCG = 6, Gamma = 0.109

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9184395	0.9535087	0.9559935	0.9800858	1.152E+02	5.619E+00	--
α_2	5.98E-03	2.37E-02	2.10E-02	5.08E-02	2.715E+00	1.117E+02	1.248
α_3	2.34E-03	1.43E-02	1.19E-02	3.45E-02	1.860E+00	1.281E+02	1.099
α_4	1.21E-04	5.80E-03	3.50E-03	1.93E-02	7.362E-01	1.261E+02	1.125
α_5	1.33E-08	1.93E-03	2.87E-04	9.57E-03	2.313E-01	1.194E+02	1.193
α_6	6.43E-20	7.04E-04	6.64E-07	4.10E-03	7.684E-02	1.091E+02	1.308

CCCG = 7, Gamma = 0.106

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9353184	0.9605176	0.9620778	0.9803884	1.880E+02	7.730E+00	--
α_2	5.34E-03	1.79E-02	1.62E-02	3.62E-02	3.312E+00	1.821E+02	1.198
α_3	2.18E-03	1.08E-02	9.25E-03	2.47E-02	2.214E+00	2.028E+02	1.084
α_4	6.52E-04	6.58E-03	5.07E-03	1.77E-02	1.357E+00	2.048E+02	1.078
α_5	3.95E-05	3.16E-03	1.75E-03	1.11E-02	6.416E-01	2.025E+02	1.094
α_6	1.63E-10	9.18E-04	6.85E-05	4.87E-03	1.780E-01	1.937E+02	1.146
α_7	8.99E-51	1.65E-04	3.39E-14	5.83E-04	2.734E-02	1.657E+02	1.341

CCCG = 8, Gamma = 0.104

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9350944	0.9602637	0.9618116	0.9801462	1.894E+02	7.837E+00	--
α_2	4.64E-03	1.65E-02	1.48E-02	3.41E-02	3.087E+00	1.843E+02	1.230
α_3	1.71E-03	9.71E-03	8.16E-03	2.30E-02	1.978E+00	2.018E+02	1.131
α_4	6.47E-04	6.50E-03	5.01E-03	1.74E-02	1.360E+00	2.081E+02	1.101
α_5	1.29E-04	4.07E-03	2.62E-03	1.30E-02	8.367E-01	2.046E+02	1.122
α_6	2.51E-06	2.05E-03	7.67E-04	8.43E-03	4.100E-01	1.998E+02	1.151
α_7	3.96E-20	3.96E-04	3.80E-07	2.30E-03	7.703E-02	1.945E+02	1.185
α_8	5.01E-18	5.39E-04	1.35E-06	3.15E-03	8.749E-02	1.623E+02	1.420

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.59E-01	9.48E-01	9.32E-01	9.51E-01	9.54E-01	9.61E-01	9.60E-01
α_2	4.13E-02	4.56E-02	5.68E-02	3.03E-02	2.37E-02	1.79E-02	1.65E-02
α_3		6.13E-03	7.10E-03	1.39E-02	1.43E-02	1.08E-02	9.71E-03
α_4			3.93E-03	3.55E-03	5.80E-03	6.58E-03	6.50E-03
α_5				8.55E-04	1.93E-03	3.16E-03	4.07E-03
α_6					7.04E-04	9.18E-04	2.05E-03
α_7						1.65E-04	3.96E-04
α_8							5.39E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.59E-01	9.48E-01	9.32E-01	9.51E-01	9.54E-01	9.61E-01	9.60E-01
Beta	4.13E-02	5.18E-02	6.78E-02	4.86E-02	4.65E-02	3.95E-02	3.97E-02
Gamma		1.18E-01	1.63E-01	3.77E-01	4.89E-01	5.48E-01	5.85E-01
Delta			3.56E-01	2.40E-01	3.71E-01	5.01E-01	5.83E-01
Epsilon				1.94E-01	3.12E-01	3.92E-01	5.21E-01
Mu					2.67E-01	2.55E-01	4.23E-01
Omega						1.52E-01	3.13E-01
Sigma							5.76E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.50	2.25	3.00	3.75	4.50	5.25	6.00
N_1	1.0833	1.0000	0.5000	0.5208	0.5208	0.5064	0.4823
N_2	0.2083	0.6250	1.2500	0.9583	0.7743	0.6580	0.5833
N_3		0.0000	0.0000	0.3750	0.5278	0.5689	0.5590

N₄			0.0000	0.0000	0.1181	0.2419	0.3334
N₅				0.0000	0.0000	0.0382	0.1030
N₆					0.0000	0.0000	0.0125
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.142

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.5781419	0.8264463	0.8541458	0.9794577	6.572E+00	1.380E+00	--
α_2	2.05E-02	1.74E-01	1.46E-01	4.22E-01	1.380E+00	6.572E+00	1.059

CCCG = 3, Gamma = 0.129

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7239480	0.8773858	0.8930903	0.9768561	1.403E+01	1.960E+00	--
α_2	6.05E-03	7.69E-02	5.89E-02	2.09E-01	1.167E+00	1.402E+01	1.156
α_3	1.28E-03	4.57E-02	2.96E-02	1.45E-01	7.927E-01	1.654E+01	1.013

CCCG = 4, Gamma = 0.124

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7712199	0.8895828	0.9002990	0.9711789	2.150E+01	2.669E+00	--
α_2	5.60E-03	5.94E-02	4.63E-02	1.58E-01	1.289E+00	2.042E+01	1.276
α_3	1.28E-03	3.30E-02	2.23E-02	1.01E-01	8.887E-01	2.601E+01	1.030
α_4	6.63E-05	1.80E-02	8.25E-03	6.90E-02	4.914E-01	2.681E+01	1.014

CCCG = 5, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8530816	0.9197390	0.9247229	0.9693427	5.142E+01	4.487E+00	--
α_2	6.07E-03	3.52E-02	2.97E-02	8.33E-02	1.916E+00	5.249E+01	1.179
α_3	3.54E-03	2.71E-02	2.19E-02	6.85E-02	1.582E+00	5.677E+01	1.099
α_4	4.07E-04	1.41E-02	9.01E-03	4.53E-02	8.090E-01	5.642E+01	1.120
α_5	8.08E-10	3.80E-03	2.95E-04	2.01E-02	1.799E-01	4.722E+01	1.353

CCCG = 6, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8712703	0.9283572	0.9325085	0.9712454	6.355E+01	4.905E+00	--
α_2	2.32E-03	2.19E-02	1.71E-02	5.78E-02	1.398E+00	6.237E+01	1.248
α_3	3.81E-03	2.46E-02	2.04E-02	5.99E-02	1.781E+00	7.065E+01	1.099
α_4	9.97E-04	1.55E-02	1.12E-02	4.46E-02	1.094E+00	6.963E+01	1.125
α_5	2.86E-05	7.45E-03	3.40E-03	2.86E-02	4.967E-01	6.622E+01	1.193
α_6	2.50E-12	2.22E-03	6.18E-05	1.25E-02	1.353E-01	6.070E+01	1.308

CCCG = 7, Gamma = 0.117

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9019426	0.9415031	0.9440352	0.9724111	1.090E+02	6.770E+00	--
α_2	1.89E-03	1.47E-02	1.18E-02	3.73E-02	1.580E+00	1.062E+02	1.198
α_3	3.52E-03	1.80E-02	1.54E-02	4.14E-02	2.145E+00	1.171E+02	1.084
α_4	1.75E-03	1.33E-02	1.08E-02	3.38E-02	1.600E+00	1.182E+02	1.078
α_5	4.44E-04	8.50E-03	5.93E-03	2.53E-02	1.004E+00	1.171E+02	1.094
α_6	2.97E-06	3.45E-03	1.22E-03	1.45E-02	3.890E-01	1.123E+02	1.146
α_7	8.77E-28	5.44E-04	1.09E-08	2.95E-03	5.237E-02	9.629E+01	1.341

CCCG = 8, Gamma = 0.116

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9129097	0.9462289	0.9482165	0.9727585	1.411E+02	8.016E+00	--
α_2	1.51E-03	1.15E-02	9.25E-03	2.92E-02	1.599E+00	1.374E+02	1.230
α_3	2.59E-03	1.38E-02	1.17E-02	3.20E-02	2.080E+00	1.491E+02	1.131
α_4	2.07E-03	1.23E-02	1.02E-02	2.94E-02	1.906E+00	1.535E+02	1.101
α_5	8.23E-04	8.69E-03	6.65E-03	2.35E-02	1.324E+00	1.511E+02	1.122
α_6	1.52E-04	5.42E-03	3.42E-03	1.75E-02	8.053E-01	1.477E+02	1.151
α_7	8.75E-08	1.90E-03	4.00E-04	8.95E-03	2.747E-01	1.441E+02	1.185
α_8	2.18E-49	2.33E-04	9.08E-14	8.48E-04	2.808E-02	1.204E+02	1.420

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	8.26E-01	8.77E-01	8.90E-01	9.20E-01	9.28E-01	9.42E-01	9.46E-01
α_2	1.74E-01	7.69E-02	5.94E-02	3.52E-02	2.19E-02	1.47E-02	1.15E-02
α_3		4.57E-02	3.30E-02	2.71E-02	2.46E-02	1.80E-02	1.38E-02
α_4			1.80E-02	1.41E-02	1.55E-02	1.33E-02	1.23E-02
α_5				3.80E-03	7.45E-03	8.50E-03	8.69E-03
α_6					2.22E-03	3.45E-03	5.42E-03
α_7						5.44E-04	1.90E-03
α_8							2.33E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	8.26E-01	8.77E-01	8.90E-01	9.20E-01	9.28E-01	9.42E-01	9.46E-01
Beta	1.74E-01	1.23E-01	1.10E-01	8.03E-02	7.16E-02	5.85E-02	5.38E-02
Gamma		3.73E-01	4.62E-01	5.61E-01	6.94E-01	7.49E-01	7.86E-01
Delta			3.53E-01	3.98E-01	5.06E-01	5.89E-01	6.75E-01
Epsilon				2.12E-01	3.85E-01	4.83E-01	5.70E-01
Mu					2.30E-01	3.20E-01	4.65E-01
Omega						1.36E-01	2.83E-01
Sigma							1.09E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	3.00	4.00	5.00	6.00	7.00	8.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313	0.0156
N_3		0.5000	0.5000	0.3750	0.2500	0.1563	0.0938

N₄			0.2500	0.3750	0.3750	0.3125	0.2344
N₅				0.1250	0.2500	0.3125	0.3125
N₆					0.0625	0.1563	0.2344
N₇						0.0313	0.0938
N₈							0.0156

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 10.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.266

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9328048	0.9823193	0.9917160	0.9999256	2.800E+01	5.039E-01	--
α_2	7.44E-05	1.77E-02	8.28E-03	6.72E-02	5.039E-01	2.800E+01	1.059

CCCG = 3, Gamma = 0.272

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9469743	0.9809396	0.9857387	0.9984889	6.189E+01	1.203E+00	--
α_2	6.06E-04	1.49E-02	1.00E-02	4.57E-02	9.104E-01	6.028E+01	1.156
α_3	3.52E-07	4.18E-03	9.84E-04	1.93E-02	2.921E-01	6.954E+01	1.013

CCCG = 4, Gamma = 0.276

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9527382	0.9794272	0.9823991	0.9959496	1.025E+02	2.153E+00	--
α_2	1.85E-03	1.53E-02	1.22E-02	3.96E-02	1.512E+00	9.699E+01	1.276
α_3	5.94E-06	3.53E-03	1.40E-03	1.43E-02	4.307E-01	1.216E+02	1.030
α_4	3.38E-09	1.69E-03	2.00E-04	8.62E-03	2.099E-01	1.237E+02	1.014

CCCG = 5, Gamma = 0.278

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9645882	0.9823481	0.9839713	0.9945603	1.915E+02	3.440E+00	--
α_2	1.91E-03	1.06E-02	8.91E-03	2.49E-02	2.017E+00	1.890E+02	1.179
α_3	2.04E-04	4.60E-03	3.12E-03	1.40E-02	9.426E-01	2.039E+02	1.099
α_4	1.43E-06	1.90E-03	6.53E-04	8.01E-03	3.816E-01	2.006E+02	1.120
α_5	2.37E-16	5.93E-04	3.25E-06	3.45E-03	9.865E-02	1.664E+02	1.353

CCCG = 6, Gamma = 0.279

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9672540	0.9826597	0.9839343	0.9937106	2.449E+02	4.322E+00	--
α_2	1.88E-03	9.32E-03	7.98E-03	2.13E-02	2.214E+00	2.353E+02	1.248
α_3	2.69E-04	4.11E-03	2.97E-03	1.18E-02	1.108E+00	2.687E+02	1.099
α_4	3.27E-05	2.47E-03	1.38E-03	8.62E-03	6.509E-01	2.628E+02	1.125
α_5	2.02E-08	1.02E-03	1.84E-04	4.92E-03	2.536E-01	2.483E+02	1.193
α_6	6.85E-17	4.22E-04	1.92E-06	2.46E-03	9.572E-02	2.265E+02	1.308

CCCG = 7, Gamma = 0.279

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9729309	0.9846060	0.9854561	0.9933777	3.707E+02	5.795E+00	--
α_2	1.81E-03	7.41E-03	6.51E-03	1.61E-02	2.655E+00	3.557E+02	1.198
α_3	3.48E-04	3.46E-03	2.67E-03	9.27E-03	1.370E+00	3.948E+02	1.084
α_4	1.28E-04	2.50E-03	1.73E-03	7.50E-03	9.967E-01	3.973E+02	1.078
α_5	6.76E-06	1.34E-03	6.35E-04	5.05E-03	5.249E-01	3.920E+02	1.094
α_6	3.88E-10	5.22E-04	5.11E-05	2.71E-03	1.956E-01	3.744E+02	1.146
α_7	4.72E-28	1.65E-04	3.75E-09	8.97E-04	5.291E-02	3.202E+02	1.341

CCCG = 8, Gamma = 0.280

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9739364	0.9847628	0.9855099	0.9930382	4.225E+02	6.537E+00	--
α_2	1.79E-03	6.91E-03	6.13E-03	1.47E-02	2.829E+00	4.065E+02	1.230
α_3	3.03E-04	3.06E-03	2.35E-03	8.21E-03	1.360E+00	4.437E+02	1.131
α_4	1.32E-04	2.29E-03	1.62E-03	6.74E-03	1.047E+00	4.564E+02	1.101
α_5	3.99E-05	1.70E-03	1.04E-03	5.61E-03	7.626E-01	4.479E+02	1.122
α_6	1.71E-07	7.48E-04	2.09E-04	3.33E-03	3.271E-01	4.370E+02	1.151
α_7	3.06E-13	3.16E-04	8.48E-06	1.78E-03	1.344E-01	4.248E+02	1.185
α_8	1.95E-20	2.17E-04	2.03E-07	1.26E-03	7.682E-02	3.545E+02	1.420

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.81E-01	9.79E-01	9.82E-01	9.83E-01	9.85E-01	9.85E-01
α_2	1.77E-02	1.49E-02	1.53E-02	1.06E-02	9.32E-03	7.41E-03	6.91E-03
α_3		4.18E-03	3.53E-03	4.60E-03	4.11E-03	3.46E-03	3.06E-03
α_4			1.69E-03	1.90E-03	2.47E-03	2.50E-03	2.29E-03
α_5				5.93E-04	1.02E-03	1.34E-03	1.70E-03
α_6					4.22E-04	5.22E-04	7.48E-04
α_7						1.65E-04	3.16E-04
α_8							2.17E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.81E-01	9.79E-01	9.82E-01	9.83E-01	9.85E-01	9.85E-01
Beta	1.77E-02	1.91E-02	2.06E-02	1.77E-02	1.73E-02	1.54E-02	1.52E-02
Gamma		2.19E-01	2.54E-01	4.02E-01	4.63E-01	5.19E-01	5.46E-01
Delta			3.24E-01	3.51E-01	4.88E-01	5.67E-01	6.33E-01
Epsilon				2.38E-01	3.69E-01	4.47E-01	5.66E-01
Mu					2.93E-01	3.40E-01	4.30E-01
Omega						2.40E-01	4.16E-01
Sigma							4.07E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.00	7.50	10.00	12.50	15.00	17.50	20.00
N_1	0.6000	0.8000	0.9333	1.0000	1.0000	1.0500	1.0800
N_2	0.0333	0.1000	0.2000	0.3333	0.5000	0.5500	0.6000
N_3		0.0000	0.0000	0.0000	0.0000	0.0500	0.1000

N₄			0.0000	0.0000	0.0000	0.0000	0.0050
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 3.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.083

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9818240	0.9952821	0.9978668	0.9999826	1.040E+02	4.932E-01	--
α_2	1.74E-05	4.72E-03	2.13E-03	1.82E-02	4.932E-01	1.040E+02	1.059

CCCG = 3, Gamma = 0.085

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9862599	0.9953081	0.9966652	0.9997220	2.248E+02	1.059E+00	--
α_2	6.16E-05	3.29E-03	1.94E-03	1.11E-02	7.137E-01	2.160E+02	1.156
α_3	5.03E-07	1.40E-03	4.23E-04	6.10E-03	3.458E-01	2.469E+02	1.013

CCCG = 4, Gamma = 0.087

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9878358	0.9947692	0.9955594	0.9990015	4.021E+02	2.115E+00	--
α_2	5.02E-04	4.05E-03	3.22E-03	1.04E-02	1.549E+00	3.812E+02	1.276
α_3	1.74E-08	5.58E-04	1.09E-04	2.66E-03	2.646E-01	4.739E+02	1.030
α_4	6.91E-08	6.25E-04	1.53E-04	2.86E-03	3.010E-01	4.810E+02	1.014

CCCG = 5, Gamma = 0.088

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9921256	0.9956260	0.9958943	0.9982102	1.212E+03	5.325E+00	--
α_2	9.70E-04	3.04E-03	2.77E-03	6.04E-03	3.632E+00	1.191E+03	1.179
α_3	1.04E-04	1.06E-03	8.12E-04	2.85E-03	1.354E+00	1.280E+03	1.099
α_4	2.24E-08	2.36E-04	5.62E-05	1.08E-03	2.961E-01	1.256E+03	1.120
α_5	1.21E-34	4.08E-05	4.49E-11	2.02E-04	4.243E-02	1.041E+03	1.353

CCCG = 6, Gamma = 0.089

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9914843	0.9953565	0.9956633	0.9981808	1.058E+03	4.936E+00	--
α_2	7.60E-04	2.86E-03	2.54E-03	6.04E-03	2.915E+00	1.017E+03	1.248
α_3	9.25E-05	1.08E-03	8.15E-04	3.00E-03	1.257E+00	1.158E+03	1.099
α_4	1.81E-06	4.45E-04	2.03E-04	1.70E-03	5.031E-01	1.131E+03	1.125
α_5	3.13E-15	1.08E-04	1.43E-06	6.20E-04	1.155E-01	1.067E+03	1.193
α_6	6.97E-13	1.49E-04	5.46E-06	8.26E-04	1.451E-01	9.733E+02	1.308

CCCG = 7, Gamma = 0.089

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9936374	0.9959728	0.9961099	0.9978403	2.388E+03	9.654E+00	--
α_2	8.22E-04	2.12E-03	1.98E-03	3.91E-03	4.851E+00	2.280E+03	1.198
α_3	2.84E-04	1.11E-03	9.80E-04	2.37E-03	2.800E+00	2.524E+03	1.084
α_4	5.57E-05	5.45E-04	4.21E-04	1.46E-03	1.384E+00	2.539E+03	1.078
α_5	6.93E-07	1.96E-04	8.75E-05	7.58E-04	4.902E-01	2.503E+03	1.094
α_6	1.14E-15	4.80E-05	6.08E-07	2.75E-04	1.146E-01	2.389E+03	1.146
α_7	3.77E-93	7.17E-06	7.63E-25	8.52E-06	1.464E-02	2.042E+03	1.341

CCCG = 8, Gamma = 0.090

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931680	0.9959384	0.9961247	0.9980729	1.753E+03	7.148E+00	--
α_2	4.79E-04	1.77E-03	1.57E-03	3.71E-03	2.980E+00	1.684E+03	1.230
α_3	1.85E-04	1.07E-03	8.94E-04	2.55E-03	1.960E+00	1.832E+03	1.131
α_4	4.52E-05	6.18E-04	4.53E-04	1.76E-03	1.166E+00	1.884E+03	1.101
α_5	1.65E-06	2.91E-04	1.41E-04	1.09E-03	5.375E-01	1.848E+03	1.122
α_6	2.21E-11	1.00E-04	7.77E-06	5.30E-04	1.805E-01	1.802E+03	1.151
α_7	1.22E-35	2.36E-05	1.77E-11	1.16E-04	4.139E-02	1.751E+03	1.185
α_8	1.18E-08	1.93E-04	4.27E-05	9.02E-04	2.827E-01	1.461E+03	1.420

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.95E-01	9.96E-01	9.96E-01
α_2	4.72E-03	3.29E-03	4.05E-03	3.04E-03	2.86E-03	2.12E-03	1.77E-03
α_3		1.40E-03	5.58E-04	1.06E-03	1.08E-03	1.11E-03	1.07E-03
α_4			6.25E-04	2.36E-04	4.45E-04	5.45E-04	6.18E-04
α_5				4.08E-05	1.08E-04	1.96E-04	2.91E-04
α_6					1.49E-04	4.80E-05	1.00E-04
α_7						7.17E-06	2.36E-05
α_8							1.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.95E-01	9.96E-01	9.96E-01
Beta	4.72E-03	4.69E-03	5.23E-03	4.37E-03	4.64E-03	4.03E-03	4.06E-03
Gamma		2.98E-01	2.26E-01	3.05E-01	3.85E-01	4.73E-01	5.65E-01
Delta			5.28E-01	2.07E-01	3.93E-01	4.18E-01	5.34E-01
Epsilon				1.47E-01	3.67E-01	3.15E-01	4.96E-01
Mu					5.79E-01	2.20E-01	5.22E-01
Omega						1.30E-01	6.84E-01
Sigma							8.91E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.75	2.63	3.50	4.38	5.25	6.13	7.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.6.2 Service Water Strainers

2.6.2.1 SWS-TSA-FO-NE: SWS Travelling Screens Fail to Operate Non-Environmental

Generic CCF Parameters

System Group:	Raw Water
System:	Normally Operating Service Water, Standby Service Water
Component Group:	Filter
Component Type:	Strainer
Component Subtype:	Traveling Screen
Failure Mode:	Fail to Operate
Date Range:	2006 through 2020
Cause Group:	Component, Design, Environment, Human, Other, Unknown
Cause:	IW, IC, IQ, DC, DE, DM, EA, IE, HA, HP, HM, PA, OT, EC, OK
Prior:	Default 2015

Total Number of Independent Failure Events: 15.0

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.8806171	0.9530886	0.9622178	0.9942767	0.8868613	3.051E+01	1.502E+00
α_2	5.72E-03	4.69E-02	3.78E-02	1.19E-01	1.13E-01	1.502E+00	3.051E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9302245	0.9691651	0.9733938	0.9936399	0.9163498	7.003E+01	2.228E+00
α_2	2.26E-03	2.01E-02	1.59E-02	5.24E-02	4.56E-02	1.451E+00	7.081E+01
α_3	2.71E-04	1.08E-02	6.70E-03	3.51E-02	3.80E-02	7.768E-01	7.148E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9419669	0.9718000	0.9746223	0.9919901	0.9299611	1.066E+02	3.094E+00
α_2	2.26E-03	1.56E-02	1.28E-02	3.86E-02	2.63E-02	1.710E+00	1.080E+02
α_3	3.25E-04	8.23E-03	5.49E-03	2.55E-02	2.92E-02	9.024E-01	1.088E+02
α_4	1.42E-05	4.39E-03	1.94E-03	1.71E-02	1.46E-02	4.815E-01	1.092E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9592926	0.9778714	0.9793330	0.9914516	0.9367589	2.106E+02	4.766E+00
α_2	2.43E-03	1.11E-02	9.59E-03	2.47E-02	2.17E-02	2.383E+00	2.130E+02
α_3	7.14E-04	6.61E-03	5.16E-03	1.75E-02	1.78E-02	1.424E+00	2.139E+02
α_4	8.08E-05	3.52E-03	2.15E-03	1.16E-02	1.78E-02	7.572E-01	2.146E+02
α_5	1.08E-09	9.37E-04	9.97E-05	4.82E-03	5.93E-03	2.017E-01	2.152E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9624101	0.9790009	0.9802438	0.9913384	0.9400000	2.487E+02	5.335E+00
α_2	1.84E-03	8.91E-03	7.66E-03	2.03E-02	2.25E-02	2.264E+00	2.518E+02
α_3	6.44E-04	5.73E-03	4.50E-03	1.50E-02	1.00E-02	1.457E+00	2.526E+02
α_4	1.83E-04	3.82E-03	2.62E-03	1.15E-02	1.50E-02	9.710E-01	2.531E+02
α_5	5.28E-06	1.85E-03	8.01E-04	7.27E-03	1.00E-02	4.711E-01	2.536E+02
α_6	7.09E-11	6.78E-04	4.56E-05	3.63E-03	2.50E-03	1.723E-01	2.539E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9698925	0.9819230	0.9827055	0.9912739	0.9446367	3.991E+02	7.347E+00
α_2	1.80E-03	6.95E-03	6.16E-03	1.48E-02	2.01E-02	2.824E+00	4.036E+02
α_3	7.20E-04	4.52E-03	3.73E-03	1.10E-02	7.14E-03	1.836E+00	4.046E+02
α_4	3.57E-04	3.43E-03	2.66E-03	9.15E-03	1.08E-02	1.395E+00	4.051E+02
α_5	7.84E-05	2.16E-03	1.42E-03	6.77E-03	1.08E-02	8.779E-01	4.056E+02
α_6	3.22E-07	8.56E-04	2.61E-04	3.73E-03	5.41E-03	3.478E-01	4.061E+02
α_7	2.93E-23	1.63E-04	4.04E-08	9.28E-04	1.08E-03	6.605E-02	4.064E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9711804	0.9826604	0.9834035	0.9915906	0.9479945	4.211E+02	7.431E+00
α_2	1.49E-03	6.15E-03	5.40E-03	1.34E-02	1.88E-02	2.634E+00	4.259E+02
α_3	4.75E-04	3.70E-03	2.96E-03	9.44E-03	5.91E-03	1.584E+00	4.269E+02
α_4	2.78E-04	3.04E-03	2.31E-03	8.29E-03	7.30E-03	1.301E+00	4.272E+02
α_5	1.26E-04	2.37E-03	1.65E-03	7.05E-03	9.53E-03	1.015E+00	4.275E+02
α_6	1.14E-05	1.36E-03	7.04E-04	4.95E-03	7.15E-03	5.841E-01	4.279E+02
α_7	5.37E-10	4.70E-04	4.99E-05	2.42E-03	2.86E-03	2.016E-01	4.283E+02
α_8	2.30E-15	2.57E-04	2.67E-06	1.48E-03	4.77E-04	1.103E-01	4.284E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.53E-01	9.69E-01	9.72E-01	9.78E-01	9.79E-01	9.82E-01	9.83E-01
α_2	4.69E-02	2.01E-02	1.56E-02	1.11E-02	8.91E-03	6.95E-03	6.15E-03
α_3		1.08E-02	8.23E-03	6.61E-03	5.73E-03	4.52E-03	3.70E-03
α_4			4.39E-03	3.52E-03	3.82E-03	3.43E-03	3.04E-03
α_5				9.37E-04	1.85E-03	2.16E-03	2.37E-03
α_6					6.78E-04	8.56E-04	1.36E-03
α_7						1.63E-04	4.70E-04
α_8							2.57E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.53E-01	9.69E-01	9.72E-01	9.78E-01	9.79E-01	9.82E-01	9.83E-01
Beta	4.69E-02	3.08E-02	2.82E-02	2.21E-02	2.10E-02	1.81E-02	1.73E-02
Gamma		3.49E-01	4.47E-01	5.00E-01	5.76E-01	6.16E-01	6.46E-01
Delta			3.48E-01	4.02E-01	5.26E-01	5.94E-01	6.70E-01

Epsilon				2.10E-01	3.99E-01	4.81E-01	5.95E-01
Mu					2.68E-01	3.20E-01	4.69E-01
Omega						1.60E-01	3.48E-01
Sigma							3.54E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.50	11.25	15.00	18.75	22.50	26.25	30.00
N₁	0.6000	0.8000	0.9333	1.0000	1.0000	1.0500	1.0800
N₂	1.0333	0.6000	0.4500	0.4583	0.5625	0.5813	0.6156
N₃		0.5000	0.5000	0.3750	0.2500	0.2063	0.1938
N₄			0.2500	0.3750	0.3750	0.3125	0.2394
N₅				0.1250	0.2500	0.3125	0.3125
N₆					0.0625	0.1563	0.2344
N₇						0.0313	0.0938
N₈							0.0156

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 7.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.383

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9650242	0.9909694	0.9959675	0.9999700	5.305E+01	4.834E-01	--
α_2	3.00E-05	9.03E-03	4.03E-03	3.50E-02	4.834E-01	5.305E+01	0.893

CCCG = 3, Gamma = 0.399

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9780172	0.9920906	0.9940828	0.9993546	1.537E+02	1.226E+00	--
α_2	3.05E-04	6.28E-03	4.33E-03	1.89E-02	9.769E-01	1.547E+02	0.875
α_3	2.61E-08	1.63E-03	2.83E-04	7.91E-03	2.487E-01	1.521E+02	0.894

CCCG = 4, Gamma = 0.409

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9773319	0.9903174	0.9918077	0.9982072	2.104E+02	2.057E+00	--
α_2	7.31E-04	6.63E-03	5.19E-03	1.74E-02	1.442E+00	2.162E+02	0.877
α_3	2.57E-06	2.05E-03	7.70E-04	8.43E-03	4.114E-01	2.002E+02	0.952
α_4	1.32E-09	1.01E-03	1.10E-04	5.16E-03	2.036E-01	2.020E+02	0.944

CCCG = 5, Gamma = 0.415

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9815340	0.9906510	0.9914678	0.9969776	3.903E+02	3.683E+00	--
α_2	1.15E-03	5.64E-03	4.84E-03	1.29E-02	2.243E+00	3.952E+02	0.913
α_3	1.21E-04	2.40E-03	1.66E-03	7.20E-03	9.912E-01	4.121E+02	0.879
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.540E+02	1.024
α_5	2.11E-21	2.43E-04	1.39E-07	1.40E-03	7.237E-02	2.978E+02	1.219

CCCG = 6, Gamma = 0.420

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9813165	0.9902419	0.9910014	0.9965726	4.200E+02	4.139E+00	--
α_2	1.01E-03	5.27E-03	4.48E-03	1.22E-02	2.128E+00	4.020E+02	1.027
α_3	1.58E-04	2.29E-03	1.67E-03	6.57E-03	1.134E+00	4.930E+02	0.840
α_4	8.48E-06	1.30E-03	6.44E-04	4.81E-03	5.533E-01	4.257E+02	0.973
α_5	2.29E-09	5.88E-04	7.86E-05	2.95E-03	2.210E-01	3.753E+02	1.105
α_6	3.96E-16	3.11E-04	2.17E-06	1.80E-03	1.027E-01	3.299E+02	1.257

CCCG = 7, Gamma = 0.424

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9848289	0.9911793	0.9916243	0.9960102	7.228E+02	6.432E+00	--
α_2	1.10E-03	4.21E-03	3.74E-03	8.97E-03	2.840E+00	6.710E+02	1.038
α_3	3.13E-04	2.11E-03	1.72E-03	5.22E-03	1.746E+00	8.268E+02	0.845
α_4	8.71E-05	1.40E-03	1.00E-03	4.07E-03	1.084E+00	7.740E+02	0.903
α_5	4.31E-06	7.59E-04	3.67E-04	2.84E-03	5.376E-01	7.081E+02	0.988
α_6	2.60E-10	2.96E-04	2.98E-05	1.53E-03	1.979E-01	6.694E+02	1.045
α_7	1.03E-52	4.61E-05	4.62E-15	1.57E-04	2.656E-02	5.765E+02	1.214

CCCG = 8, Gamma = 0.427

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9848396	0.9912882	0.9917506	0.9961579	6.955E+02	6.112E+00	--
α_2	7.95E-04	3.67E-03	3.17E-03	8.26E-03	2.364E+00	6.412E+02	1.090
α_3	2.26E-04	1.90E-03	1.50E-03	4.93E-03	1.512E+00	7.944E+02	0.881
α_4	7.83E-05	1.34E-03	9.46E-04	3.92E-03	1.056E+00	7.899E+02	0.887
α_5	1.45E-05	9.60E-04	5.47E-04	3.31E-03	6.745E-01	7.021E+02	0.998
α_6	6.33E-08	4.71E-04	1.20E-04	2.14E-03	3.076E-01	6.525E+02	1.074
α_7	1.18E-15	1.68E-04	1.66E-06	9.70E-04	1.093E-01	6.501E+02	1.078
α_8	3.16E-18	2.05E-04	5.68E-07	1.19E-03	8.885E-02	4.343E+02	1.614

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.92E-01	9.90E-01	9.91E-01	9.90E-01	9.91E-01	9.91E-01
α_2	9.03E-03	6.28E-03	6.63E-03	5.64E-03	5.27E-03	4.21E-03	3.67E-03
α_3		1.63E-03	2.05E-03	2.40E-03	2.29E-03	2.11E-03	1.90E-03
α_4			1.01E-03	1.06E-03	1.30E-03	1.40E-03	1.34E-03
α_5				2.43E-04	5.88E-04	7.59E-04	9.60E-04
α_6					3.11E-04	2.96E-04	4.71E-04
α_7						4.61E-05	1.68E-04
α_8							2.05E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.92E-01	9.90E-01	9.91E-01	9.90E-01	9.91E-01	9.91E-01
Beta	9.03E-03	7.91E-03	9.68E-03	9.35E-03	9.76E-03	8.82E-03	8.71E-03
Gamma		2.06E-01	3.16E-01	3.96E-01	4.60E-01	5.22E-01	5.78E-01
Delta			3.29E-01	3.52E-01	4.89E-01	5.42E-01	6.23E-01
Epsilon				1.86E-01	4.09E-01	4.40E-01	5.75E-01
Mu					3.46E-01	3.10E-01	4.68E-01
Omega						1.35E-01	4.42E-01
Sigma							5.49E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.50	5.25	7.00	8.75	10.50	12.25	14.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.055

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8915873	0.9724941	0.9882235	0.9999374	1.590E+01	4.498E-01	--
α_2	6.26E-05	2.75E-02	1.18E-02	1.08E-01	4.498E-01	1.590E+01	0.893

CCCG = 3, Gamma = 0.057

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9208954	0.9716284	0.9787968	0.9978252	4.035E+01	1.178E+00	--
α_2	1.00E-03	2.25E-02	1.54E-02	6.82E-02	9.387E-01	4.077E+01	0.875
α_3	6.19E-08	5.87E-03	9.52E-04	2.88E-02	2.396E-01	4.060E+01	0.894

CCCG = 4, Gamma = 0.058

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9236064	0.9678583	0.9729903	0.9945405	5.717E+01	1.898E+00	--
α_2	1.92E-03	2.12E-02	1.62E-02	5.76E-02	1.285E+00	5.934E+01	0.877
α_3	6.51E-06	7.03E-03	2.52E-03	2.93E-02	3.927E-01	5.550E+01	0.952
α_4	1.51E-08	3.92E-03	5.26E-04	1.97E-02	2.207E-01	5.611E+01	0.944

CCCG = 5, Gamma = 0.059

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9418799	0.9707536	0.9733350	0.9908018	1.164E+02	3.506E+00	--
α_2	2.95E-03	1.65E-02	1.39E-02	3.89E-02	1.992E+00	1.188E+02	0.913
α_3	5.32E-04	8.59E-03	6.16E-03	2.49E-02	1.078E+00	1.245E+02	0.879
α_4	1.77E-06	3.37E-03	1.09E-03	1.45E-02	3.632E-01	1.074E+02	1.024
α_5	7.41E-21	8.01E-04	4.64E-07	4.64E-03	7.248E-02	9.046E+01	1.219

CCCG = 6, Gamma = 0.060

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9441081	0.9704989	0.9726773	0.9894441	1.381E+02	4.199E+00	--
α_2	2.50E-03	1.45E-02	1.21E-02	3.44E-02	1.941E+00	1.323E+02	1.027
α_3	7.78E-04	8.12E-03	6.22E-03	2.19E-02	1.332E+00	1.628E+02	0.840
α_4	4.69E-05	4.37E-03	2.36E-03	1.55E-02	6.181E-01	1.409E+02	0.973
α_5	1.27E-08	1.85E-03	2.76E-04	9.19E-03	2.313E-01	1.245E+02	1.105
α_6	6.40E-20	7.01E-04	6.61E-07	4.08E-03	7.684E-02	1.095E+02	1.257

CCCG = 7, Gamma = 0.061

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9525336	0.9724597	0.9738431	0.9876606	2.197E+02	6.223E+00	--
α_2	3.12E-03	1.27E-02	1.12E-02	2.75E-02	2.654E+00	2.060E+02	1.038
α_3	8.74E-04	6.41E-03	5.18E-03	1.62E-02	1.645E+00	2.549E+02	0.845
α_4	3.09E-04	4.65E-03	3.36E-03	1.34E-02	1.115E+00	2.389E+02	0.903
α_5	2.66E-05	2.75E-03	1.46E-03	9.86E-03	6.034E-01	2.188E+02	0.988
α_6	1.53E-10	8.59E-04	6.40E-05	4.56E-03	1.780E-01	2.071E+02	1.045
α_7	8.35E-51	1.53E-04	3.15E-14	5.41E-04	2.734E-02	1.785E+02	1.214

CCCG = 8, Gamma = 0.061

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9518802	0.9720539	0.9734514	0.9874541	2.172E+02	6.246E+00	--
α_2	2.81E-03	1.22E-02	1.06E-02	2.68E-02	2.504E+00	2.035E+02	1.090
α_3	5.97E-04	5.57E-03	4.34E-03	1.47E-02	1.419E+00	2.533E+02	0.881
α_4	2.23E-04	4.06E-03	2.85E-03	1.20E-02	1.027E+00	2.521E+02	0.887
α_5	6.73E-05	3.26E-03	1.96E-03	1.09E-02	7.337E-01	2.242E+02	0.998
α_6	1.90E-06	1.90E-03	6.87E-04	7.92E-03	3.975E-01	2.085E+02	1.074
α_7	3.70E-20	3.70E-04	3.55E-07	2.15E-03	7.703E-02	2.080E+02	1.078
α_8	5.85E-18	6.29E-04	1.57E-06	3.67E-03	8.749E-02	1.390E+02	1.614

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.72E-01	9.72E-01	9.68E-01	9.71E-01	9.70E-01	9.72E-01	9.72E-01
α_2	2.75E-02	2.25E-02	2.12E-02	1.65E-02	1.45E-02	1.27E-02	1.22E-02
α_3		5.87E-03	7.03E-03	8.59E-03	8.12E-03	6.41E-03	5.57E-03
α_4			3.92E-03	3.37E-03	4.37E-03	4.65E-03	4.06E-03
α_5				8.01E-04	1.85E-03	2.75E-03	3.26E-03
α_6					7.01E-04	8.59E-04	1.90E-03
α_7						1.53E-04	3.70E-04
α_8							6.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.72E-01	9.72E-01	9.68E-01	9.71E-01	9.70E-01	9.72E-01	9.72E-01
Beta	2.75E-02	2.84E-02	3.21E-02	2.92E-02	2.95E-02	2.75E-02	2.79E-02
Gamma		2.07E-01	3.41E-01	4.36E-01	5.10E-01	5.38E-01	5.65E-01
Delta			3.58E-01	3.27E-01	4.60E-01	5.67E-01	6.47E-01
Epsilon				1.92E-01	3.69E-01	4.47E-01	6.03E-01
Mu					2.74E-01	2.69E-01	4.71E-01
Omega						1.51E-01	3.44E-01
Sigma							6.30E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.50	0.75	1.00	1.25	1.50	1.75	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.219

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.5943490	0.8339203	0.8609561	0.9804817	6.930E+00	1.380E+00	--
α_2	1.95E-02	1.66E-01	1.39E-01	4.06E-01	1.380E+00	6.930E+00	0.893

CCCG = 3, Gamma = 0.190

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7556306	0.8922864	0.9065679	0.9798898	1.624E+01	1.960E+00	--
α_2	4.94E-03	6.36E-02	4.84E-02	1.75E-01	1.167E+00	1.719E+01	0.875
α_3	1.23E-03	4.41E-02	2.85E-02	1.40E-01	7.927E-01	1.718E+01	0.894

CCCG = 4, Gamma = 0.175

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8018566	0.9050277	0.9145799	0.9754425	2.543E+01	2.669E+00	--
α_2	4.09E-03	4.40E-02	3.41E-02	1.18E-01	1.289E+00	2.800E+01	0.877
α_3	1.28E-03	3.29E-02	2.22E-02	1.01E-01	8.887E-01	2.611E+01	0.952
α_4	6.65E-05	1.81E-02	8.28E-03	6.92E-02	4.914E-01	2.673E+01	0.944

CCCG = 5, Gamma = 0.166

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8750238	0.9320197	0.9363579	0.9741760	6.152E+01	4.487E+00	--
α_2	4.87E-03	2.84E-02	2.39E-02	6.74E-02	1.916E+00	6.554E+01	0.913
α_3	2.93E-03	2.26E-02	1.82E-02	5.71E-02	1.582E+00	6.852E+01	0.879
α_4	3.87E-04	1.35E-02	8.57E-03	4.32E-02	8.090E-01	5.934E+01	1.024
α_5	7.57E-10	3.56E-03	2.77E-04	1.89E-02	1.799E-01	5.037E+01	1.219

CCCG = 6, Gamma = 0.160

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8890035	0.9384353	0.9420823	0.9753958	7.476E+01	4.905E+00	--
α_2	1.98E-03	1.87E-02	1.46E-02	4.95E-02	1.398E+00	7.318E+01	1.027
α_3	3.02E-03	1.95E-02	1.61E-02	4.77E-02	1.781E+00	8.941E+01	0.840
α_4	8.95E-04	1.39E-02	1.01E-02	4.01E-02	1.094E+00	7.757E+01	0.973
α_5	2.75E-05	7.17E-03	3.27E-03	2.75E-02	4.967E-01	6.881E+01	1.105
α_6	2.50E-12	2.22E-03	6.17E-05	1.25E-02	1.353E-01	6.077E+01	1.257

CCCG = 7, Gamma = 0.156

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9149933	0.9494047	0.9516325	0.9762043	1.270E+02	6.770E+00	--
α_2	1.68E-03	1.31E-02	1.05E-02	3.32E-02	1.580E+00	1.194E+02	1.038
α_3	2.82E-03	1.44E-02	1.23E-02	3.32E-02	2.145E+00	1.466E+02	0.845
α_4	1.51E-03	1.15E-02	9.25E-03	2.91E-02	1.600E+00	1.376E+02	0.903
α_5	4.12E-04	7.89E-03	5.50E-03	2.35E-02	1.004E+00	1.263E+02	0.988
α_6	2.78E-06	3.23E-03	1.14E-03	1.36E-02	3.890E-01	1.199E+02	1.045
α_7	8.16E-28	5.06E-04	1.02E-08	2.74E-03	5.237E-02	1.035E+02	1.214

CCCG = 8, Gamma = 0.153

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9242981	0.9533496	0.9551007	0.9764202	1.638E+02	8.016E+00	--
α_2	1.37E-03	1.04E-02	8.39E-03	2.65E-02	1.599E+00	1.517E+02	1.090
α_3	2.06E-03	1.10E-02	9.30E-03	2.56E-02	2.080E+00	1.875E+02	0.881
α_4	1.70E-03	1.01E-02	8.45E-03	2.43E-02	1.906E+00	1.865E+02	0.887
α_5	7.49E-04	7.91E-03	6.05E-03	2.14E-02	1.324E+00	1.661E+02	0.998
α_6	1.46E-04	5.18E-03	3.27E-03	1.67E-02	8.053E-01	1.547E+02	1.074
α_7	8.15E-08	1.77E-03	3.73E-04	8.34E-03	2.747E-01	1.546E+02	1.078
α_8	2.54E-49	2.71E-04	1.06E-13	9.88E-04	2.808E-02	1.034E+02	1.614

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	8.34E-01	8.92E-01	9.05E-01	9.32E-01	9.38E-01	9.49E-01	9.53E-01
α_2	1.66E-01	6.36E-02	4.40E-02	2.84E-02	1.87E-02	1.31E-02	1.04E-02
α_3		4.41E-02	3.29E-02	2.26E-02	1.95E-02	1.44E-02	1.10E-02
α_4			1.81E-02	1.35E-02	1.39E-02	1.15E-02	1.01E-02
α_5				3.56E-03	7.17E-03	7.89E-03	7.91E-03
α_6					2.22E-03	3.23E-03	5.18E-03
α_7						5.06E-04	1.77E-03
α_8							2.71E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	8.34E-01	8.92E-01	9.05E-01	9.32E-01	9.38E-01	9.49E-01	9.53E-01
Beta	1.66E-01	1.08E-01	9.50E-02	6.80E-02	6.16E-02	5.06E-02	4.67E-02
Gamma		4.10E-01	5.37E-01	5.82E-01	6.96E-01	7.42E-01	7.76E-01
Delta			3.54E-01	4.30E-01	5.44E-01	6.16E-01	6.97E-01
Epsilon				2.09E-01	4.03E-01	5.03E-01	5.99E-01
Mu					2.37E-01	3.22E-01	4.77E-01
Omega						1.35E-01	2.83E-01
Sigma							1.33E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.50	2.00	2.50	3.00	3.50	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313	0.0156
N_3		0.5000	0.5000	0.3750	0.2500	0.1563	0.0938

N₄			0.2500	0.3750	0.3750	0.3125	0.2344
N₅				0.1250	0.2500	0.3125	0.3125
N₆					0.0625	0.1563	0.2344
N₇						0.0313	0.0938
N₈							0.0156

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 5.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.343

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9381743	0.9837431	0.9923970	0.9999317	3.049E+01	5.039E-01	--
α_2	6.83E-05	1.63E-02	7.60E-03	6.18E-02	5.039E-01	3.049E+01	0.893

CCCG = 3, Gamma = 0.354

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9560184	0.9842168	0.9882120	0.9987523	7.499E+01	1.203E+00	--
α_2	4.83E-04	1.19E-02	7.99E-03	3.66E-02	9.104E-01	7.567E+01	0.875
α_3	3.28E-07	3.90E-03	9.16E-04	1.80E-02	2.921E-01	7.469E+01	0.894

CCCG = 4, Gamma = 0.358

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9630992	0.9839691	0.9863042	0.9968531	1.321E+02	2.153E+00	--
α_2	1.32E-03	1.10E-02	8.73E-03	2.84E-02	1.512E+00	1.360E+02	0.877
α_3	5.71E-06	3.40E-03	1.34E-03	1.37E-02	4.307E-01	1.264E+02	0.952
α_4	3.27E-09	1.64E-03	1.94E-04	8.36E-03	2.099E-01	1.276E+02	0.944

CCCG = 5, Gamma = 0.360

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9707999	0.9854612	0.9868061	0.9955266	2.332E+02	3.440E+00	--
α_2	1.52E-03	8.42E-03	7.10E-03	1.98E-02	2.017E+00	2.376E+02	0.913
α_3	1.67E-04	3.78E-03	2.57E-03	1.16E-02	9.426E-01	2.481E+02	0.879
α_4	1.34E-06	1.79E-03	6.14E-04	7.54E-03	3.816E-01	2.133E+02	1.024
α_5	2.20E-16	5.49E-04	3.01E-06	3.20E-03	9.865E-02	1.795E+02	1.219

CCCG = 6, Gamma = 0.360

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9722765	0.9853326	0.9864163	0.9946863	2.904E+02	4.322E+00	--
α_2	1.59E-03	7.87E-03	6.74E-03	1.80E-02	2.214E+00	2.792E+02	1.027
α_3	2.11E-04	3.22E-03	2.32E-03	9.29E-03	1.108E+00	3.430E+02	0.840
α_4	2.90E-05	2.19E-03	1.22E-03	7.65E-03	6.509E-01	2.962E+02	0.973
α_5	1.92E-08	9.70E-04	1.75E-04	4.67E-03	2.536E-01	2.612E+02	1.105
α_6	6.76E-17	4.17E-04	1.89E-06	2.43E-03	9.572E-02	2.297E+02	1.257

CCCG = 7, Gamma = 0.360

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9765683	0.9866829	0.9874213	0.9942757	4.294E+02	5.795E+00	--
α_2	1.60E-03	6.56E-03	5.76E-03	1.42E-02	2.655E+00	4.024E+02	1.038
α_3	2.76E-04	2.75E-03	2.12E-03	7.38E-03	1.370E+00	4.966E+02	0.845
α_4	1.09E-04	2.14E-03	1.48E-03	6.41E-03	9.967E-01	4.649E+02	0.903
α_5	6.23E-06	1.23E-03	5.86E-04	4.65E-03	5.249E-01	4.254E+02	0.988
α_6	3.61E-10	4.86E-04	4.75E-05	2.52E-03	1.956E-01	4.023E+02	1.045
α_7	4.36E-28	1.53E-04	3.46E-09	8.29E-04	5.291E-02	3.465E+02	1.214

CCCG = 8, Gamma = 0.359

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9771464	0.9866466	0.9873038	0.9939029	4.830E+02	6.537E+00	--
α_2	1.62E-03	6.25E-03	5.54E-03	1.33E-02	2.829E+00	4.501E+02	1.090
α_3	2.41E-04	2.43E-03	1.87E-03	6.53E-03	1.360E+00	5.588E+02	0.881
α_4	1.08E-04	1.88E-03	1.33E-03	5.54E-03	1.047E+00	5.556E+02	0.887
α_5	3.62E-05	1.54E-03	9.43E-04	5.08E-03	7.626E-01	4.939E+02	0.998
α_6	1.63E-07	7.12E-04	1.99E-04	3.17E-03	3.271E-01	4.591E+02	1.074
α_7	2.85E-13	2.94E-04	7.87E-06	1.65E-03	1.344E-01	4.575E+02	1.078
α_8	2.27E-20	2.51E-04	2.36E-07	1.46E-03	7.682E-02	3.057E+02	1.614

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.84E-01	9.84E-01	9.85E-01	9.85E-01	9.87E-01	9.87E-01
α_2	1.63E-02	1.19E-02	1.10E-02	8.42E-03	7.87E-03	6.56E-03	6.25E-03
α_3		3.90E-03	3.40E-03	3.78E-03	3.22E-03	2.75E-03	2.43E-03
α_4			1.64E-03	1.79E-03	2.19E-03	2.14E-03	1.88E-03
α_5				5.49E-04	9.70E-04	1.23E-03	1.54E-03
α_6					4.17E-04	4.86E-04	7.12E-04
α_7						1.53E-04	2.94E-04
α_8							2.51E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.84E-01	9.84E-01	9.85E-01	9.85E-01	9.87E-01	9.87E-01
Beta	1.63E-02	1.58E-02	1.60E-02	1.45E-02	1.47E-02	1.33E-02	1.34E-02
Gamma		2.47E-01	3.14E-01	4.21E-01	4.64E-01	5.08E-01	5.32E-01
Delta			3.26E-01	3.82E-01	5.26E-01	5.93E-01	6.58E-01
Epsilon				2.35E-01	3.87E-01	4.67E-01	5.98E-01
Mu					3.00E-01	3.41E-01	4.49E-01
Omega						2.39E-01	4.34E-01
Sigma							4.61E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.50	3.75	5.00	6.25	7.50	8.75	10.00
N_1	0.6000	0.8000	0.9333	1.0000	1.0000	1.0500	1.0800
N_2	0.0333	0.1000	0.2000	0.3333	0.5000	0.5500	0.6000
N_3		0.0000	0.0000	0.0000	0.0000	0.0500	0.1000

N₄			0.0000	0.0000	0.0000	0.0000	0.0050
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.6.2.2 SWS-STR-PG: SWS Strainers Plug Pooled Causes

Generic CCF Parameters

System Group: Raw Water
System: Normally Operating Service Water, Standby Service Water
Component Group: Filter
Component Type: Strainer
Component Subtype: Self-Cleaning strainer
Failure Mode: Plug
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 24.5

Total Number of Common-Cause Failure Events: 4

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.8548955	0.9300208	0.9370275	0.9811462	0.8657845	3.768E+01	2.835E+00
α_2	1.89E-02	7.00E-02	6.30E-02	1.45E-01	1.34E-01	2.835E+00	3.768E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9071918	0.9508900	0.9544360	0.9824680	0.8797595	7.993E+01	4.128E+00
α_2	8.70E-03	3.33E-02	2.97E-02	7.04E-02	7.82E-02	2.801E+00	8.126E+01
α_3	1.51E-03	1.58E-02	1.21E-02	4.25E-02	4.21E-02	1.327E+00	8.273E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9200434	0.9542937	0.9567107	0.9802901	0.8812500	1.189E+02	5.694E+00
α_2	8.20E-03	2.70E-02	2.45E-02	5.43E-02	6.56E-02	3.360E+00	1.212E+02
α_3	1.69E-03	1.29E-02	1.04E-02	3.26E-02	3.75E-02	1.602E+00	1.230E+02
α_4	1.20E-04	5.87E-03	3.52E-03	1.96E-02	1.56E-02	7.315E-01	1.238E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9472619	0.9681394	0.9694677	0.9844789	0.8974359	2.258E+02	7.432E+00
α_2	4.31E-03	1.43E-02	1.30E-02	2.90E-02	3.63E-02	3.341E+00	2.299E+02
α_3	2.74E-03	1.13E-02	9.92E-03	2.45E-02	4.06E-02	2.632E+00	2.306E+02
α_4	3.34E-04	4.85E-03	3.53E-03	1.39E-02	1.92E-02	1.132E+00	2.321E+02
α_5	3.18E-07	1.40E-03	3.91E-04	6.23E-03	6.41E-03	3.267E-01	2.329E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9533312	0.9715150	0.9726485	0.9858239	0.9130435	2.672E+02	7.835E+00
α_2	1.71E-03	8.25E-03	7.10E-03	1.88E-02	1.24E-02	2.271E+00	2.728E+02
α_3	3.28E-03	1.15E-02	1.03E-02	2.36E-02	4.23E-02	3.151E+00	2.719E+02

α_4	5.94E-04	5.30E-03	4.16E-03	1.39E-02	1.87E-02	1.457E+00	2.736E+02
α_5	5.08E-05	2.62E-03	1.56E-03	8.82E-03	1.09E-02	7.211E-01	2.743E+02
α_6	7.00E-09	8.54E-04	1.31E-04	4.21E-03	2.72E-03	2.348E-01	2.748E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9644557	0.9773605	0.9780988	0.9877492	0.9245283	4.208E+02	9.747E+00
α_2	1.45E-03	6.04E-03	5.30E-03	1.32E-02	6.77E-03	2.602E+00	4.279E+02
α_3	1.89E-03	6.94E-03	6.19E-03	1.45E-02	2.56E-02	2.986E+00	4.276E+02
α_4	1.15E-03	5.41E-03	4.67E-03	1.22E-02	2.35E-02	2.330E+00	4.282E+02
α_5	2.32E-04	2.85E-03	2.13E-03	7.94E-03	1.25E-02	1.227E+00	4.293E+02
α_6	4.81E-06	1.17E-03	5.37E-04	4.48E-03	5.90E-03	5.041E-01	4.300E+02
α_7	6.00E-17	2.26E-04	1.14E-06	1.31E-03	1.18E-03	9.730E-02	4.305E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9664708	0.9786601	0.9793550	0.9884657	0.9333333	4.460E+02	9.726E+00
α_2	1.01E-03	4.93E-03	4.23E-03	1.13E-02	3.81E-03	2.247E+00	4.535E+02
α_3	1.09E-03	5.12E-03	4.42E-03	1.15E-02	1.57E-02	2.333E+00	4.534E+02
α_4	1.07E-03	5.06E-03	4.36E-03	1.15E-02	2.08E-02	2.307E+00	4.534E+02
α_5	4.48E-04	3.48E-03	2.79E-03	8.89E-03	1.47E-02	1.586E+00	4.542E+02
α_6	5.62E-05	1.82E-03	1.17E-03	5.83E-03	8.02E-03	8.308E-01	4.549E+02
α_7	6.01E-08	6.48E-04	1.54E-04	2.98E-03	3.13E-03	2.953E-01	4.555E+02
α_8	6.35E-14	2.76E-04	5.55E-06	1.57E-03	5.21E-04	1.259E-01	4.556E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.51E-01	9.54E-01	9.68E-01	9.72E-01	9.77E-01	9.79E-01
α_2	7.00E-02	3.33E-02	2.70E-02	1.43E-02	8.25E-03	6.04E-03	4.93E-03
α_3		1.58E-02	1.29E-02	1.13E-02	1.15E-02	6.94E-03	5.12E-03
α_4			5.87E-03	4.85E-03	5.30E-03	5.41E-03	5.06E-03
α_5				1.40E-03	2.62E-03	2.85E-03	3.48E-03
α_6					8.54E-04	1.17E-03	1.82E-03
α_7						2.26E-04	6.48E-04
α_8							2.76E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.51E-01	9.54E-01	9.68E-01	9.72E-01	9.77E-01	9.79E-01
Beta	7.00E-02	4.91E-02	4.57E-02	3.19E-02	2.85E-02	2.26E-02	2.13E-02
Gamma		3.21E-01	4.10E-01	5.50E-01	7.10E-01	7.33E-01	7.69E-01
Delta			3.13E-01	3.57E-01	4.34E-01	5.82E-01	6.88E-01
Epsilon				2.24E-01	3.96E-01	4.40E-01	5.52E-01
Mu					2.46E-01	3.29E-01	4.41E-01
Omega						1.62E-01	3.36E-01
Sigma							2.99E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	14.00	21.00	28.00	35.00	42.00	49.00	56.00
N₁	1.2667	0.9500	0.2000	0.0000	0.0000	0.0000	0.0000
N₂	2.3667	1.9500	2.1000	1.4167	0.5694	0.3588	0.2288
N₃		1.0500	1.2000	1.5833	1.9444	1.3569	0.9426
N₄			0.5000	0.7500	0.8611	1.2472	1.2450
N₅				0.2500	0.5000	0.6620	0.8838
N₆					0.1250	0.3125	0.4811
N₇						0.0625	0.1875
N₈							0.0313

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9126740	0.9747023	0.9855834	0.9996580	2.504E+01	6.498E-01	--
α_2	3.42E-04	2.53E-02	1.44E-02	8.73E-02	6.498E-01	2.504E+01	0.647

CCCG = 3, Gamma = 0.141

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9376930	0.9748822	0.9794542	0.9964224	6.514E+01	1.678E+00	--
α_2	2.23E-03	2.13E-02	1.66E-02	5.64E-02	1.389E+00	6.376E+01	0.603
α_3	2.95E-07	3.80E-03	8.81E-04	1.76E-02	2.896E-01	7.591E+01	0.515

CCCG = 4, Gamma = 0.138

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9410854	0.9724755	0.9756261	0.9930887	9.534E+01	2.698E+00	--
α_2	3.31E-03	1.99E-02	1.66E-02	4.76E-02	1.885E+00	9.304E+01	0.596
α_3	5.20E-05	5.79E-03	3.04E-03	2.09E-02	5.927E-01	1.018E+02	0.553
α_4	7.22E-09	1.88E-03	2.51E-04	9.44E-03	2.207E-01	1.172E+02	0.482

CCCG = 5, Gamma = 0.136

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9602763	0.9787125	0.9802029	0.9920567	2.072E+02	4.506E+00	--
α_2	2.76E-03	1.20E-02	1.05E-02	2.65E-02	2.492E+00	2.049E+02	0.552
α_3	9.50E-04	7.42E-03	5.95E-03	1.90E-02	1.578E+00	2.110E+02	0.538
α_4	7.90E-07	1.51E-03	4.87E-04	6.47E-03	3.632E-01	2.405E+02	0.475
α_5	3.14E-21	3.40E-04	1.97E-07	1.97E-03	7.248E-02	2.128E+02	0.537

CCCG = 6, Gamma = 0.134

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9632299	0.9795908	0.9808333	0.9917074	2.496E+02	5.199E+00	--
α_2	1.27E-03	7.37E-03	6.16E-03	1.76E-02	1.941E+00	2.615E+02	0.541
α_3	2.11E-03	9.87E-03	8.52E-03	2.22E-02	2.332E+00	2.340E+02	0.603
α_4	2.18E-05	2.04E-03	1.10E-03	7.25E-03	6.181E-01	3.027E+02	0.470
α_5	5.56E-09	8.12E-04	1.20E-04	4.02E-03	2.313E-01	2.846E+02	0.500
α_6	2.95E-20	3.24E-04	3.05E-07	1.88E-03	7.684E-02	2.371E+02	0.601

CCCG = 7, Gamma = 0.132

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9714552	0.9829311	0.9836864	0.9918280	4.159E+02	7.223E+00	--
α_2	1.66E-03	6.79E-03	5.97E-03	1.47E-02	2.654E+00	3.885E+02	0.567
α_3	1.05E-03	5.11E-03	4.39E-03	1.17E-02	2.245E+00	4.367E+02	0.506
α_4	4.20E-04	3.52E-03	2.79E-03	9.12E-03	1.515E+00	4.292E+02	0.515
α_5	1.17E-05	1.21E-03	6.40E-04	4.34E-03	6.034E-01	4.979E+02	0.445
α_6	6.57E-11	3.71E-04	2.76E-05	1.97E-03	1.780E-01	4.802E+02	0.462
α_7	3.82E-51	7.01E-05	1.44E-14	2.48E-04	2.734E-02	3.898E+02	0.569

CCCG = 8, Gamma = 0.131

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9707661	0.9825049	0.9832760	0.9916109	4.069E+02	7.246E+00	--
α_2	1.50E-03	6.51E-03	5.68E-03	1.44E-02	2.504E+00	3.822E+02	0.599
α_3	6.01E-04	3.94E-03	3.24E-03	9.69E-03	1.779E+00	4.497E+02	0.510
α_4	4.19E-04	3.54E-03	2.80E-03	9.19E-03	1.507E+00	4.243E+02	0.541
α_5	7.86E-05	2.06E-03	1.36E-03	6.41E-03	8.937E-01	4.332E+02	0.531
α_6	8.13E-07	8.17E-04	2.94E-04	3.40E-03	3.975E-01	4.862E+02	0.473
α_7	1.64E-20	1.64E-04	1.58E-07	9.54E-04	7.703E-02	4.688E+02	0.491
α_8	4.33E-18	4.66E-04	1.17E-06	2.72E-03	8.749E-02	1.875E+02	1.228

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.75E-01	9.75E-01	9.72E-01	9.79E-01	9.80E-01	9.83E-01	9.83E-01
α_2	2.53E-02	2.13E-02	1.99E-02	1.20E-02	7.37E-03	6.79E-03	6.51E-03
α_3		3.80E-03	5.79E-03	7.42E-03	9.87E-03	5.11E-03	3.94E-03
α_4			1.88E-03	1.51E-03	2.04E-03	3.52E-03	3.54E-03
α_5				3.40E-04	8.12E-04	1.21E-03	2.06E-03
α_6					3.24E-04	3.71E-04	8.17E-04
α_7						7.01E-05	1.64E-04
α_8							4.66E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.75E-01	9.75E-01	9.72E-01	9.79E-01	9.80E-01	9.83E-01	9.83E-01
Beta	2.53E-02	2.51E-02	2.75E-02	2.13E-02	2.04E-02	1.71E-02	1.75E-02
Gamma		1.51E-01	2.79E-01	4.36E-01	6.39E-01	6.02E-01	6.28E-01
Delta			2.45E-01	1.99E-01	2.43E-01	5.03E-01	6.41E-01
Epsilon				1.84E-01	3.58E-01	3.19E-01	4.98E-01
Mu					2.85E-01	2.67E-01	4.13E-01
Omega						1.59E-01	4.36E-01
Sigma							7.40E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.71	2.57	3.43	4.29	5.14	6.00	6.86
N_1	0.6000	0.4500	0.2000	0.0000	0.0000	0.0000	0.0000
N_2	0.2000	0.4500	0.6000	0.5000	0.0000	0.0000	0.0000
N_3		0.0500	0.2000	0.5000	1.0000	0.6000	0.3600

N₄			0.0000	0.0000	0.0000	0.4000	0.4800
N₅				0.0000	0.0000	0.0000	0.1600
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 16.5

Total Number of Common-Cause Failure Events: 3

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.695

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8028067	0.9068037	0.9166620	0.9769904	2.478E+01	2.547E+00	--
α_2	2.30E-02	9.32E-02	8.33E-02	1.97E-01	2.547E+00	2.478E+01	0.647

CCCG = 3, Gamma = 0.687

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8735561	0.9357491	0.9410967	0.9796380	5.039E+01	3.460E+00	--
α_2	8.57E-03	4.26E-02	3.67E-02	9.66E-02	2.167E+00	4.877E+01	0.603
α_3	1.99E-03	2.17E-02	1.66E-02	5.88E-02	1.293E+00	5.828E+01	0.515

CCCG = 4, Gamma = 0.683

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8918276	0.9407608	0.9444643	0.9770292	7.415E+01	4.669E+00	--
α_2	8.07E-03	3.40E-02	2.99E-02	7.39E-02	2.539E+00	7.216E+01	0.596
α_3	1.80E-03	1.72E-02	1.34E-02	4.57E-02	1.389E+00	7.922E+01	0.553
α_4	1.72E-04	8.02E-03	4.86E-03	2.66E-02	7.414E-01	9.167E+01	0.482

CCCG = 5, Gamma = 0.681

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9306681	0.9592375	0.9611496	0.9812747	1.527E+02	6.487E+00	--
α_2	4.42E-03	1.76E-02	1.56E-02	3.79E-02	2.708E+00	1.508E+02	0.552
α_3	3.06E-03	1.46E-02	1.26E-02	3.29E-02	2.290E+00	1.551E+02	0.538
α_4	5.04E-04	6.64E-03	4.91E-03	1.87E-02	1.184E+00	1.772E+02	0.475
α_5	2.41E-07	1.93E-03	4.86E-04	8.80E-03	3.049E-01	1.573E+02	0.537

CCCG = 6, Gamma = 0.680

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9392490	0.9638356	0.9654454	0.9829236	1.840E+02	6.905E+00	--
α_2	1.67E-03	9.91E-03	8.27E-03	2.38E-02	1.904E+00	1.902E+02	0.541
α_3	3.29E-03	1.44E-02	1.25E-02	3.17E-02	2.475E+00	1.698E+02	0.603
α_4	9.16E-04	7.14E-03	5.72E-03	1.82E-02	1.580E+00	2.196E+02	0.470
α_5	7.88E-05	3.60E-03	2.18E-03	1.19E-02	7.467E-01	2.069E+02	0.500
α_6	9.99E-10	1.14E-03	1.16E-04	5.91E-03	1.978E-01	1.727E+02	0.601

CCCG = 7, Gamma = 0.679

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9544465	0.9715439	0.9725586	0.9851768	2.994E+02	8.770E+00	--
α_2	1.16E-03	6.89E-03	5.74E-03	1.65E-02	1.908E+00	2.751E+02	0.567
α_3	2.23E-03	8.83E-03	7.80E-03	1.90E-02	2.746E+00	3.081E+02	0.506
α_4	1.35E-03	7.00E-03	5.95E-03	1.62E-02	2.134E+00	3.029E+02	0.515
α_5	3.77E-04	3.83E-03	2.95E-03	1.03E-02	1.353E+00	3.517E+02	0.445
α_6	9.77E-06	1.60E-03	7.86E-04	5.96E-03	5.452E-01	3.397E+02	0.462
α_7	6.01E-19	3.03E-04	5.47E-07	1.77E-03	8.362E-02	2.760E+02	0.569

CCCG = 8, Gamma = 0.679

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9587049	0.9735322	0.9743625	0.9855247	3.684E+02	1.002E+01	--
α_2	8.38E-04	5.35E-03	4.41E-03	1.31E-02	1.812E+00	3.368E+02	0.599
α_3	1.53E-03	6.46E-03	5.66E-03	1.42E-02	2.569E+00	3.949E+02	0.510
α_4	1.46E-03	6.50E-03	5.65E-03	1.45E-02	2.437E+00	3.724E+02	0.541
α_5	6.68E-04	4.54E-03	3.71E-03	1.12E-02	1.735E+00	3.804E+02	0.531
α_6	1.43E-04	2.46E-03	1.74E-03	7.22E-03	1.052E+00	4.273E+02	0.473
α_7	5.19E-07	8.93E-04	2.93E-04	3.81E-03	3.684E-01	4.124E+02	0.491
α_8	5.97E-33	2.65E-04	4.57E-10	1.33E-03	4.370E-02	1.651E+02	1.228

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.07E-01	9.36E-01	9.41E-01	9.59E-01	9.64E-01	9.72E-01	9.74E-01
α_2	9.32E-02	4.26E-02	3.40E-02	1.76E-02	9.91E-03	6.89E-03	5.35E-03
α_3		2.17E-02	1.72E-02	1.46E-02	1.44E-02	8.83E-03	6.46E-03
α_4			8.02E-03	6.64E-03	7.14E-03	7.00E-03	6.50E-03
α_5				1.93E-03	3.60E-03	3.83E-03	4.54E-03
α_6					1.14E-03	1.60E-03	2.46E-03
α_7						3.03E-04	8.93E-04
α_8							2.65E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.07E-01	9.36E-01	9.41E-01	9.59E-01	9.64E-01	9.72E-01	9.74E-01
Beta	9.32E-02	6.43E-02	5.92E-02	4.08E-02	3.62E-02	2.85E-02	2.65E-02
Gamma		3.38E-01	4.26E-01	5.67E-01	7.26E-01	7.58E-01	7.98E-01
Delta			3.18E-01	3.71E-01	4.53E-01	5.90E-01	6.94E-01
Epsilon				2.26E-01	3.99E-01	4.51E-01	5.56E-01
Mu					2.41E-01	3.32E-01	4.43E-01
Omega						1.59E-01	3.20E-01
Sigma							2.29E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	9.43	14.14	18.86	23.57	28.29	33.00	37.71
N_1	0.6667	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	2.1667	1.5000	1.5000	0.9167	0.5694	0.3588	0.2288
N_3		1.0000	1.0000	1.0833	0.9444	0.7569	0.5826

N₄			0.5000	0.7500	0.8611	0.8472	0.7650
N₅				0.2500	0.5000	0.6620	0.7238
N₆					0.1250	0.3125	0.4811
N₇						0.0625	0.1875
N₈							0.0313

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.130

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9556807	0.9886549	0.9950428	0.9999674	4.101E+01	4.706E-01	--
α_2	3.26E-05	1.13E-02	4.96E-03	4.43E-02	4.706E-01	4.101E+01	0.647

CCCG = 3, Gamma = 0.137

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9720190	0.9902866	0.9929754	0.9993664	1.124E+02	1.103E+00	--
α_2	2.13E-04	7.43E-03	4.71E-03	2.39E-02	8.104E-01	1.083E+02	0.603
α_3	1.92E-07	2.29E-03	5.36E-04	1.06E-02	2.921E-01	1.274E+02	0.515

CCCG = 4, Gamma = 0.143

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9775856	0.9905827	0.9921073	0.9983667	2.054E+02	1.953E+00	--
α_2	6.12E-04	6.57E-03	5.01E-03	1.78E-02	1.312E+00	1.984E+02	0.596
α_3	3.35E-06	2.00E-03	7.89E-04	8.09E-03	4.307E-01	2.151E+02	0.553
α_4	1.69E-09	8.50E-04	1.00E-04	4.32E-03	2.099E-01	2.469E+02	0.482

CCCG = 5, Gamma = 0.147

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9840555	0.9923035	0.9931003	0.9978288	4.006E+02	3.107E+00	--
α_2	6.03E-04	4.28E-03	3.47E-03	1.07E-02	1.684E+00	3.918E+02	0.552
α_3	1.03E-04	2.34E-03	1.58E-03	7.14E-03	9.426E-01	4.023E+02	0.538
α_4	6.26E-07	8.35E-04	2.87E-04	3.53E-03	3.816E-01	4.566E+02	0.475
α_5	9.75E-17	2.44E-04	1.34E-06	1.42E-03	9.865E-02	4.038E+02	0.537

CCCG = 6, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9857745	0.9927312	0.9933459	0.9975878	5.220E+02	3.822E+00	--
α_2	4.67E-04	3.23E-03	2.63E-03	8.04E-03	1.714E+00	5.287E+02	0.541
α_3	1.53E-04	2.33E-03	1.68E-03	6.72E-03	1.108E+00	4.747E+02	0.603
α_4	1.41E-05	1.07E-03	5.93E-04	3.72E-03	6.509E-01	6.100E+02	0.470
α_5	8.75E-09	4.42E-04	7.96E-05	2.13E-03	2.536E-01	5.731E+02	0.500
α_6	3.25E-17	2.00E-04	9.09E-07	1.17E-03	9.572E-02	4.774E+02	0.601

CCCG = 7, Gamma = 0.151

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9881874	0.9934732	0.9938817	0.9973638	7.908E+02	5.195E+00	--
α_2	5.41E-04	2.86E-03	2.42E-03	6.66E-03	2.105E+00	7.349E+02	0.567
α_3	1.50E-04	1.60E-03	1.22E-03	4.34E-03	1.320E+00	8.258E+02	0.506
α_4	6.25E-05	1.23E-03	8.51E-04	3.68E-03	9.967E-01	8.107E+02	0.515
α_5	2.82E-06	5.59E-04	2.65E-04	2.11E-03	5.249E-01	9.389E+02	0.445
α_6	1.60E-10	2.16E-04	2.11E-05	1.12E-03	1.956E-01	9.050E+02	0.462
α_7	2.05E-28	7.20E-05	1.63E-09	3.91E-04	5.291E-02	7.345E+02	0.569

CCCG = 8, Gamma = 0.152

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9883070	0.9933578	0.9937286	0.9971425	8.722E+02	5.832E+00	--
α_2	5.51E-04	2.72E-03	2.33E-03	6.23E-03	2.229E+00	8.177E+02	0.599
α_3	1.12E-04	1.31E-03	9.84E-04	3.62E-03	1.260E+00	9.611E+02	0.510
α_4	6.52E-05	1.15E-03	8.09E-04	3.39E-03	1.042E+00	9.065E+02	0.541
α_5	1.93E-05	8.24E-04	5.04E-04	2.72E-03	7.626E-01	9.245E+02	0.531
α_6	7.21E-08	3.15E-04	8.80E-05	1.40E-03	3.271E-01	1.037E+03	0.473
α_7	1.30E-13	1.34E-04	3.60E-06	7.55E-04	1.344E-01	9.993E+02	0.491
α_8	1.73E-20	1.92E-04	1.80E-07	1.12E-03	7.682E-02	3.997E+02	1.228

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.90E-01	9.91E-01	9.92E-01	9.93E-01	9.93E-01	9.93E-01
α_2	1.13E-02	7.43E-03	6.57E-03	4.28E-03	3.23E-03	2.86E-03	2.72E-03
α_3		2.29E-03	2.00E-03	2.34E-03	2.33E-03	1.60E-03	1.31E-03
α_4			8.50E-04	8.35E-04	1.07E-03	1.23E-03	1.15E-03
α_5				2.44E-04	4.42E-04	5.59E-04	8.24E-04
α_6					2.00E-04	2.16E-04	3.15E-04
α_7						7.20E-05	1.34E-04
α_8							1.92E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.90E-01	9.91E-01	9.92E-01	9.93E-01	9.93E-01	9.93E-01
Beta	1.13E-02	9.71E-03	9.42E-03	7.70E-03	7.27E-03	6.53E-03	6.64E-03
Gamma		2.36E-01	3.02E-01	4.44E-01	5.55E-01	5.62E-01	5.91E-01
Delta			2.98E-01	3.16E-01	4.23E-01	5.65E-01	6.66E-01
Epsilon				2.26E-01	3.76E-01	4.08E-01	5.61E-01
Mu					3.12E-01	3.40E-01	4.38E-01
Omega						2.50E-01	5.09E-01
Sigma							5.88E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.29	3.43	4.57	5.71	6.86	8.00	9.14
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.032

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9887676	0.9970867	0.9986858	0.9999893	1.688E+02	4.932E-01	--
α_2	1.07E-05	2.91E-03	1.31E-03	1.12E-02	4.932E-01	1.688E+02	0.647

CCCG = 3, Gamma = 0.034

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928309	0.9975547	0.9982644	0.9998554	4.322E+02	1.059E+00	--
α_2	3.23E-05	1.73E-03	1.02E-03	5.84E-03	7.137E-01	4.121E+02	0.603
α_3	2.57E-07	7.16E-04	2.16E-04	3.13E-03	3.458E-01	4.824E+02	0.515

CCCG = 4, Gamma = 0.036

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941774	0.9974991	0.9978787	0.9995235	8.434E+02	2.115E+00	--
α_2	2.35E-04	1.90E-03	1.51E-03	4.90E-03	1.549E+00	8.132E+02	0.596
α_3	9.39E-09	3.01E-04	5.88E-05	1.43E-03	2.646E-01	8.789E+02	0.553
α_4	3.30E-08	2.99E-04	7.32E-05	1.36E-03	3.010E-01	1.008E+03	0.482

CCCG = 5, Gamma = 0.037

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9962869	0.9979389	0.9980659	0.9991574	2.578E+03	5.325E+00	--
α_2	4.54E-04	1.43E-03	1.30E-03	2.84E-03	3.632E+00	2.543E+03	0.552
α_3	5.09E-05	5.19E-04	3.98E-04	1.40E-03	1.354E+00	2.609E+03	0.538
α_4	9.50E-09	1.00E-04	2.39E-05	4.60E-04	2.961E-01	2.958E+03	0.475
α_5	4.83E-35	1.62E-05	1.79E-11	8.04E-05	4.243E-02	2.614E+03	0.537

CCCG = 6, Gamma = 0.037

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9960755	0.9978617	0.9980037	0.9991631	2.303E+03	4.936E+00	--
α_2	3.30E-04	1.24E-03	1.10E-03	2.63E-03	2.915E+00	2.345E+03	0.541
α_3	5.09E-05	5.97E-04	4.48E-04	1.65E-03	1.257E+00	2.105E+03	0.603
α_4	7.56E-07	1.86E-04	8.51E-05	7.13E-04	5.031E-01	2.703E+03	0.470
α_5	1.32E-15	4.55E-05	6.00E-07	2.61E-04	1.155E-01	2.538E+03	0.500
α_6	3.21E-13	6.86E-05	2.51E-06	3.80E-04	1.451E-01	2.114E+03	0.601

CCCG = 7, Gamma = 0.038

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9970158	0.9981121	0.9981767	0.9989882	5.104E+03	9.654E+00	--
α_2	3.90E-04	1.01E-03	9.39E-04	1.86E-03	4.851E+00	4.813E+03	0.567
α_3	1.33E-04	5.18E-04	4.58E-04	1.11E-03	2.800E+00	5.404E+03	0.506
α_4	2.66E-05	2.61E-04	2.01E-04	6.98E-04	1.384E+00	5.304E+03	0.515
α_5	2.82E-07	7.98E-05	3.57E-05	3.09E-04	4.902E-01	6.140E+03	0.445
α_6	4.61E-16	1.94E-05	2.45E-07	1.11E-04	1.146E-01	5.917E+03	0.462
α_7	1.60E-93	3.05E-06	3.24E-25	3.62E-06	1.464E-02	4.802E+03	0.569

CCCG = 8, Gamma = 0.038

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9966244	0.9979944	0.9980867	0.9990490	3.557E+03	7.148E+00	--
α_2	2.34E-04	8.62E-04	7.68E-04	1.81E-03	2.980E+00	3.455E+03	0.599
α_3	8.37E-05	4.83E-04	4.04E-04	1.15E-03	1.960E+00	4.057E+03	0.510
α_4	2.23E-05	3.05E-04	2.23E-04	8.65E-04	1.166E+00	3.827E+03	0.541
α_5	7.82E-07	1.38E-04	6.66E-05	5.16E-04	5.375E-01	3.902E+03	0.531
α_6	9.12E-12	4.13E-05	3.20E-06	2.18E-04	1.805E-01	4.375E+03	0.473
α_7	5.08E-36	9.82E-06	7.35E-12	4.80E-05	4.139E-02	4.215E+03	0.491
α_8	1.02E-08	1.68E-04	3.70E-05	7.81E-04	2.827E-01	1.686E+03	1.228

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.98E-01	9.97E-01	9.98E-01	9.98E-01	9.98E-01	9.98E-01
α_2	2.91E-03	1.73E-03	1.90E-03	1.43E-03	1.24E-03	1.01E-03	8.62E-04
α_3		7.16E-04	3.01E-04	5.19E-04	5.97E-04	5.18E-04	4.83E-04
α_4			2.99E-04	1.00E-04	1.86E-04	2.61E-04	3.05E-04
α_5				1.62E-05	4.55E-05	7.98E-05	1.38E-04
α_6					6.86E-05	1.94E-05	4.13E-05
α_7						3.05E-06	9.82E-06
α_8							1.68E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.98E-01	9.97E-01	9.98E-01	9.98E-01	9.98E-01	9.98E-01
Beta	2.91E-03	2.45E-03	2.50E-03	2.06E-03	2.14E-03	1.89E-03	2.01E-03
Gamma		2.93E-01	2.40E-01	3.08E-01	4.19E-01	4.67E-01	5.70E-01
Delta			4.98E-01	1.83E-01	3.35E-01	4.12E-01	5.78E-01
Epsilon				1.40E-01	3.80E-01	2.82E-01	5.39E-01
Mu					6.01E-01	2.19E-01	6.14E-01
Omega						1.36E-01	8.11E-01
Sigma							9.45E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.57	0.86	1.14	1.43	1.71	2.00	2.29
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.6.2.3 SWS-STR-PG-EE: SWS Strainers Plug Environmental

Generic CCF Parameters

System Group: Raw Water
System: Normally Operating Service Water, Standby Service Water
Component Group: Filter
Component Type: Strainer
Component Subtype: Self-Cleaning strainer
Failure Mode: Plug
Date Range: 2006 through 2020
Cause Group: Environment
Cause: EE
Prior: Default 2015

Total Number of Independent Failure Events: 7.0

Total Number of Common-Cause Failure Events: 3

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.8210245	0.9148972	0.9237615	0.9783873	0.7319588	2.833E+01	2.635E+00
α_2	2.16E-02	8.51E-02	7.62E-02	1.79E-01	2.68E-01	2.635E+00	2.833E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.8987790	0.9481576	0.9523811	0.9830764	0.7701149	6.635E+01	3.628E+00
α_2	7.36E-03	3.36E-02	2.92E-02	7.47E-02	1.38E-01	2.351E+00	6.763E+01
α_3	1.63E-03	1.82E-02	1.39E-02	4.97E-02	9.20E-02	1.277E+00	6.871E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9163444	0.9538641	0.9566928	0.9817083	0.7777778	1.012E+02	4.894E+00
α_2	6.67E-03	2.60E-02	2.31E-02	5.54E-02	1.11E-01	2.760E+00	1.033E+02
α_3	1.40E-03	1.32E-02	1.03E-02	3.50E-02	7.41E-02	1.402E+00	1.047E+02
α_4	1.41E-04	6.90E-03	4.14E-03	2.30E-02	3.70E-02	7.315E-01	1.053E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9477499	0.9694284	0.9709029	0.9860617	0.8139535	2.040E+02	6.432E+00
α_2	3.53E-03	1.35E-02	1.20E-02	2.86E-02	5.68E-02	2.841E+00	2.076E+02
α_3	1.96E-03	1.01E-02	8.63E-03	2.35E-02	6.72E-02	2.132E+00	2.083E+02
α_4	3.71E-04	5.38E-03	3.92E-03	1.54E-02	4.65E-02	1.132E+00	2.093E+02
α_5	3.53E-07	1.55E-03	4.34E-04	6.91E-03	1.55E-02	3.267E-01	2.101E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9534483	0.9724181	0.9736821	0.9870779	0.8400000	2.410E+02	6.835E+00

α_2	1.90E-03	9.16E-03	7.88E-03	2.08E-02	3.04E-02	2.271E+00	2.455E+02
α_3	1.70E-03	8.68E-03	7.40E-03	2.01E-02	5.04E-02	2.151E+00	2.457E+02
α_4	6.60E-04	5.88E-03	4.62E-03	1.54E-02	4.59E-02	1.457E+00	2.463E+02
α_5	5.65E-05	2.91E-03	1.73E-03	9.79E-03	2.67E-02	7.211E-01	2.471E+02
α_6	7.77E-09	9.47E-04	1.45E-04	4.67E-03	6.67E-03	2.348E-01	2.476E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9648181	0.9780725	0.9788702	0.9886099	0.8596491	3.902E+02	8.747E+00
α_2	1.56E-03	6.52E-03	5.72E-03	1.42E-02	1.68E-02	2.602E+00	3.963E+02
α_3	1.31E-03	5.98E-03	5.18E-03	1.34E-02	3.54E-02	2.386E+00	3.965E+02
α_4	8.24E-04	4.84E-03	4.04E-03	1.16E-02	3.96E-02	1.930E+00	3.970E+02
α_5	2.51E-04	3.08E-03	2.30E-03	8.57E-03	3.10E-02	1.227E+00	3.977E+02
α_6	5.20E-06	1.26E-03	5.80E-04	4.84E-03	1.46E-02	5.041E-01	3.984E+02
α_7	6.47E-17	2.44E-04	1.23E-06	1.42E-03	2.92E-03	9.730E-02	3.988E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9666259	0.9792123	0.9799671	0.9892198	0.8750000	4.110E+02	8.726E+00
α_2	1.10E-03	5.35E-03	4.59E-03	1.22E-02	9.53E-03	2.247E+00	4.175E+02
α_3	8.24E-04	4.70E-03	3.94E-03	1.12E-02	2.43E-02	1.973E+00	4.178E+02
α_4	6.89E-04	4.35E-03	3.60E-03	1.06E-02	3.19E-02	1.827E+00	4.179E+02
α_5	3.67E-04	3.40E-03	2.65E-03	8.99E-03	3.02E-02	1.426E+00	4.183E+02
α_6	6.11E-05	1.98E-03	1.27E-03	6.33E-03	2.00E-02	8.308E-01	4.189E+02
α_7	6.53E-08	7.04E-04	1.67E-04	3.23E-03	7.81E-03	2.953E-01	4.195E+02
α_8	6.90E-14	3.00E-04	6.03E-06	1.70E-03	1.30E-03	1.259E-01	4.196E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.15E-01	9.48E-01	9.54E-01	9.69E-01	9.72E-01	9.78E-01	9.79E-01
α_2	8.51E-02	3.36E-02	2.60E-02	1.35E-02	9.16E-03	6.52E-03	5.35E-03
α_3		1.82E-02	1.32E-02	1.01E-02	8.68E-03	5.98E-03	4.70E-03
α_4			6.90E-03	5.38E-03	5.88E-03	4.84E-03	4.35E-03
α_5				1.55E-03	2.91E-03	3.08E-03	3.40E-03
α_6					9.47E-04	1.26E-03	1.98E-03
α_7						2.44E-04	7.04E-04
α_8							3.00E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.15E-01	9.48E-01	9.54E-01	9.69E-01	9.72E-01	9.78E-01	9.79E-01
Beta	8.51E-02	5.18E-02	4.61E-02	3.06E-02	2.76E-02	2.19E-02	2.08E-02
Gamma		3.52E-01	4.36E-01	5.58E-01	6.68E-01	7.03E-01	7.42E-01
Delta			3.43E-01	4.06E-01	5.29E-01	6.12E-01	6.95E-01
Epsilon				2.24E-01	3.96E-01	4.87E-01	5.94E-01
Mu					2.46E-01	3.29E-01	4.67E-01
Omega						1.62E-01	3.36E-01

Sigma							2.99E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.25	7.88	10.50	13.13	15.75	18.38	21.00
N₁	0.6667	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	2.1667	1.5000	1.5000	0.9167	0.5694	0.3588	0.2288
N₃		1.0000	1.0000	1.0833	0.9444	0.7569	0.5826
N₄			0.5000	0.7500	0.8611	0.8472	0.7650
N₅				0.2500	0.5000	0.6620	0.7238
N₆					0.1250	0.3125	0.4811
N₇						0.0625	0.1875
N₈							0.0313

Component Causal CCF Parameters

Not applicable as this CCF template is for the extreme environmental cause only.

Design Causal CCF Parameters

Not applicable as this CCF template is for the extreme environmental cause only.

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 7.0

Total Number of Common-Cause Failure Events: 3

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8192766	0.9148972	0.9240624	0.9790936	2.738E+01	2.547E+00	--
α_2	2.09E-02	8.51E-02	7.59E-02	1.81E-01	2.547E+00	2.738E+01	0.451

CCCG = 3, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8974876	0.9481576	0.9525864	0.9836742	6.328E+01	3.460E+00	--
α_2	6.72E-03	3.36E-02	2.89E-02	7.66E-02	2.167E+00	6.234E+01	0.379
α_3	1.67E-03	1.82E-02	1.39E-02	4.95E-02	1.293E+00	6.956E+01	0.345

CCCG = 4, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9153796	0.9538641	0.9568294	0.9822112	9.653E+01	4.669E+00	--
α_2	6.15E-03	2.60E-02	2.28E-02	5.67E-02	2.539E+00	9.505E+01	0.371
α_3	1.37E-03	1.32E-02	1.03E-02	3.51E-02	1.389E+00	1.036E+02	0.345
α_4	1.48E-04	6.90E-03	4.17E-03	2.29E-02	7.414E-01	1.068E+02	0.337

CCCG = 5, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9478470	0.9694284	0.9708929	0.9860073	2.057E+02	6.487E+00	--
α_2	3.37E-03	1.35E-02	1.19E-02	2.90E-02	2.708E+00	1.978E+02	0.370
α_3	2.13E-03	1.01E-02	8.73E-03	2.29E-02	2.290E+00	2.237E+02	0.329
α_4	4.08E-04	5.38E-03	3.98E-03	1.52E-02	1.184E+00	2.188E+02	0.337
α_5	1.93E-07	1.55E-03	3.90E-04	7.07E-03	3.049E-01	1.960E+02	0.378

CCCG = 6, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9535538	0.9724181	0.9736677	0.9870148	2.434E+02	6.905E+00	--
α_2	1.54E-03	9.16E-03	7.64E-03	2.20E-02	1.904E+00	2.059E+02	0.439
α_3	1.98E-03	8.68E-03	7.56E-03	1.92E-02	2.475E+00	2.826E+02	0.320
α_4	7.53E-04	5.88E-03	4.71E-03	1.50E-02	1.580E+00	2.672E+02	0.340
α_5	6.37E-05	2.91E-03	1.76E-03	9.66E-03	7.467E-01	2.559E+02	0.356
α_6	8.27E-10	9.47E-04	9.57E-05	4.90E-03	1.978E-01	2.086E+02	0.437

CCCG = 7, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9648395	0.9780725	0.9788649	0.9886002	3.912E+02	8.770E+00	--
α_2	1.10E-03	6.52E-03	5.44E-03	1.57E-02	1.908E+00	2.906E+02	0.487
α_3	1.51E-03	5.98E-03	5.28E-03	1.29E-02	2.746E+00	4.563E+02	0.311
α_4	9.34E-04	4.84E-03	4.11E-03	1.12E-02	2.134E+00	4.390E+02	0.323
α_5	3.02E-04	3.08E-03	2.36E-03	8.29E-03	1.353E+00	4.385E+02	0.324
α_6	7.70E-06	1.26E-03	6.19E-04	4.70E-03	5.452E-01	4.309E+02	0.330
α_7	4.84E-19	2.44E-04	4.40E-07	1.42E-03	8.362E-02	3.427E+02	0.416

CCCG = 8, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9675230	0.9792123	0.9798720	0.9886493	4.718E+02	1.002E+01	--
α_2	8.38E-04	5.35E-03	4.42E-03	1.31E-02	1.812E+00	3.367E+02	0.550
α_3	1.11E-03	4.70E-03	4.11E-03	1.03E-02	2.569E+00	5.439E+02	0.340
α_4	9.74E-04	4.35E-03	3.78E-03	9.69E-03	2.437E+00	5.574E+02	0.332
α_5	5.00E-04	3.40E-03	2.78E-03	8.42E-03	1.735E+00	5.088E+02	0.364
α_6	1.15E-04	1.98E-03	1.40E-03	5.82E-03	1.052E+00	5.304E+02	0.350
α_7	4.09E-07	7.04E-04	2.31E-04	3.01E-03	3.684E-01	5.232E+02	0.355
α_8	6.78E-33	3.00E-04	5.18E-10	1.51E-03	4.370E-02	1.456E+02	1.277

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.15E-01	9.48E-01	9.54E-01	9.69E-01	9.72E-01	9.78E-01	9.79E-01
α_2	8.51E-02	3.36E-02	2.60E-02	1.35E-02	9.16E-03	6.52E-03	5.35E-03
α_3		1.82E-02	1.32E-02	1.01E-02	8.68E-03	5.98E-03	4.70E-03
α_4			6.90E-03	5.38E-03	5.88E-03	4.84E-03	4.35E-03
α_5				1.55E-03	2.91E-03	3.08E-03	3.40E-03
α_6					9.47E-04	1.26E-03	1.98E-03
α_7						2.44E-04	7.04E-04
α_8							3.00E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.15E-01	9.48E-01	9.54E-01	9.69E-01	9.72E-01	9.78E-01	9.79E-01
Beta	8.51E-02	5.18E-02	4.61E-02	3.06E-02	2.76E-02	2.19E-02	2.08E-02
Gamma		3.52E-01	4.36E-01	5.58E-01	6.68E-01	7.03E-01	7.42E-01
Delta			3.43E-01	4.06E-01	5.29E-01	6.12E-01	6.95E-01
Epsilon				2.24E-01	3.96E-01	4.87E-01	5.94E-01
Mu					2.46E-01	3.29E-01	4.67E-01
Omega						1.62E-01	3.36E-01
Sigma							2.99E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.25	7.88	10.50	13.13	15.75	18.38	21.00
N_1	0.6667	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	2.1667	1.5000	1.5000	0.9167	0.5694	0.3588	0.2288
N_3		1.0000	1.0000	1.0833	0.9444	0.7569	0.5826

N₄			0.5000	0.7500	0.8611	0.8472	0.7650
N₅				0.2500	0.5000	0.6620	0.7238
N₆					0.1250	0.3125	0.4811
N₇						0.0625	0.1875
N₈							0.0313

Human Causal CCF Parameters

Not applicable as this CCF template is for the extreme environmental cause only.

Other/Unknown Causal CCF Parameters

Not applicable as this CCF template is for the extreme environmental cause only.

2.6.2.4 SWS-STR-PG-NE: SWS Strainers Plug Non-Environmental

Generic CCF Parameters

System Group: Raw Water
 System: Normally Operating Service Water, Standby Service Water
 Component Group: Filter
 Component Type: Strainer
 Component Subtype: Self-Cleaning strainer
 Failure Mode: Plug
 Date Range: 2006 through 2020
 Cause Group: Component, Design, Environment, Human, Other, Unknown
 Cause: IW, IC, IQ, DC, DE, DM, EA, IE, HA, HP, HM, PA, OT, EC, OK
 Prior: Default 2015

Total Number of Independent Failure Events: 17.5

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9225083	0.9773494	0.9868947	0.9996574	0.9698492	2.885E+01	6.685E-01
α_2	3.41E-04	2.27E-02	1.31E-02	7.75E-02	3.02E-02	6.685E-01	2.885E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9406845	0.9763390	0.9807866	0.9967860	0.9484536	6.718E+01	1.628E+00
α_2	1.75E-03	1.89E-02	1.45E-02	5.12E-02	4.64E-02	1.301E+00	6.751E+01
α_3	1.09E-06	4.75E-03	1.33E-03	2.11E-02	5.15E-03	3.268E-01	6.848E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9451397	0.9744041	0.9773525	0.9935885	0.9368421	1.025E+02	2.694E+00
α_2	2.89E-03	1.77E-02	1.47E-02	4.26E-02	4.74E-02	1.860E+00	1.034E+02
α_3	5.52E-05	5.72E-03	3.04E-03	2.05E-02	1.58E-02	6.024E-01	1.046E+02
α_4	1.53E-08	2.20E-03	3.28E-04	1.09E-02	0.00E+00	2.315E-01	1.050E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9604236	0.9788798	0.9803813	0.9922040	0.9358289	2.054E+02	4.432E+00
α_2	2.58E-03	1.16E-02	1.00E-02	2.57E-02	3.21E-02	2.424E+00	2.074E+02
α_3	9.17E-04	7.38E-03	5.89E-03	1.90E-02	3.21E-02	1.549E+00	2.083E+02
α_4	1.38E-06	1.82E-03	6.28E-04	7.68E-03	0.00E+00	3.822E-01	2.095E+02
α_5	3.18E-20	3.66E-04	3.41E-07	2.12E-03	0.00E+00	7.674E-02	2.098E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9641732	0.9804693	0.9817470	0.9923973	0.9459459	2.427E+02	4.835E+00

α_2	9.85E-04	6.87E-03	5.60E-03	1.71E-02	0.00E+00	1.701E+00	2.459E+02
α_3	1.79E-03	8.92E-03	7.63E-03	2.04E-02	5.41E-02	2.207E+00	2.453E+02
α_4	2.21E-05	2.41E-03	1.26E-03	8.67E-03	0.00E+00	5.960E-01	2.470E+02
α_5	3.50E-09	8.93E-04	1.19E-04	4.48E-03	0.00E+00	2.211E-01	2.473E+02
α_6	3.49E-15	4.43E-04	4.49E-06	2.56E-03	0.00E+00	1.098E-01	2.474E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9712869	0.9830878	0.9838863	0.9921488	0.9533074	3.922E+02	6.747E+00
α_2	1.15E-03	5.62E-03	4.82E-03	1.28E-02	0.00E+00	2.243E+00	3.967E+02
α_3	1.13E-03	5.59E-03	4.79E-03	1.28E-02	2.80E-02	2.230E+00	3.967E+02
α_4	4.29E-04	3.72E-03	2.93E-03	9.70E-03	1.87E-02	1.483E+00	3.975E+02
α_5	1.02E-05	1.42E-03	7.15E-04	5.21E-03	0.00E+00	5.654E-01	3.984E+02
α_6	2.64E-10	4.80E-04	4.44E-05	2.50E-03	0.00E+00	1.916E-01	3.988E+02
α_7	5.97E-41	8.72E-05	3.24E-12	3.83E-04	0.00E+00	3.480E-02	3.989E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9727910	0.9839898	0.9847494	0.9925863	0.9589041	4.134E+02	6.726E+00
α_2	8.66E-04	4.80E-03	4.04E-03	1.13E-02	0.00E+00	2.018E+00	4.181E+02
α_3	6.21E-04	4.17E-03	3.41E-03	1.03E-02	1.48E-02	1.751E+00	4.183E+02
α_4	4.52E-04	3.67E-03	2.92E-03	9.46E-03	1.97E-02	1.542E+00	4.185E+02
α_5	7.08E-05	2.05E-03	1.34E-03	6.48E-03	6.58E-03	8.626E-01	4.192E+02
α_6	3.27E-07	8.33E-04	2.56E-04	3.62E-03	0.00E+00	3.497E-01	4.197E+02
α_7	1.26E-15	2.57E-04	2.36E-06	1.48E-03	0.00E+00	1.078E-01	4.200E+02
α_8	2.62E-17	2.25E-04	9.55E-07	1.31E-03	0.00E+00	9.469E-02	4.200E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.77E-01	9.76E-01	9.74E-01	9.79E-01	9.80E-01	9.83E-01	9.84E-01
α_2	2.27E-02	1.89E-02	1.77E-02	1.16E-02	6.87E-03	5.62E-03	4.80E-03
α_3		4.75E-03	5.72E-03	7.38E-03	8.92E-03	5.59E-03	4.17E-03
α_4			2.20E-03	1.82E-03	2.41E-03	3.72E-03	3.67E-03
α_5				3.66E-04	8.93E-04	1.42E-03	2.05E-03
α_6					4.43E-04	4.80E-04	8.33E-04
α_7						8.72E-05	2.57E-04
α_8							2.25E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.77E-01	9.76E-01	9.74E-01	9.79E-01	9.80E-01	9.83E-01	9.84E-01
Beta	2.27E-02	2.37E-02	2.56E-02	2.11E-02	1.95E-02	1.69E-02	1.60E-02
Gamma		2.01E-01	3.10E-01	4.53E-01	6.48E-01	6.68E-01	7.00E-01
Delta			2.78E-01	2.29E-01	2.96E-01	5.05E-01	6.28E-01
Epsilon				1.67E-01	3.57E-01	3.48E-01	4.78E-01
Mu					3.32E-01	2.86E-01	3.90E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.83	8.75	11.67	14.58	17.50	20.42	23.33
N₁	0.6000	0.4500	0.2000	0.0000	0.0000	0.0000	0.0000
N₂	0.2000	0.4500	0.6000	0.5000	0.0000	0.0000	0.0000
N₃		0.0500	0.2000	0.5000	1.0000	0.6000	0.3600
N₄			0.0000	0.0000	0.0000	0.4000	0.4800
N₅				0.0000	0.0000	0.0000	0.1600
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.271

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9115181	0.9743628	0.9853849	0.9996532	2.470E+01	6.498E-01	--
α_2	3.47E-04	2.56E-02	1.46E-02	8.85E-02	6.498E-01	2.470E+01	0.628

CCCG = 3, Gamma = 0.253

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9344509	0.9735586	0.9783602	0.9962301	6.179E+01	1.678E+00	--
α_2	2.42E-03	2.31E-02	1.80E-02	6.10E-02	1.389E+00	5.875E+01	0.635
α_3	2.60E-07	3.35E-03	7.75E-04	1.55E-02	2.896E-01	8.617E+01	0.442

CCCG = 4, Gamma = 0.237

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9381938	0.9711084	0.9744068	0.9927397	9.070E+01	2.698E+00	--
α_2	3.54E-03	2.12E-02	1.77E-02	5.07E-02	1.885E+00	8.714E+01	0.620
α_3	5.51E-05	6.12E-03	3.22E-03	2.21E-02	5.927E-01	9.620E+01	0.570
α_4	6.12E-09	1.60E-03	2.13E-04	8.01E-03	2.207E-01	1.381E+02	0.399

CCCG = 5, Gamma = 0.225

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9593132	0.9781926	0.9797178	0.9918609	2.021E+02	4.506E+00	--
α_2	2.86E-03	1.24E-02	1.08E-02	2.74E-02	2.492E+00	1.980E+02	0.562
α_3	9.86E-04	7.71E-03	6.17E-03	1.97E-02	1.578E+00	2.032E+02	0.550
α_4	6.91E-07	1.32E-03	4.26E-04	5.66E-03	3.632E-01	2.750E+02	0.409
α_5	3.26E-21	3.53E-04	2.04E-07	2.04E-03	7.248E-02	2.053E+02	0.548

CCCG = 6, Gamma = 0.216

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9624855	0.9791749	0.9804417	0.9915370	2.445E+02	5.199E+00	--
α_2	1.28E-03	7.44E-03	6.23E-03	1.78E-02	1.941E+00	2.589E+02	0.538
α_3	2.26E-03	1.05E-02	9.10E-03	2.37E-02	2.332E+00	2.191E+02	0.634
α_4	1.90E-05	1.78E-03	9.56E-04	6.32E-03	6.181E-01	3.472E+02	0.403
α_5	4.81E-09	7.02E-04	1.04E-04	3.48E-03	2.313E-01	3.294E+02	0.426
α_6	3.39E-20	3.72E-04	3.50E-07	2.16E-03	7.684E-02	2.065E+02	0.679

CCCG = 7, Gamma = 0.210

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9708462	0.9825652	0.9833361	0.9916518	4.070E+02	7.223E+00	--
α_2	1.69E-03	6.94E-03	6.10E-03	1.50E-02	2.654E+00	3.800E+02	0.573
α_3	1.10E-03	5.35E-03	4.59E-03	1.22E-02	2.245E+00	4.172E+02	0.523
α_4	4.36E-04	3.65E-03	2.89E-03	9.45E-03	1.515E+00	4.140E+02	0.528
α_5	1.05E-05	1.09E-03	5.78E-04	3.92E-03	6.034E-01	5.519E+02	0.397
α_6	5.83E-11	3.28E-04	2.44E-05	1.74E-03	1.780E-01	5.417E+02	0.405
α_7	4.32E-51	7.94E-05	1.63E-14	2.80E-04	2.734E-02	3.444E+02	0.637

CCCG = 8, Gamma = 0.205

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9709512	0.9826162	0.9833826	0.9916646	4.096E+02	7.246E+00	--
α_2	1.51E-03	6.56E-03	5.72E-03	1.45E-02	2.504E+00	3.792E+02	0.596
α_3	6.10E-04	4.00E-03	3.29E-03	9.84E-03	1.779E+00	4.427E+02	0.512
α_4	4.21E-04	3.55E-03	2.81E-03	9.23E-03	1.507E+00	4.225E+02	0.536
α_5	7.37E-05	1.93E-03	1.28E-03	6.02E-03	8.937E-01	4.618E+02	0.492
α_6	6.54E-07	6.58E-04	2.37E-04	2.74E-03	3.975E-01	6.040E+02	0.376
α_7	1.30E-20	1.30E-04	1.24E-07	7.53E-04	7.703E-02	5.937E+02	0.383
α_8	5.09E-18	5.48E-04	1.37E-06	3.20E-03	8.749E-02	1.595E+02	1.425

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.74E-01	9.74E-01	9.71E-01	9.78E-01	9.79E-01	9.83E-01	9.83E-01
α_2	2.56E-02	2.31E-02	2.12E-02	1.24E-02	7.44E-03	6.94E-03	6.56E-03
α_3		3.35E-03	6.12E-03	7.71E-03	1.05E-02	5.35E-03	4.00E-03
α_4			1.60E-03	1.32E-03	1.78E-03	3.65E-03	3.55E-03
α_5				3.53E-04	7.02E-04	1.09E-03	1.93E-03
α_6					3.72E-04	3.28E-04	6.58E-04
α_7						7.94E-05	1.30E-04
α_8							5.48E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.74E-01	9.74E-01	9.71E-01	9.78E-01	9.79E-01	9.83E-01	9.83E-01
Beta	2.56E-02	2.64E-02	2.89E-02	2.18E-02	2.08E-02	1.74E-02	1.74E-02
Gamma		1.27E-01	2.67E-01	4.30E-01	6.43E-01	6.02E-01	6.23E-01
Delta			2.07E-01	1.78E-01	2.13E-01	4.90E-01	6.30E-01
Epsilon				2.11E-01	3.77E-01	2.91E-01	4.79E-01
Mu					3.46E-01	2.72E-01	4.09E-01
Omega						1.95E-01	5.08E-01
Sigma							8.09E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.50	2.00	2.50	3.00	3.50	4.00
N_1	0.6000	0.4500	0.2000	0.0000	0.0000	0.0000	0.0000
N_2	0.2000	0.4500	0.6000	0.5000	0.0000	0.0000	0.0000
N_3		0.0500	0.2000	0.5000	1.0000	0.6000	0.3600

N₄			0.0000	0.0000	0.0000	0.4000	0.4800
N₅				0.0000	0.0000	0.0000	0.1600
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 9.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.477

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8837188	0.9722271	0.9900703	0.9999787	1.331E+01	3.801E-01	--
α_2	2.13E-05	2.78E-02	9.93E-03	1.16E-01	3.801E-01	1.331E+01	0.628

CCCG = 3, Gamma = 0.490

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9096051	0.9697885	0.9789720	0.9985601	3.082E+01	9.600E-01	--
α_2	3.46E-04	2.31E-02	1.34E-02	7.92E-02	6.673E-01	2.816E+01	0.635
α_3	6.11E-07	7.06E-03	1.68E-03	3.25E-02	2.927E-01	4.115E+01	0.442

CCCG = 4, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9179737	0.9668649	0.9728412	0.9952904	4.870E+01	1.669E+00	--
α_2	1.28E-03	2.22E-02	1.58E-02	6.48E-02	1.039E+00	4.580E+01	0.620
α_3	6.60E-06	7.63E-03	2.71E-03	3.20E-02	3.887E-01	5.053E+01	0.570
α_4	3.79E-08	3.32E-03	5.43E-04	1.62E-02	2.414E-01	7.254E+01	0.399

CCCG = 5, Gamma = 0.508

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9434062	0.9715717	0.9740982	0.9910995	1.192E+02	3.487E+00	--
α_2	2.36E-03	1.52E-02	1.26E-02	3.72E-02	1.791E+00	1.158E+02	0.562
α_3	7.97E-04	1.01E-02	7.49E-03	2.81E-02	1.207E+00	1.189E+02	0.550
α_4	4.73E-06	2.69E-03	1.07E-03	1.08E-02	4.340E-01	1.611E+02	0.409
α_5	1.01E-26	4.56E-04	1.62E-08	2.51E-03	5.493E-02	1.204E+02	0.548

CCCG = 6, Gamma = 0.514

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9497661	0.9740145	0.9760905	0.9911676	1.464E+02	3.905E+00	--
α_2	8.43E-04	8.75E-03	6.72E-03	2.36E-02	1.335E+00	1.512E+02	0.538
α_3	1.45E-03	1.18E-02	9.42E-03	3.04E-02	1.531E+00	1.280E+02	0.634
α_4	6.79E-05	3.53E-03	2.10E-03	1.19E-02	7.191E-01	2.028E+02	0.403
α_5	1.87E-08	1.28E-03	2.18E-04	6.22E-03	2.467E-01	1.926E+02	0.426
α_6	6.61E-21	6.02E-04	3.62E-07	3.49E-03	7.279E-02	1.208E+02	0.679

CCCG = 7, Gamma = 0.518

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9602825	0.9773866	0.9786230	0.9902676	2.494E+02	5.770E+00	--
α_2	8.34E-04	6.72E-03	5.35E-03	1.73E-02	1.549E+00	2.291E+02	0.573
α_3	1.40E-03	7.87E-03	6.61E-03	1.86E-02	1.989E+00	2.508E+02	0.523
α_4	4.61E-04	5.14E-03	3.90E-03	1.41E-02	1.287E+00	2.491E+02	0.528
α_5	3.45E-05	2.08E-03	1.20E-03	7.09E-03	6.913E-01	3.323E+02	0.397
α_6	5.25E-09	7.12E-04	1.07E-04	3.52E-03	2.327E-01	3.264E+02	0.405
α_7	6.90E-65	1.02E-04	1.54E-17	2.56E-04	2.112E-02	2.076E+02	0.637

CCCG = 8, Gamma = 0.521

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9648223	0.9790752	0.9800209	0.9900991	3.283E+02	7.016E+00	--
α_2	6.94E-04	5.40E-03	4.33E-03	1.38E-02	1.583E+00	2.915E+02	0.596
α_3	1.03E-03	5.82E-03	4.88E-03	1.38E-02	1.986E+00	3.394E+02	0.512
α_4	7.17E-04	5.13E-03	4.16E-03	1.29E-02	1.672E+00	3.240E+02	0.536
α_5	1.50E-04	2.84E-03	1.98E-03	8.48E-03	1.011E+00	3.544E+02	0.492
α_6	9.29E-06	1.23E-03	6.25E-04	4.50E-03	5.709E-01	4.636E+02	0.376
α_7	9.09E-11	3.97E-04	3.10E-05	2.10E-03	1.809E-01	4.559E+02	0.383
α_8	1.47E-107	1.02E-04	3.08E-27	7.62E-05	1.245E-02	1.226E+02	1.425

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.72E-01	9.70E-01	9.67E-01	9.72E-01	9.74E-01	9.77E-01	9.79E-01
α_2	2.78E-02	2.31E-02	2.22E-02	1.52E-02	8.75E-03	6.72E-03	5.40E-03
α_3		7.06E-03	7.63E-03	1.01E-02	1.18E-02	7.87E-03	5.82E-03
α_4			3.32E-03	2.69E-03	3.53E-03	5.14E-03	5.13E-03
α_5				4.56E-04	1.28E-03	2.08E-03	2.84E-03
α_6					6.02E-04	7.12E-04	1.23E-03
α_7						1.02E-04	3.97E-04
α_8							1.02E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.72E-01	9.70E-01	9.67E-01	9.72E-01	9.74E-01	9.77E-01	9.79E-01
Beta	2.78E-02	3.02E-02	3.31E-02	2.84E-02	2.60E-02	2.26E-02	2.09E-02
Gamma		2.34E-01	3.30E-01	4.64E-01	6.63E-01	7.03E-01	7.42E-01
Delta			3.03E-01	2.38E-01	3.14E-01	5.05E-01	6.25E-01
Epsilon				1.45E-01	3.47E-01	3.60E-01	4.71E-01
Mu					3.20E-01	2.82E-01	3.78E-01
Omega						1.25E-01	2.88E-01
Sigma							2.04E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.17	4.75	6.33	7.92	9.50	11.08	12.67
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.201

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9554361	0.9885920	0.9950148	0.9999672	4.078E+01	4.706E-01	--
α_2	3.28E-05	1.14E-02	4.99E-03	4.46E-02	4.706E-01	4.078E+01	0.628

CCCG = 3, Gamma = 0.206

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9711897	0.9899973	0.9927650	0.9993473	1.091E+02	1.103E+00	--
α_2	2.30E-04	8.00E-03	5.08E-03	2.57E-02	8.104E-01	1.005E+02	0.635
α_3	1.68E-07	2.01E-03	4.70E-04	9.25E-03	2.921E-01	1.454E+02	0.442

CCCG = 4, Gamma = 0.211

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9768029	0.9902524	0.9918296	0.9983090	1.984E+02	1.953E+00	--
α_2	6.46E-04	6.94E-03	5.30E-03	1.88E-02	1.312E+00	1.878E+02	0.620
α_3	3.52E-06	2.10E-03	8.27E-04	8.48E-03	4.307E-01	2.052E+02	0.570
α_4	1.42E-09	7.14E-04	8.41E-05	3.63E-03	2.099E-01	2.936E+02	0.399

CCCG = 5, Gamma = 0.214

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9838408	0.9921996	0.9930070	0.9977994	3.952E+02	3.107E+00	--
α_2	6.21E-04	4.41E-03	3.58E-03	1.10E-02	1.684E+00	3.804E+02	0.562
α_3	1.07E-04	2.41E-03	1.64E-03	7.38E-03	9.426E-01	3.894E+02	0.550
α_4	5.45E-07	7.27E-04	2.50E-04	3.07E-03	3.816E-01	5.246E+02	0.409
α_5	1.01E-16	2.52E-04	1.38E-06	1.46E-03	9.865E-02	3.914E+02	0.548

CCCG = 6, Gamma = 0.216

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9858032	0.9927458	0.9933594	0.9975927	5.231E+02	3.822E+00	--
α_2	4.69E-04	3.25E-03	2.65E-03	8.08E-03	1.714E+00	5.261E+02	0.538
α_3	1.62E-04	2.47E-03	1.78E-03	7.14E-03	1.108E+00	4.470E+02	0.634
α_4	1.22E-05	9.25E-04	5.15E-04	3.23E-03	6.509E-01	7.033E+02	0.403
α_5	7.52E-09	3.80E-04	6.84E-05	1.83E-03	2.536E-01	6.667E+02	0.426
α_6	3.71E-17	2.29E-04	1.04E-06	1.33E-03	9.572E-02	4.179E+02	0.679

CCCG = 7, Gamma = 0.218

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9880234	0.9933824	0.9937966	0.9973271	7.799E+02	5.195E+00	--
α_2	5.52E-04	2.91E-03	2.47E-03	6.78E-03	2.105E+00	7.214E+02	0.573
α_3	1.56E-04	1.66E-03	1.27E-03	4.52E-03	1.320E+00	7.917E+02	0.523
α_4	6.46E-05	1.27E-03	8.79E-04	3.80E-03	9.967E-01	7.845E+02	0.528
α_5	2.54E-06	5.02E-04	2.39E-04	1.90E-03	5.249E-01	1.044E+03	0.397
α_6	1.42E-10	1.91E-04	1.87E-05	9.89E-04	1.956E-01	1.024E+03	0.405
α_7	2.32E-28	8.13E-05	1.84E-09	4.41E-04	5.291E-02	6.511E+02	0.637

CCCG = 8, Gamma = 0.219

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9884669	0.9934488	0.9938146	0.9971818	8.844E+02	5.832E+00	--
α_2	5.53E-04	2.73E-03	2.33E-03	6.25E-03	2.229E+00	8.151E+02	0.596
α_3	1.13E-04	1.32E-03	9.95E-04	3.66E-03	1.260E+00	9.507E+02	0.512
α_4	6.52E-05	1.15E-03	8.09E-04	3.39E-03	1.042E+00	9.070E+02	0.536
α_5	1.80E-05	7.70E-04	4.71E-04	2.54E-03	7.626E-01	9.901E+02	0.492
α_6	5.78E-08	2.53E-04	7.05E-05	1.12E-03	3.271E-01	1.294E+03	0.376
α_7	1.02E-13	1.06E-04	2.83E-06	5.93E-04	1.344E-01	1.272E+03	0.383
α_8	2.03E-20	2.25E-04	2.11E-07	1.31E-03	7.682E-02	3.418E+02	1.425

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.90E-01	9.90E-01	9.92E-01	9.93E-01	9.93E-01	9.93E-01
α_2	1.14E-02	8.00E-03	6.94E-03	4.41E-03	3.25E-03	2.91E-03	2.73E-03
α_3		2.01E-03	2.10E-03	2.41E-03	2.47E-03	1.66E-03	1.32E-03
α_4			7.14E-04	7.27E-04	9.25E-04	1.27E-03	1.15E-03
α_5				2.52E-04	3.80E-04	5.02E-04	7.70E-04
α_6					2.29E-04	1.91E-04	2.53E-04
α_7						8.13E-05	1.06E-04
α_8							2.25E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.90E-01	9.90E-01	9.92E-01	9.93E-01	9.93E-01	9.93E-01
Beta	1.14E-02	1.00E-02	9.75E-03	7.80E-03	7.25E-03	6.62E-03	6.55E-03
Gamma		2.00E-01	2.88E-01	4.35E-01	5.52E-01	5.60E-01	5.84E-01
Delta			2.54E-01	2.88E-01	3.83E-01	5.51E-01	6.54E-01
Epsilon				2.57E-01	3.97E-01	3.79E-01	5.41E-01
Mu					3.76E-01	3.51E-01	4.31E-01
Omega						2.99E-01	5.67E-01
Sigma							6.80E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.33	2.00	2.67	3.33	4.00	4.67	5.33
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9890818	0.9971683	0.9987228	0.9999896	1.737E+02	4.932E-01	--
α_2	1.04E-05	2.83E-03	1.28E-03	1.09E-02	4.932E-01	1.737E+02	0.628

CCCG = 3, Gamma = 0.052

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928481	0.9975605	0.9982686	0.9998558	4.333E+02	1.059E+00	--
α_2	3.41E-05	1.82E-03	1.08E-03	6.16E-03	7.137E-01	3.905E+02	0.635
α_3	2.21E-07	6.15E-04	1.86E-04	2.68E-03	3.458E-01	5.620E+02	0.442

CCCG = 4, Gamma = 0.053

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940958	0.9974641	0.9978490	0.9995168	8.317E+02	2.115E+00	--
α_2	2.45E-04	1.98E-03	1.57E-03	5.09E-03	1.549E+00	7.816E+02	0.620
α_3	9.70E-09	3.11E-04	6.07E-05	1.48E-03	2.646E-01	8.512E+02	0.570
α_4	2.73E-08	2.47E-04	6.06E-05	1.13E-03	3.010E-01	1.217E+03	0.399

CCCG = 5, Gamma = 0.053

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9962422	0.9979141	0.9980426	0.9991472	2.547E+03	5.325E+00	--
α_2	4.63E-04	1.45E-03	1.32E-03	2.89E-03	3.632E+00	2.496E+03	0.562
α_3	5.21E-05	5.30E-04	4.07E-04	1.43E-03	1.354E+00	2.552E+03	0.550
α_4	8.18E-09	8.62E-05	2.06E-05	3.96E-04	2.961E-01	3.434E+03	0.409
α_5	4.93E-35	1.66E-05	1.82E-11	8.21E-05	4.243E-02	2.561E+03	0.548

CCCG = 6, Gamma = 0.054

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9960727	0.9978602	0.9980023	0.9991625	2.302E+03	4.936E+00	--
α_2	3.29E-04	1.24E-03	1.10E-03	2.61E-03	2.915E+00	2.356E+03	0.538
α_3	5.35E-05	6.28E-04	4.71E-04	1.74E-03	1.257E+00	2.001E+03	0.634
α_4	6.50E-07	1.60E-04	7.32E-05	6.13E-04	5.031E-01	3.146E+03	0.403
α_5	1.12E-15	3.87E-05	5.11E-07	2.22E-04	1.155E-01	2.981E+03	0.426
α_6	3.63E-13	7.77E-05	2.84E-06	4.30E-04	1.451E-01	1.868E+03	0.679

CCCG = 7, Gamma = 0.054

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9969761	0.9980870	0.9981524	0.9989747	5.037E+03	9.654E+00	--
α_2	3.94E-04	1.02E-03	9.49E-04	1.88E-03	4.851E+00	4.761E+03	0.573
α_3	1.37E-04	5.36E-04	4.74E-04	1.15E-03	2.800E+00	5.221E+03	0.523
α_4	2.73E-05	2.67E-04	2.07E-04	7.16E-04	1.384E+00	5.173E+03	0.528
α_5	2.52E-07	7.12E-05	3.18E-05	2.76E-04	4.902E-01	6.881E+03	0.397
α_6	4.04E-16	1.70E-05	2.15E-07	9.74E-05	1.146E-01	6.749E+03	0.405
α_7	1.79E-93	3.41E-06	3.63E-25	4.05E-06	1.464E-02	4.289E+03	0.637

CCCG = 8, Gamma = 0.055

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9966209	0.9979923	0.9980847	0.9990480	3.553E+03	7.148E+00	--
α_2	2.33E-04	8.58E-04	7.64E-04	1.80E-03	2.980E+00	3.470E+03	0.596
α_3	8.39E-05	4.85E-04	4.05E-04	1.16E-03	1.960E+00	4.043E+03	0.512
α_4	2.21E-05	3.02E-04	2.22E-04	8.58E-04	1.166E+00	3.857E+03	0.536
α_5	7.25E-07	1.28E-04	6.18E-05	4.78E-04	5.375E-01	4.210E+03	0.492
α_6	7.25E-12	3.28E-05	2.55E-06	1.74E-04	1.805E-01	5.499E+03	0.376
α_7	3.96E-36	7.66E-06	5.73E-12	3.75E-05	4.139E-02	5.403E+03	0.383
α_8	1.19E-08	1.95E-04	4.29E-05	9.07E-04	2.827E-01	1.452E+03	1.425

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.98E-01	9.97E-01	9.98E-01	9.98E-01	9.98E-01	9.98E-01
α_2	2.83E-03	1.82E-03	1.98E-03	1.45E-03	1.24E-03	1.02E-03	8.58E-04
α_3		6.15E-04	3.11E-04	5.30E-04	6.28E-04	5.36E-04	4.85E-04
α_4			2.47E-04	8.62E-05	1.60E-04	2.67E-04	3.02E-04
α_5				1.66E-05	3.87E-05	7.12E-05	1.28E-04
α_6					7.77E-05	1.70E-05	3.28E-05
α_7						3.41E-06	7.66E-06
α_8							1.95E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.98E-01	9.97E-01	9.98E-01	9.98E-01	9.98E-01	9.98E-01
Beta	2.83E-03	2.44E-03	2.54E-03	2.09E-03	2.14E-03	1.91E-03	2.01E-03
Gamma		2.52E-01	2.20E-01	3.03E-01	4.22E-01	4.68E-01	5.73E-01
Delta			4.43E-01	1.62E-01	3.06E-01	4.01E-01	5.78E-01
Epsilon				1.61E-01	4.21E-01	2.55E-01	5.46E-01
Mu					6.67E-01	2.23E-01	6.48E-01
Omega						1.67E-01	8.60E-01
Sigma							9.62E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.33	0.50	0.67	0.83	1.00	1.17	1.33
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.6.3 Circulating Water Strainers

2.6.3.1 CWS-TSA-PG-EE: CWS Travelling Screens Plug Extreme Environmental

Generic CCF Parameters

System Group:	Raw Water
System:	Circulating Water System
Component Group:	Filter
Component Type:	Strainer
Component Subtype:	Traveling Screen
Failure Mode:	Plug
Date Range:	2006 through 2020
Cause Group:	Environment
Cause:	EE
Prior:	Default 2015

Total Number of Independent Failure Events: 18.0

Total Number of Common-Cause Failure Events: 8

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.7438971	0.8470657	0.8530518	0.9297435	0.6567732	3.287E+01	5.935E+00
α_2	7.03E-02	1.53E-01	1.47E-01	2.56E-01	3.43E-01	5.935E+00	3.287E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.8502655	0.9082825	0.9116818	0.9546742	0.7017927	7.257E+01	7.328E+00
α_2	7.01E-03	3.07E-02	2.68E-02	6.75E-02	7.70E-02	2.451E+00	7.745E+01
α_3	2.43E-02	6.10E-02	5.74E-02	1.10E-01	2.21E-01	4.877E+00	7.502E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.8810816	0.9246032	0.9269958	0.9599437	0.7242779	1.091E+02	8.894E+00
α_2	7.52E-03	2.64E-02	2.37E-02	5.42E-02	7.29E-02	3.110E+00	1.148E+02
α_3	6.17E-03	2.38E-02	2.11E-02	5.04E-02	9.45E-02	2.802E+00	1.152E+02
α_4	6.95E-03	2.53E-02	2.26E-02	5.26E-02	1.08E-01	2.981E+00	1.150E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9246106	0.9504715	0.9518048	0.9717669	0.7428862	2.130E+02	1.110E+01
α_2	5.41E-03	1.66E-02	1.52E-02	3.26E-02	6.01E-02	3.716E+00	2.204E+02
α_3	4.08E-03	1.42E-02	1.27E-02	2.91E-02	7.13E-02	3.174E+00	2.209E+02
α_4	3.13E-03	1.23E-02	1.09E-02	2.63E-02	7.96E-02	2.757E+00	2.213E+02
α_5	7.23E-04	6.48E-03	5.08E-03	1.70E-02	4.61E-02	1.452E+00	2.226E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9322911	0.9550407	0.9561871	0.9738683	0.7659574	2.514E+02	1.183E+01
α_2	2.67E-03	1.05E-02	9.29E-03	2.25E-02	3.11E-02	2.764E+00	2.605E+02
α_3	4.86E-03	1.46E-02	1.33E-02	2.84E-02	7.68E-02	3.832E+00	2.594E+02
α_4	1.92E-03	8.91E-03	7.70E-03	2.00E-02	5.12E-02	2.346E+00	2.609E+02
α_5	1.51E-03	7.96E-03	6.76E-03	1.85E-02	5.49E-02	2.096E+00	2.611E+02
α_6	8.23E-05	3.03E-03	1.90E-03	9.82E-03	2.01E-02	7.973E-01	2.624E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9514001	0.9669608	0.9677043	0.9799722	0.7924528	4.023E+02	1.375E+01
α_2	2.07E-03	7.39E-03	6.62E-03	1.54E-02	2.16E-02	3.074E+00	4.130E+02
α_3	2.45E-03	8.11E-03	7.33E-03	1.64E-02	4.52E-02	3.373E+00	4.127E+02
α_4	2.06E-03	7.38E-03	6.61E-03	1.53E-02	5.16E-02	3.070E+00	4.130E+02
α_5	1.25E-03	5.71E-03	4.94E-03	1.28E-02	4.70E-02	2.378E+00	4.137E+02
α_6	4.04E-04	3.54E-03	2.78E-03	9.26E-03	3.32E-02	1.473E+00	4.146E+02
α_7	6.45E-07	9.10E-04	3.09E-04	3.85E-03	8.92E-03	3.786E-01	4.157E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9539436	0.9687099	0.9694182	0.9810489	0.8135593	4.249E+02	1.373E+01
α_2	1.50E-03	6.10E-03	5.36E-03	1.32E-02	1.53E-02	2.674E+00	4.360E+02
α_3	1.44E-03	5.97E-03	5.24E-03	1.30E-02	2.86E-02	2.618E+00	4.360E+02
α_4	1.67E-03	6.45E-03	5.71E-03	1.37E-02	4.11E-02	2.828E+00	4.358E+02
α_5	1.33E-03	5.75E-03	5.02E-03	1.27E-02	4.24E-02	2.523E+00	4.361E+02
α_6	7.20E-04	4.32E-03	3.60E-03	1.04E-02	3.61E-02	1.897E+00	4.368E+02
α_7	8.69E-05	2.10E-03	1.41E-03	6.47E-03	1.89E-02	9.203E-01	4.377E+02
α_8	2.05E-08	6.08E-04	1.21E-04	2.88E-03	4.01E-03	2.666E-01	4.384E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	8.47E-01	9.08E-01	9.25E-01	9.50E-01	9.55E-01	9.67E-01	9.69E-01
α_2	1.53E-01	3.07E-02	2.64E-02	1.66E-02	1.05E-02	7.39E-03	6.10E-03
α_3		6.10E-02	2.38E-02	1.42E-02	1.46E-02	8.11E-03	5.97E-03
α_4			2.53E-02	1.23E-02	8.91E-03	7.38E-03	6.45E-03
α_5				6.48E-03	7.96E-03	5.71E-03	5.75E-03
α_6					3.03E-03	3.54E-03	4.32E-03
α_7						9.10E-04	2.10E-03
α_8							6.08E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	8.47E-01	9.08E-01	9.25E-01	9.50E-01	9.55E-01	9.67E-01	9.69E-01
Beta	1.53E-01	9.17E-02	7.54E-02	4.95E-02	4.50E-02	3.30E-02	3.13E-02
Gamma		6.66E-01	6.50E-01	6.65E-01	7.66E-01	7.76E-01	8.05E-01
Delta			5.15E-01	5.70E-01	5.78E-01	6.84E-01	7.63E-01

Epsilon				3.45E-01	5.52E-01	5.79E-01	6.65E-01
Mu					2.76E-01	4.38E-01	5.50E-01
Omega						2.04E-01	3.85E-01
Sigma							2.25E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.73	13.09	17.45	21.82	26.18	30.55	34.91
N₁	1.7333	1.5000	0.9333	0.3333	0.0000	0.0000	0.0000
N₂	5.4667	1.6000	1.8500	1.7917	1.0625	0.8313	0.6556
N₃		4.6000	2.4000	2.1250	2.6250	1.7438	1.2275
N₄			2.7500	2.3750	1.7500	1.9875	1.7656
N₅				1.3750	1.8750	1.8125	1.8200
N₆					0.6875	1.2813	1.5469
N₇						0.3438	0.8125
N₈							0.1719

Component Causal CCF Parameters

Not applicable as this CCF template is for the extreme environmental cause only.

Design Causal CCF Parameters

Not applicable as this CCF template is for the extreme environmental cause only.

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 18.0

Total Number of Common-Cause Failure Events: 8

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7430710	0.8470657	0.8531412	0.9302577	3.238E+01	5.847E+00	--
α_2	6.97E-02	1.53E-01	1.47E-01	2.57E-01	5.847E+00	3.238E+01	0.558

CCCG = 3, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8495393	0.9082825	0.9117640	0.9551238	7.091E+01	7.160E+00	--
α_2	6.45E-03	3.07E-02	2.65E-02	6.91E-02	2.267E+00	7.164E+01	0.465
α_3	2.44E-02	6.10E-02	5.74E-02	1.10E-01	4.893E+00	7.527E+01	0.429

CCCG = 4, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8804845	0.9246032	0.9270597	0.9603289	1.063E+02	8.669E+00	--
α_2	7.05E-03	2.64E-02	2.35E-02	5.54E-02	2.889E+00	1.067E+02	0.439
α_3	6.14E-03	2.38E-02	2.11E-02	5.04E-02	2.789E+00	1.146E+02	0.410
α_4	6.97E-03	2.53E-02	2.26E-02	5.26E-02	2.991E+00	1.154E+02	0.406

CCCG = 5, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9246801	0.9504715	0.9518012	0.9717230	2.140E+02	1.115E+01	--
α_2	5.27E-03	1.66E-02	1.51E-02	3.29E-02	3.583E+00	2.125E+02	0.407
α_3	4.25E-03	1.42E-02	1.28E-02	2.87E-02	3.332E+00	2.319E+02	0.374
α_4	3.18E-03	1.23E-02	1.09E-02	2.62E-02	2.809E+00	2.255E+02	0.385
α_5	7.04E-04	6.48E-03	5.06E-03	1.71E-02	1.430E+00	2.193E+02	0.398

CCCG = 6, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9323591	0.9550407	0.9561830	0.9738225	2.529E+02	1.190E+01	--
α_2	2.32E-03	1.05E-02	9.11E-03	2.34E-02	2.398E+00	2.260E+02	0.467
α_3	5.14E-03	1.46E-02	1.34E-02	2.78E-02	4.156E+00	2.813E+02	0.374
α_4	2.03E-03	8.91E-03	7.76E-03	1.97E-02	2.469E+00	2.746E+02	0.385
α_5	1.53E-03	7.96E-03	6.77E-03	1.85E-02	2.122E+00	2.643E+02	0.401
α_6	7.05E-05	3.03E-03	1.85E-03	9.99E-03	7.603E-01	2.503E+02	0.425

CCCG = 7, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9514155	0.9669608	0.9677055	0.9799644	4.030E+02	1.377E+01	--
α_2	1.61E-03	7.39E-03	6.40E-03	1.66E-02	2.380E+00	3.198E+02	0.496
α_3	2.65E-03	8.11E-03	7.41E-03	1.60E-02	3.733E+00	4.567E+02	0.347
α_4	2.17E-03	7.38E-03	6.65E-03	1.51E-02	3.275E+00	4.405E+02	0.360
α_5	1.32E-03	5.71E-03	4.98E-03	1.26E-02	2.504E+00	4.356E+02	0.365
α_6	4.23E-04	3.54E-03	2.80E-03	9.18E-03	1.514E+00	4.262E+02	0.373
α_7	4.93E-07	9.10E-04	2.95E-04	3.90E-03	3.649E-01	4.007E+02	0.398

CCCG = 8, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9546349	0.9687099	0.9693591	0.9805689	4.649E+02	1.502E+01	--
α_2	1.24E-03	6.10E-03	5.23E-03	1.39E-02	2.239E+00	3.650E+02	0.558
α_3	1.73E-03	5.97E-03	5.37E-03	1.23E-02	3.214E+00	5.352E+02	0.381
α_4	1.97E-03	6.45E-03	5.84E-03	1.30E-02	3.438E+00	5.298E+02	0.384
α_5	1.49E-03	5.75E-03	5.10E-03	1.22E-02	2.831E+00	4.895E+02	0.416
α_6	8.26E-04	4.32E-03	3.67E-03	1.01E-02	2.118E+00	4.877E+02	0.418
α_7	1.06E-04	2.10E-03	1.45E-03	6.29E-03	9.934E-01	4.725E+02	0.433
α_8	1.86E-10	6.08E-04	5.03E-05	3.20E-03	1.843E-01	3.031E+02	0.676

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	8.47E-01	9.08E-01	9.25E-01	9.50E-01	9.55E-01	9.67E-01	9.69E-01
α_2	1.53E-01	3.07E-02	2.64E-02	1.66E-02	1.05E-02	7.39E-03	6.10E-03
α_3		6.10E-02	2.38E-02	1.42E-02	1.46E-02	8.11E-03	5.97E-03
α_4			2.53E-02	1.23E-02	8.91E-03	7.38E-03	6.45E-03
α_5				6.48E-03	7.96E-03	5.71E-03	5.75E-03
α_6					3.03E-03	3.54E-03	4.32E-03
α_7						9.10E-04	2.10E-03
α_8							6.08E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	8.47E-01	9.08E-01	9.25E-01	9.50E-01	9.55E-01	9.67E-01	9.69E-01
Beta	1.53E-01	9.17E-02	7.54E-02	4.95E-02	4.50E-02	3.30E-02	3.13E-02
Gamma		6.66E-01	6.50E-01	6.65E-01	7.66E-01	7.76E-01	8.05E-01
Delta			5.15E-01	5.70E-01	5.78E-01	6.84E-01	7.63E-01
Epsilon				3.45E-01	5.52E-01	5.79E-01	6.65E-01
Mu					2.76E-01	4.38E-01	5.50E-01
Omega						2.04E-01	3.85E-01
Sigma							2.25E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.73	13.09	17.45	21.82	26.18	30.55	34.91
N_1	1.7333	1.5000	0.9333	0.3333	0.0000	0.0000	0.0000
N_2	5.4667	1.6000	1.8500	1.7917	1.0625	0.8313	0.6556
N_3		4.6000	2.4000	2.1250	2.6250	1.7438	1.2275

N₄			2.7500	2.3750	1.7500	1.9875	1.7656
N₅				1.3750	1.8750	1.8125	1.8200
N₆					0.6875	1.2813	1.5469
N₇						0.3438	0.8125
N₈							0.1719

Human Causal CCF Parameters

Not applicable as this CCF template is for the extreme environmental cause only.

Other/Unknown Causal CCF Parameters

Not applicable as this CCF template is for the extreme environmental cause only.

2.6.3.2 CWS-TSA-PG-NE: CWS Travelling Screens Plug Non-Environmental

Generic CCF Parameters

System Group: Raw Water
System: Circulating Water System
Component Group: Filter
Component Type: Strainer
Component Subtype: Traveling Screen
Failure Mode: Plug
Date Range: 2006 through 2020
Cause Group: Component, Design, Environment, Human, Other, Unknown
Cause: IW, IC, IQ, DC, DE, DM, EA, IE, HA, HP, HM, PA, OT, EC, OK
Prior: Default 2015

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9319869	0.9825706	0.9923504	0.9999473	1.0000000	2.641E+01	4.685E-01
α_2	4.94E-05	1.74E-02	7.65E-03	6.80E-02	0.00E+00	4.685E-01	2.641E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9491259	0.9821250	0.9869099	0.9987658	1.0000000	6.198E+01	1.128E+00
α_2	4.53E-04	1.35E-02	8.81E-03	4.25E-02	0.00E+00	8.512E-01	6.226E+01
α_3	2.19E-07	4.39E-03	9.41E-04	2.06E-02	0.00E+00	2.768E-01	6.283E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9530858	0.9803911	0.9836046	0.9967121	1.0000000	9.468E+01	1.894E+00
α_2	1.13E-03	1.30E-02	9.87E-03	3.58E-02	0.00E+00	1.260E+00	9.531E+01
α_3	4.53E-06	4.17E-03	1.53E-03	1.73E-02	0.00E+00	4.024E-01	9.617E+01
α_4	1.66E-08	2.40E-03	3.58E-04	1.19E-02	0.00E+00	2.315E-01	9.634E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9652486	0.9826895	0.9842843	0.9946781	1.0000000	1.948E+02	3.432E+00
α_2	1.65E-03	9.70E-03	8.11E-03	2.32E-02	0.00E+00	1.924E+00	1.963E+02
α_3	3.06E-04	5.29E-03	3.75E-03	1.55E-02	0.00E+00	1.049E+00	1.972E+02
α_4	1.47E-06	1.93E-03	6.65E-04	8.13E-03	0.00E+00	3.822E-01	1.979E+02
α_5	3.36E-20	3.87E-04	3.61E-07	2.25E-03	0.00E+00	7.674E-02	1.982E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9679315	0.9835450	0.9849062	0.9944998	1.0000000	2.292E+02	3.835E+00

α_2	1.05E-03	7.30E-03	5.95E-03	1.82E-02	0.00E+00	1.701E+00	2.314E+02
α_3	4.09E-04	5.18E-03	3.85E-03	1.45E-02	0.00E+00	1.207E+00	2.318E+02
α_4	2.34E-05	2.56E-03	1.34E-03	9.21E-03	0.00E+00	5.960E-01	2.325E+02
α_5	3.71E-09	9.49E-04	1.27E-04	4.76E-03	0.00E+00	2.211E-01	2.328E+02
α_6	3.71E-15	4.71E-04	4.77E-06	2.72E-03	0.00E+00	1.098E-01	2.329E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9734614	0.9849367	0.9857739	0.9935469	1.0000000	3.758E+02	5.747E+00
α_2	1.20E-03	5.88E-03	5.04E-03	1.34E-02	0.00E+00	2.243E+00	3.793E+02
α_3	5.73E-04	4.27E-03	3.44E-03	1.08E-02	0.00E+00	1.630E+00	3.799E+02
α_4	1.77E-04	2.84E-03	2.03E-03	8.26E-03	0.00E+00	1.083E+00	3.805E+02
α_5	1.07E-05	1.48E-03	7.47E-04	5.44E-03	0.00E+00	5.654E-01	3.810E+02
α_6	2.76E-10	5.02E-04	4.64E-05	2.62E-03	0.00E+00	1.916E-01	3.814E+02
α_7	6.25E-41	9.12E-05	3.39E-12	4.00E-04	0.00E+00	3.480E-02	3.815E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9747326	0.9856770	0.9864773	0.9938818	1.0000000	3.940E+02	5.726E+00
α_2	9.10E-04	5.05E-03	4.25E-03	1.19E-02	0.00E+00	2.018E+00	3.977E+02
α_3	3.59E-04	3.48E-03	2.69E-03	9.28E-03	0.00E+00	1.391E+00	3.984E+02
α_4	1.58E-04	2.66E-03	1.89E-03	7.78E-03	0.00E+00	1.062E+00	3.987E+02
α_5	3.10E-05	1.76E-03	1.03E-03	5.97E-03	0.00E+00	7.026E-01	3.990E+02
α_6	3.44E-07	8.75E-04	2.69E-04	3.80E-03	0.00E+00	3.497E-01	3.994E+02
α_7	1.32E-15	2.70E-04	2.48E-06	1.56E-03	0.00E+00	1.078E-01	3.996E+02
α_8	2.76E-17	2.37E-04	1.00E-06	1.38E-03	0.00E+00	9.469E-02	3.997E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.82E-01	9.80E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.74E-02	1.35E-02	1.30E-02	9.70E-03	7.30E-03	5.88E-03	5.05E-03
α_3		4.39E-03	4.17E-03	5.29E-03	5.18E-03	4.27E-03	3.48E-03
α_4			2.40E-03	1.93E-03	2.56E-03	2.84E-03	2.66E-03
α_5				3.87E-04	9.49E-04	1.48E-03	1.76E-03
α_6					4.71E-04	5.02E-04	8.75E-04
α_7						9.12E-05	2.70E-04
α_8							2.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.82E-01	9.80E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.74E-02	1.79E-02	1.96E-02	1.73E-02	1.65E-02	1.51E-02	1.43E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9501285	0.9874317	0.9947333	0.9999721	3.534E+01	4.498E-01	--
α_2	2.79E-05	1.26E-02	5.27E-03	4.99E-02	4.498E-01	3.534E+01	0.422

CCCG = 3, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9681251	0.9886668	0.9916109	0.9991445	1.028E+02	1.178E+00	--
α_2	4.14E-04	9.41E-03	6.40E-03	2.87E-02	9.387E-01	9.880E+01	0.368
α_3	2.01E-08	1.92E-03	3.09E-04	9.42E-03	2.396E-01	1.245E+02	0.295

CCCG = 4, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9706658	0.9877697	0.9897938	0.9979510	1.533E+02	1.898E+00	--
α_2	7.77E-04	8.67E-03	6.58E-03	2.37E-02	1.285E+00	1.470E+02	0.359
α_3	2.14E-06	2.33E-03	8.31E-04	9.75E-03	3.927E-01	1.679E+02	0.316
α_4	4.72E-09	1.23E-03	1.64E-04	6.18E-03	2.207E-01	1.791E+02	0.297

CCCG = 5, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9780639	0.9890358	0.9900382	0.9965827	3.162E+02	3.506E+00	--
α_2	1.18E-03	6.63E-03	5.57E-03	1.57E-02	1.992E+00	2.987E+02	0.366
α_3	1.85E-04	3.00E-03	2.14E-03	8.74E-03	1.078E+00	3.581E+02	0.307
α_4	5.42E-07	1.03E-03	3.34E-04	4.44E-03	3.632E-01	3.509E+02	0.313
α_5	2.80E-21	3.04E-04	1.76E-07	1.76E-03	7.248E-02	2.385E+02	0.462

CCCG = 6, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9785401	0.9887438	0.9896050	0.9960052	3.689E+02	4.199E+00	--
α_2	1.06E-03	6.15E-03	5.14E-03	1.47E-02	1.941E+00	3.137E+02	0.435
α_3	2.72E-04	2.85E-03	2.18E-03	7.72E-03	1.332E+00	4.658E+02	0.294
α_4	1.49E-05	1.39E-03	7.50E-04	4.96E-03	6.181E-01	4.430E+02	0.310
α_5	3.81E-09	5.57E-04	8.25E-05	2.76E-03	2.313E-01	4.151E+02	0.331
α_6	2.78E-20	3.06E-04	2.88E-07	1.78E-03	7.684E-02	2.513E+02	0.546

CCCG = 7, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9810396	0.9890524	0.9896207	0.9951244	5.622E+02	6.223E+00	--
α_2	1.42E-03	5.81E-03	5.11E-03	1.26E-02	2.654E+00	4.538E+02	0.473
α_3	3.18E-04	2.34E-03	1.89E-03	5.90E-03	1.645E+00	7.020E+02	0.307
α_4	1.07E-04	1.62E-03	1.17E-03	4.66E-03	1.115E+00	6.885E+02	0.313
α_5	8.20E-06	8.50E-04	4.49E-04	3.05E-03	6.034E-01	7.096E+02	0.304
α_6	4.55E-11	2.57E-04	1.91E-05	1.36E-03	1.780E-01	6.928E+02	0.312
α_7	3.95E-51	7.25E-05	1.49E-14	2.56E-04	2.734E-02	3.769E+02	0.573

CCCG = 8, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9802459	0.9885829	0.9891729	0.9949051	5.408E+02	6.246E+00	--
α_2	1.30E-03	5.66E-03	4.93E-03	1.25E-02	2.504E+00	4.399E+02	0.505
α_3	2.23E-04	2.08E-03	1.62E-03	5.52E-03	1.419E+00	6.804E+02	0.328
α_4	7.66E-05	1.40E-03	9.79E-04	4.14E-03	1.027E+00	7.347E+02	0.304
α_5	2.19E-05	1.07E-03	6.38E-04	3.56E-03	7.337E-01	6.878E+02	0.325
α_6	5.09E-07	5.12E-04	1.85E-04	2.13E-03	3.975E-01	7.759E+02	0.288
α_7	1.02E-20	1.02E-04	9.81E-08	5.94E-04	7.703E-02	7.523E+02	0.297
α_8	5.58E-18	6.00E-04	1.50E-06	3.51E-03	8.749E-02	1.456E+02	1.533

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.89E-01	9.88E-01	9.89E-01	9.89E-01	9.89E-01	9.89E-01
α_2	1.26E-02	9.41E-03	8.67E-03	6.63E-03	6.15E-03	5.81E-03	5.66E-03
α_3		1.92E-03	2.33E-03	3.00E-03	2.85E-03	2.34E-03	2.08E-03
α_4			1.23E-03	1.03E-03	1.39E-03	1.62E-03	1.40E-03
α_5				3.04E-04	5.57E-04	8.50E-04	1.07E-03
α_6					3.06E-04	2.57E-04	5.12E-04
α_7						7.25E-05	1.02E-04
α_8							6.00E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.89E-01	9.88E-01	9.89E-01	9.89E-01	9.89E-01	9.89E-01
Beta	1.26E-02	1.13E-02	1.22E-02	1.10E-02	1.13E-02	1.09E-02	1.14E-02
Gamma		1.70E-01	2.91E-01	3.96E-01	4.54E-01	4.69E-01	5.04E-01
Delta			3.45E-01	3.08E-01	4.42E-01	5.45E-01	6.39E-01
Epsilon				2.27E-01	3.82E-01	4.22E-01	6.20E-01
Mu					3.54E-01	2.79E-01	5.33E-01
Omega						2.20E-01	5.78E-01
Sigma							8.54E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.750

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9199647	0.9809502	0.9932891	0.9999856	1.957E+01	3.801E-01	--
α_2	1.44E-05	1.90E-02	6.71E-03	8.00E-02	3.801E-01	1.957E+01	0.422

CCCG = 3, Gamma = 0.750

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9396666	0.9799444	0.9861382	0.9990540	4.691E+01	9.600E-01	--
α_2	2.20E-04	1.48E-02	8.51E-03	5.10E-02	6.673E-01	4.428E+01	0.368
α_3	4.48E-07	5.21E-03	1.23E-03	2.40E-02	2.927E-01	5.591E+01	0.295

CCCG = 4, Gamma = 0.750

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9450801	0.9779316	0.9819916	0.9968892	7.396E+01	1.669E+00	--
α_2	8.28E-04	1.45E-02	1.03E-02	4.26E-02	1.039E+00	7.060E+01	0.359
α_3	4.11E-06	4.78E-03	1.69E-03	2.00E-02	3.887E-01	8.095E+01	0.316
α_4	3.18E-08	2.79E-03	4.56E-04	1.36E-02	2.414E-01	8.641E+01	0.297

CCCG = 5, Gamma = 0.750

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9611984	0.9805741	0.9823309	0.9939452	1.760E+02	3.487E+00	--
α_2	1.66E-03	1.07E-02	8.85E-03	2.62E-02	1.791E+00	1.651E+02	0.366
α_3	4.78E-04	6.05E-03	4.50E-03	1.69E-02	1.207E+00	1.982E+02	0.307
α_4	3.92E-06	2.23E-03	8.86E-04	8.98E-03	4.340E-01	1.945E+02	0.313
α_5	9.18E-27	4.15E-04	1.47E-08	2.28E-03	5.493E-02	1.324E+02	0.462

CCCG = 6, Gamma = 0.750

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9647425	0.9818120	0.9832873	0.9938404	2.108E+02	3.905E+00	--
α_2	7.39E-04	7.68E-03	5.89E-03	2.07E-02	1.335E+00	1.724E+02	0.435
α_3	7.25E-04	5.95E-03	4.73E-03	1.54E-02	1.531E+00	2.556E+02	0.294
α_4	5.66E-05	2.95E-03	1.75E-03	9.91E-03	7.191E-01	2.435E+02	0.310
α_5	1.57E-08	1.08E-03	1.84E-04	5.25E-03	2.467E-01	2.283E+02	0.331
α_6	5.77E-21	5.26E-04	3.16E-07	3.05E-03	7.279E-02	1.383E+02	0.546

CCCG = 7, Gamma = 0.750

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9710798	0.9835648	0.9844745	0.9929431	3.453E+02	5.770E+00	--
α_2	7.33E-04	5.90E-03	4.70E-03	1.52E-02	1.549E+00	2.610E+02	0.473
α_3	8.70E-04	4.92E-03	4.13E-03	1.17E-02	1.989E+00	4.027E+02	0.307
α_4	2.90E-04	3.25E-03	2.46E-03	8.89E-03	1.287E+00	3.953E+02	0.313
α_5	2.81E-05	1.69E-03	9.79E-04	5.78E-03	6.913E-01	4.078E+02	0.304
α_6	4.30E-09	5.84E-04	8.77E-05	2.89E-03	2.327E-01	3.983E+02	0.312
α_7	6.61E-65	9.74E-05	1.47E-17	2.45E-04	2.112E-02	2.167E+02	0.573

CCCG = 8, Gamma = 0.750

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9742521	0.9847084	0.9854072	0.9927783	4.518E+02	7.016E+00	--
α_2	6.22E-04	4.84E-03	3.88E-03	1.24E-02	1.583E+00	3.252E+02	0.505
α_3	6.96E-04	3.94E-03	3.31E-03	9.36E-03	1.986E+00	5.015E+02	0.328
α_4	4.29E-04	3.08E-03	2.49E-03	7.72E-03	1.672E+00	5.417E+02	0.304
α_5	1.05E-04	1.99E-03	1.39E-03	5.93E-03	1.011E+00	5.075E+02	0.325
α_6	7.52E-06	9.96E-04	5.06E-04	3.65E-03	5.709E-01	5.727E+02	0.288
α_7	7.46E-11	3.26E-04	2.54E-05	1.72E-03	1.809E-01	5.555E+02	0.297
α_8	1.67E-107	1.16E-04	3.51E-27	8.68E-05	1.245E-02	1.076E+02	1.533

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.80E-01	9.78E-01	9.81E-01	9.82E-01	9.84E-01	9.85E-01
α_2	1.90E-02	1.48E-02	1.45E-02	1.07E-02	7.68E-03	5.90E-03	4.84E-03
α_3		5.21E-03	4.78E-03	6.05E-03	5.95E-03	4.92E-03	3.94E-03
α_4			2.79E-03	2.23E-03	2.95E-03	3.25E-03	3.08E-03
α_5				4.15E-04	1.08E-03	1.69E-03	1.99E-03
α_6					5.26E-04	5.84E-04	9.96E-04
α_7						9.74E-05	3.26E-04
α_8							1.16E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.80E-01	9.78E-01	9.81E-01	9.82E-01	9.84E-01	9.85E-01
Beta	1.90E-02	2.01E-02	2.21E-02	1.94E-02	1.82E-02	1.64E-02	1.53E-02
Gamma		2.60E-01	3.43E-01	4.48E-01	5.78E-01	6.41E-01	6.83E-01
Delta			3.68E-01	3.04E-01	4.33E-01	5.33E-01	6.22E-01
Epsilon				1.57E-01	3.53E-01	4.22E-01	5.27E-01
Mu					3.28E-01	2.87E-01	4.20E-01
Omega						1.43E-01	3.07E-01
Sigma							2.62E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9254105	0.9808392	0.9915376	0.9999442	2.409E+01	4.706E-01	--
α_2	5.58E-05	1.92E-02	8.46E-03	7.46E-02	4.706E-01	2.409E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9492792	0.9823211	0.9871539	0.9988381	6.126E+01	1.103E+00	--
α_2	3.76E-04	1.30E-02	8.28E-03	4.17E-02	8.104E-01	6.155E+01	--
α_3	3.95E-07	4.68E-03	1.10E-03	2.16E-02	2.921E-01	6.207E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9595678	0.9829546	0.9856771	0.9970284	1.126E+02	1.953E+00	--
α_2	1.07E-03	1.15E-02	8.76E-03	3.10E-02	1.312E+00	1.132E+02	--
α_3	6.33E-06	3.76E-03	1.49E-03	1.52E-02	4.307E-01	1.141E+02	--
α_4	3.65E-09	1.83E-03	2.17E-04	9.33E-03	2.099E-01	1.143E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9696218	0.9852970	0.9867994	0.9958370	2.082E+02	3.107E+00	--
α_2	1.13E-03	7.97E-03	6.48E-03	1.99E-02	1.684E+00	2.096E+02	--
α_3	1.97E-04	4.46E-03	3.03E-03	1.36E-02	9.426E-01	2.104E+02	--
α_4	1.36E-06	1.81E-03	6.21E-04	7.62E-03	3.816E-01	2.109E+02	--
α_5	1.87E-16	4.67E-04	2.56E-06	2.72E-03	9.865E-02	2.112E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9733376	0.9863454	0.9874863	0.9954551	2.761E+02	3.822E+00	--
α_2	8.87E-04	6.12E-03	4.99E-03	1.52E-02	1.714E+00	2.782E+02	--
α_3	2.60E-04	3.96E-03	2.86E-03	1.14E-02	1.108E+00	2.788E+02	--
α_4	3.07E-05	2.33E-03	1.30E-03	8.12E-03	6.509E-01	2.793E+02	--
α_5	1.79E-08	9.06E-04	1.63E-04	4.37E-03	2.536E-01	2.797E+02	--
α_6	5.54E-17	3.42E-04	1.55E-06	1.99E-03	9.572E-02	2.798E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9771222	0.9873350	0.9881185	0.9948722	4.050E+02	5.195E+00	--
α_2	9.74E-04	5.13E-03	4.35E-03	1.20E-02	2.105E+00	4.081E+02	--
α_3	3.02E-04	3.22E-03	2.46E-03	8.74E-03	1.320E+00	4.089E+02	--
α_4	1.24E-04	2.43E-03	1.68E-03	7.28E-03	9.967E-01	4.092E+02	--
α_5	6.47E-06	1.28E-03	6.08E-04	4.83E-03	5.249E-01	4.097E+02	--
α_6	3.54E-10	4.77E-04	4.66E-05	2.47E-03	1.956E-01	4.100E+02	--
α_7	3.68E-28	1.29E-04	2.92E-09	7.00E-04	5.291E-02	4.101E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787229	0.9878938	0.9885625	0.9947813	4.759E+02	5.832E+00	--
α_2	9.39E-04	4.63E-03	3.96E-03	1.06E-02	2.229E+00	4.795E+02	--
α_3	2.24E-04	2.62E-03	1.97E-03	7.22E-03	1.260E+00	4.805E+02	--
α_4	1.23E-04	2.16E-03	1.53E-03	6.38E-03	1.042E+00	4.807E+02	--
α_5	3.72E-05	1.58E-03	9.69E-04	5.22E-03	7.626E-01	4.810E+02	--
α_6	1.55E-07	6.79E-04	1.90E-04	3.02E-03	3.271E-01	4.814E+02	--
α_7	2.70E-13	2.79E-04	7.48E-06	1.57E-03	1.344E-01	4.816E+02	--
α_8	1.44E-20	1.59E-04	1.50E-07	9.26E-04	7.682E-02	4.817E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.92E-02	1.30E-02	1.15E-02	7.97E-03	6.12E-03	5.13E-03	4.63E-03
α_3		4.68E-03	3.76E-03	4.46E-03	3.96E-03	3.22E-03	2.62E-03
α_4			1.83E-03	1.81E-03	2.33E-03	2.43E-03	2.16E-03
α_5				4.67E-04	9.06E-04	1.28E-03	1.58E-03
α_6					3.42E-04	4.77E-04	6.79E-04
α_7						1.29E-04	2.79E-04
α_8							1.59E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.92E-02	1.77E-02	1.70E-02	1.47E-02	1.37E-02	1.27E-02	1.21E-02
Gamma		2.65E-01	3.28E-01	4.58E-01	5.52E-01	5.95E-01	6.18E-01
Delta			3.28E-01	3.38E-01	4.74E-01	5.73E-01	6.50E-01
Epsilon				2.05E-01	3.49E-01	4.37E-01	5.55E-01
Mu					2.74E-01	3.21E-01	4.14E-01
Omega						2.13E-01	3.92E-01
Sigma							3.64E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.7 Heat Exchangers

2.7.1 Pooled Heat Exchangers

2.7.1.1 ALL-HTX-HT: All Systems Heat Exchangers Loss of Heat Transfer

Generic CCF Parameters

Component Group: Other
Component Type: Heat Exchanger
Failure Mode: Loss of Heat Transfer
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 15.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9378731	0.9814004	0.9888171	0.9996349	0.9841270	3.791E+01	7.185E-01
α_2	3.63E-04	1.86E-02	1.12E-02	6.21E-02	1.59E-02	7.185E-01	3.791E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9504217	0.9802619	0.9839980	0.9973268	0.9786096	8.085E+01	1.628E+00
α_2	1.22E-03	1.49E-02	1.12E-02	4.12E-02	1.60E-02	1.226E+00	8.126E+01
α_3	5.25E-06	4.87E-03	1.79E-03	2.02E-02	5.35E-03	4.018E-01	8.208E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9545557	0.9791014	0.9816342	0.9949968	0.9777778	1.209E+02	2.581E+00
α_2	1.80E-03	1.32E-02	1.07E-02	3.33E-02	1.21E-02	1.635E+00	1.219E+02
α_3	7.07E-05	5.28E-03	2.96E-03	1.84E-02	8.08E-03	6.524E-01	1.229E+02
α_4	2.12E-07	2.38E-03	5.64E-04	1.10E-02	2.02E-03	2.940E-01	1.232E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9654058	0.9817622	0.9831226	0.9934582	0.9788790	2.285E+02	4.245E+00
α_2	1.96E-03	9.61E-03	8.25E-03	2.19E-02	8.12E-03	2.237E+00	2.305E+02
α_3	5.83E-04	5.85E-03	4.51E-03	1.57E-02	8.12E-03	1.362E+00	2.314E+02
α_4	1.33E-05	2.31E-03	1.12E-03	8.65E-03	4.06E-03	5.385E-01	2.322E+02
α_5	2.36E-15	4.64E-04	4.30E-06	2.68E-03	8.12E-04	1.080E-01	2.326E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9682743	0.9828186	0.9839734	0.9934058	0.9806320	2.703E+02	4.726E+00
α_2	1.20E-03	7.04E-03	5.88E-03	1.68E-02	5.10E-03	1.935E+00	2.731E+02
α_3	6.65E-04	5.52E-03	4.38E-03	1.43E-02	6.80E-03	1.520E+00	2.735E+02

α_4	9.30E-05	3.02E-03	1.93E-03	9.65E-03	5.10E-03	8.303E-01	2.742E+02
α_5	1.89E-07	1.14E-03	3.02E-04	5.15E-03	2.04E-03	3.148E-01	2.747E+02
α_6	9.52E-14	4.56E-04	8.99E-06	2.59E-03	3.40E-04	1.254E-01	2.749E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9736049	0.9844913	0.9852323	0.9928394	0.9824741	4.244E+02	6.685E+00
α_2	1.23E-03	5.58E-03	4.84E-03	1.25E-02	3.07E-03	2.407E+00	4.286E+02
α_3	7.38E-04	4.41E-03	3.68E-03	1.06E-02	5.11E-03	1.903E+00	4.291E+02
α_4	3.11E-04	3.15E-03	2.42E-03	8.47E-03	5.11E-03	1.356E+00	4.297E+02
α_5	3.41E-05	1.69E-03	1.01E-03	5.67E-03	3.07E-03	7.294E-01	4.303E+02
α_6	8.16E-09	5.71E-04	9.69E-05	2.78E-03	1.02E-03	2.463E-01	4.308E+02
α_7	3.97E-34	9.89E-05	1.16E-10	4.91E-04	1.46E-04	4.261E-02	4.310E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9750681	0.9853519	0.9860524	0.9932378	0.9841819	4.501E+02	6.690E+00
α_2	8.95E-04	4.66E-03	3.96E-03	1.08E-02	1.79E-03	2.127E+00	4.546E+02
α_3	4.64E-04	3.52E-03	2.83E-03	8.95E-03	3.59E-03	1.609E+00	4.551E+02
α_4	2.81E-04	2.92E-03	2.24E-03	7.91E-03	4.48E-03	1.336E+00	4.554E+02
α_5	8.38E-05	2.02E-03	1.35E-03	6.21E-03	3.59E-03	9.213E-01	4.558E+02
α_6	2.47E-06	1.01E-03	4.23E-04	3.98E-03	1.79E-03	4.591E-01	4.563E+02
α_7	6.07E-13	3.05E-04	9.42E-06	1.70E-03	5.12E-04	1.391E-01	4.566E+02
α_8	8.47E-17	2.16E-04	1.18E-06	1.25E-03	6.40E-05	9.860E-02	4.566E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.80E-01	9.79E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01
α_2	1.86E-02	1.49E-02	1.32E-02	9.61E-03	7.04E-03	5.58E-03	4.66E-03
α_3		4.87E-03	5.28E-03	5.85E-03	5.52E-03	4.41E-03	3.52E-03
α_4			2.38E-03	2.31E-03	3.02E-03	3.15E-03	2.92E-03
α_5				4.64E-04	1.14E-03	1.69E-03	2.02E-03
α_6					4.56E-04	5.71E-04	1.01E-03
α_7						9.89E-05	3.05E-04
α_8							2.16E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.80E-01	9.79E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01
Beta	1.86E-02	1.97E-02	2.09E-02	1.82E-02	1.72E-02	1.55E-02	1.46E-02
Gamma		2.47E-01	3.67E-01	4.73E-01	5.90E-01	6.40E-01	6.82E-01
Delta			3.11E-01	3.22E-01	4.55E-01	5.55E-01	6.47E-01
Epsilon				1.67E-01	3.46E-01	4.29E-01	5.48E-01
Mu					2.85E-01	2.84E-01	4.31E-01
Omega						1.48E-01	3.41E-01
Sigma							4.15E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	15.00	22.50	30.00	37.50	45.00	52.50	60.00
N₁	0.5000	0.3750	0.2500	0.1563	0.0938	0.0547	0.0313
N₂	0.2500	0.3750	0.3750	0.3125	0.2344	0.1641	0.1094
N₃		0.1250	0.2500	0.3125	0.3125	0.2734	0.2188
N₄			0.0625	0.1563	0.2344	0.2734	0.2734
N₅				0.0313	0.0938	0.1641	0.2188
N₆					0.0156	0.0547	0.1094
N₇						0.0078	0.0313
N₈							0.0039

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 1.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.095

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9636073	0.9906021	0.9958014	0.9999687	5.095E+01	4.834E-01	--
α_2	3.13E-05	9.40E-03	4.20E-03	3.64E-02	4.834E-01	5.095E+01	0.891

CCCG = 3, Gamma = 0.096

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9810276	0.9931774	0.9948989	0.9994438	1.784E+02	1.226E+00	--
α_2	2.77E-04	5.70E-03	3.93E-03	1.72E-02	9.769E-01	1.704E+02	0.777
α_3	1.79E-08	1.12E-03	1.95E-04	5.44E-03	2.487E-01	2.212E+02	0.601

CCCG = 4, Gamma = 0.097

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9827810	0.9926525	0.9937880	0.9986416	2.779E+02	2.057E+00	--
α_2	5.71E-04	5.18E-03	4.05E-03	1.36E-02	1.442E+00	2.770E+02	0.671
α_3	1.98E-06	1.58E-03	5.94E-04	6.51E-03	4.114E-01	2.597E+02	0.719
α_4	7.70E-10	5.87E-04	6.39E-05	3.01E-03	2.036E-01	3.466E+02	0.539

CCCG = 5, Gamma = 0.097

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9891118	0.9944951	0.9949795	0.9982236	6.654E+02	3.683E+00	--
α_2	6.93E-04	3.40E-03	2.91E-03	7.76E-03	2.243E+00	6.583E+02	0.542
α_3	6.91E-05	1.38E-03	9.51E-04	4.13E-03	9.912E-01	7.193E+02	0.497
α_4	3.88E-07	5.69E-04	1.92E-04	2.41E-03	3.765E-01	6.609E+02	0.541
α_5	1.42E-21	1.64E-04	9.32E-08	9.45E-04	7.237E-02	4.425E+02	0.809

CCCG = 6, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9888452	0.9941818	0.9946381	0.9979601	7.073E+02	4.139E+00	--
α_2	6.40E-04	3.33E-03	2.83E-03	7.74E-03	2.128E+00	6.368E+02	0.640
α_3	8.76E-05	1.27E-03	9.24E-04	3.64E-03	1.134E+00	8.906E+02	0.459
α_4	4.65E-06	7.13E-04	3.53E-04	2.64E-03	5.533E-01	7.756E+02	0.527
α_5	1.21E-09	3.11E-04	4.15E-05	1.56E-03	2.210E-01	7.095E+02	0.576
α_6	2.44E-16	1.92E-04	1.33E-06	1.11E-03	1.027E-01	5.361E+02	0.763

CCCG = 7, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9913995	0.9950050	0.9952589	0.9977437	1.281E+03	6.432E+00	--
α_2	6.96E-04	2.68E-03	2.37E-03	5.71E-03	2.840E+00	1.057E+03	0.654
α_3	1.58E-04	1.07E-03	8.71E-04	2.64E-03	1.746E+00	1.636E+03	0.423
α_4	4.51E-05	7.25E-04	5.18E-04	2.11E-03	1.084E+00	1.495E+03	0.463
α_5	2.05E-06	3.60E-04	1.74E-04	1.35E-03	5.376E-01	1.491E+03	0.464
α_6	1.16E-10	1.32E-04	1.34E-05	6.84E-04	1.979E-01	1.495E+03	0.463
α_7	7.03E-53	3.14E-05	3.14E-15	1.07E-04	2.656E-02	8.465E+02	0.818

CCCG = 8, Gamma = 0.098

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9912650	0.9949859	0.9952539	0.9977916	1.213E+03	6.112E+00	--
α_2	5.02E-04	2.32E-03	2.00E-03	5.22E-03	2.364E+00	1.017E+03	0.680
α_3	1.12E-04	9.44E-04	7.46E-04	2.45E-03	1.512E+00	1.600E+03	0.433
α_4	3.82E-05	6.52E-04	4.61E-04	1.91E-03	1.056E+00	1.620E+03	0.428
α_5	7.13E-06	4.71E-04	2.68E-04	1.62E-03	6.745E-01	1.432E+03	0.484
α_6	2.58E-08	1.92E-04	4.87E-05	8.71E-04	3.076E-01	1.603E+03	0.432
α_7	4.52E-16	6.46E-05	6.38E-07	3.73E-04	1.093E-01	1.691E+03	0.410
α_8	5.75E-18	3.72E-04	1.04E-06	2.17E-03	8.885E-02	2.386E+02	2.904

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.93E-01	9.93E-01	9.94E-01	9.94E-01	9.95E-01	9.95E-01
α_2	9.40E-03	5.70E-03	5.18E-03	3.40E-03	3.33E-03	2.68E-03	2.32E-03
α_3		1.12E-03	1.58E-03	1.38E-03	1.27E-03	1.07E-03	9.44E-04
α_4			5.87E-04	5.69E-04	7.13E-04	7.25E-04	6.52E-04
α_5				1.64E-04	3.11E-04	3.60E-04	4.71E-04
α_6					1.92E-04	1.32E-04	1.92E-04
α_7						3.14E-05	6.46E-05
α_8							3.72E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.93E-01	9.93E-01	9.94E-01	9.94E-01	9.95E-01	9.95E-01
Beta	9.40E-03	6.82E-03	7.35E-03	5.50E-03	5.82E-03	4.99E-03	5.01E-03
Gamma		1.65E-01	2.95E-01	3.83E-01	4.28E-01	4.64E-01	5.37E-01
Delta			2.71E-01	3.47E-01	4.89E-01	5.39E-01	6.50E-01
Epsilon				2.23E-01	4.14E-01	4.20E-01	6.28E-01
Mu					3.81E-01	3.12E-01	5.72E-01
Omega						1.92E-01	6.95E-01
Sigma							8.52E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.50	2.25	3.00	3.75	4.50	5.25	6.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 12.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.794

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9206238	0.9811082	0.9933465	0.9999858	1.974E+01	3.801E-01	--
α_2	1.42E-05	1.89E-02	6.65E-03	7.94E-02	3.801E-01	1.974E+01	0.891

CCCG = 3, Gamma = 0.802

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9353850	0.9785048	0.9851285	0.9989846	4.370E+01	9.600E-01	--
α_2	2.38E-04	1.60E-02	9.21E-03	5.51E-02	6.673E-01	4.092E+01	0.777
α_3	4.69E-07	5.45E-03	1.29E-03	2.51E-02	2.927E-01	5.344E+01	0.601

CCCG = 4, Gamma = 0.808

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9422671	0.9767887	0.9810503	0.9967253	7.024E+01	1.669E+00	--
α_2	8.35E-04	1.46E-02	1.04E-02	4.29E-02	1.039E+00	7.000E+01	0.671
α_3	5.05E-06	5.86E-03	2.07E-03	2.45E-02	3.887E-01	6.596E+01	0.719
α_4	3.12E-08	2.73E-03	4.46E-04	1.33E-02	2.414E-01	8.824E+01	0.539

CCCG = 5, Gamma = 0.812

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9586658	0.9792964	0.9811642	0.9935428	1.649E+02	3.487E+00	--
α_2	1.68E-03	1.09E-02	8.96E-03	2.66E-02	1.791E+00	1.631E+02	0.542
α_3	5.31E-04	6.71E-03	5.00E-03	1.88E-02	1.207E+00	1.786E+02	0.497
α_4	4.63E-06	2.63E-03	1.05E-03	1.06E-02	4.340E-01	1.646E+02	0.541
α_5	1.10E-26	4.97E-04	1.77E-08	2.74E-03	5.493E-02	1.104E+02	0.809

CCCG = 6, Gamma = 0.815

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9624500	0.9806213	0.9821895	0.9934335	1.976E+02	3.905E+00	--
α_2	7.47E-04	7.76E-03	5.96E-03	2.10E-02	1.335E+00	1.706E+02	0.640
α_3	7.77E-04	6.38E-03	5.07E-03	1.65E-02	1.531E+00	2.385E+02	0.459
α_4	6.62E-05	3.44E-03	2.04E-03	1.16E-02	7.191E-01	2.082E+02	0.527
α_5	1.88E-08	1.29E-03	2.20E-04	6.28E-03	2.467E-01	1.908E+02	0.576
α_6	5.53E-21	5.04E-04	3.03E-07	2.92E-03	7.279E-02	1.443E+02	0.763

CCCG = 7, Gamma = 0.818

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9691064	0.9824374	0.9834073	0.9924557	3.228E+02	5.770E+00	--
α_2	7.62E-04	6.14E-03	4.89E-03	1.58E-02	1.549E+00	2.507E+02	0.654
α_3	9.03E-04	5.10E-03	4.29E-03	1.21E-02	1.989E+00	3.878E+02	0.423
α_4	3.24E-04	3.61E-03	2.74E-03	9.90E-03	1.287E+00	3.548E+02	0.463
α_5	3.24E-05	1.95E-03	1.13E-03	6.65E-03	6.913E-01	3.544E+02	0.464
α_6	4.82E-09	6.54E-04	9.83E-05	3.23E-03	2.327E-01	3.556E+02	0.463
α_7	7.11E-65	1.05E-04	1.59E-17	2.64E-04	2.112E-02	2.015E+02	0.818

CCCG = 8, Gamma = 0.820

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9722331	0.9835038	0.9842559	0.9922062	4.183E+02	7.016E+00	--
α_2	6.52E-04	5.08E-03	4.07E-03	1.30E-02	1.583E+00	3.102E+02	0.680
α_3	7.16E-04	4.05E-03	3.40E-03	9.62E-03	1.986E+00	4.880E+02	0.433
α_4	4.70E-04	3.37E-03	2.73E-03	8.46E-03	1.672E+00	4.940E+02	0.428
α_5	1.22E-04	2.31E-03	1.61E-03	6.88E-03	1.011E+00	4.372E+02	0.484
α_6	8.80E-06	1.16E-03	5.91E-04	4.26E-03	5.709E-01	4.897E+02	0.432
α_7	8.01E-11	3.50E-04	2.73E-05	1.85E-03	1.809E-01	5.170E+02	0.410
α_8	2.47E-107	1.71E-04	5.18E-27	1.28E-04	1.245E-02	7.299E+01	2.904

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.79E-01	9.77E-01	9.79E-01	9.81E-01	9.82E-01	9.84E-01
α_2	1.89E-02	1.60E-02	1.46E-02	1.09E-02	7.76E-03	6.14E-03	5.08E-03
α_3		5.45E-03	5.86E-03	6.71E-03	6.38E-03	5.10E-03	4.05E-03
α_4			2.73E-03	2.63E-03	3.44E-03	3.61E-03	3.37E-03
α_5				4.97E-04	1.29E-03	1.95E-03	2.31E-03
α_6					5.04E-04	6.54E-04	1.16E-03
α_7						1.05E-04	3.50E-04
α_8							1.71E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.79E-01	9.77E-01	9.79E-01	9.81E-01	9.82E-01	9.84E-01
Beta	1.89E-02	2.15E-02	2.32E-02	2.07E-02	1.94E-02	1.76E-02	1.65E-02
Gamma		2.53E-01	3.70E-01	4.75E-01	5.99E-01	6.50E-01	6.92E-01
Delta			3.18E-01	3.18E-01	4.51E-01	5.53E-01	6.45E-01
Epsilon				1.59E-01	3.43E-01	4.28E-01	5.42E-01
Mu					2.81E-01	2.80E-01	4.22E-01
Omega						1.38E-01	3.09E-01
Sigma							3.28E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	12.50	18.75	25.00	31.25	37.50	43.75	50.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.111

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9188380	0.9756007	0.9852319	0.9995154	2.881E+01	7.206E-01	--
α_2	4.85E-04	2.44E-02	1.48E-02	8.12E-02	7.206E-01	2.881E+01	0.891

CCCG = 3, Gamma = 0.102

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9542609	0.9818979	0.9853840	0.9976077	8.692E+01	1.603E+00	--
α_2	1.09E-03	1.42E-02	1.06E-02	3.99E-02	1.185E+00	8.213E+01	0.777
α_3	5.32E-06	3.87E-03	1.48E-03	1.58E-02	4.171E-01	1.072E+02	0.601

CCCG = 4, Gamma = 0.095

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9674028	0.9849447	0.9867469	0.9963250	1.727E+02	2.640E+00	--
α_2	1.37E-03	9.64E-03	7.85E-03	2.40E-02	1.687E+00	1.733E+02	0.671
α_3	6.56E-05	4.16E-03	2.39E-03	1.43E-02	6.807E-01	1.628E+02	0.719
α_4	5.28E-08	1.25E-03	2.58E-04	5.89E-03	2.724E-01	2.177E+02	0.539

CCCG = 5, Gamma = 0.090

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9809873	0.9902112	0.9910150	0.9966890	3.965E+02	3.919E+00	--
α_2	8.96E-04	5.04E-03	4.23E-03	1.19E-02	1.997E+00	3.942E+02	0.542
α_3	2.47E-04	2.90E-03	2.18E-03	8.03E-03	1.255E+00	4.308E+02	0.497
α_4	7.73E-06	1.36E-03	6.57E-04	5.07E-03	5.379E-01	3.962E+02	0.541
α_5	2.26E-13	4.89E-04	1.13E-05	2.76E-03	1.299E-01	2.654E+02	0.809

CCCG = 6, Gamma = 0.087

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9827102	0.9906660	0.9913058	0.9964366	5.002E+02	4.713E+00	--
α_2	7.57E-04	4.39E-03	3.67E-03	1.05E-02	1.948E+00	4.416E+02	0.640
α_3	2.46E-04	2.29E-03	1.79E-03	6.08E-03	1.421E+00	6.177E+02	0.459
α_4	6.10E-05	1.64E-03	1.08E-03	5.14E-03	8.853E-01	5.380E+02	0.527
α_5	2.62E-07	7.05E-04	2.14E-04	3.07E-03	3.474E-01	4.924E+02	0.576
α_6	3.41E-15	2.99E-04	3.26E-06	1.72E-03	1.113E-01	3.721E+02	0.763

CCCG = 7, Gamma = 0.084

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9864464	0.9922076	0.9926206	0.9965587	7.809E+02	6.133E+00	--
α_2	7.40E-04	3.58E-03	3.07E-03	8.14E-03	2.269E+00	6.321E+02	0.654
α_3	2.10E-04	1.63E-03	1.30E-03	4.15E-03	1.593E+00	9.785E+02	0.423
α_4	1.24E-04	1.42E-03	1.07E-03	3.91E-03	1.270E+00	8.940E+02	0.463
α_5	1.27E-05	7.72E-04	4.45E-04	2.64E-03	6.890E-01	8.923E+02	0.464
α_6	4.78E-09	2.80E-04	4.90E-05	1.35E-03	2.503E-01	8.945E+02	0.463
α_7	4.37E-25	1.20E-04	1.28E-08	6.74E-04	6.072E-02	5.066E+02	0.818

CCCG = 8, Gamma = 0.082

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9868777	0.9922776	0.9926473	0.9964154	8.733E+02	6.797E+00	--
α_2	6.99E-04	3.27E-03	2.82E-03	7.37E-03	2.338E+00	7.134E+02	0.680
α_3	1.51E-04	1.31E-03	1.03E-03	3.44E-03	1.479E+00	1.123E+03	0.433
α_4	1.08E-04	1.16E-03	8.80E-04	3.15E-03	1.315E+00	1.137E+03	0.428
α_5	4.78E-05	9.75E-04	6.71E-04	2.94E-03	9.814E-01	1.005E+03	0.484
α_6	7.04E-07	3.88E-04	1.55E-04	1.56E-03	4.365E-01	1.125E+03	0.432
α_7	7.51E-12	1.40E-04	8.25E-06	7.52E-04	1.657E-01	1.187E+03	0.410
α_8	2.74E-19	4.82E-04	6.69E-07	2.81E-03	8.073E-02	1.675E+02	2.904

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.76E-01	9.82E-01	9.85E-01	9.90E-01	9.91E-01	9.92E-01	9.92E-01
α_2	2.44E-02	1.42E-02	9.64E-03	5.04E-03	4.39E-03	3.58E-03	3.27E-03
α_3		3.87E-03	4.16E-03	2.90E-03	2.29E-03	1.63E-03	1.31E-03
α_4			1.25E-03	1.36E-03	1.64E-03	1.42E-03	1.16E-03
α_5				4.89E-04	7.05E-04	7.72E-04	9.75E-04
α_6					2.99E-04	2.80E-04	3.88E-04
α_7						1.20E-04	1.40E-04
α_8							4.82E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.76E-01	9.82E-01	9.85E-01	9.90E-01	9.91E-01	9.92E-01	9.92E-01
Beta	2.44E-02	1.81E-02	1.51E-02	9.79E-03	9.33E-03	7.79E-03	7.72E-03
Gamma		2.14E-01	3.60E-01	4.85E-01	5.29E-01	5.41E-01	5.77E-01
Delta			2.31E-01	3.88E-01	5.36E-01	6.14E-01	7.05E-01
Epsilon				2.65E-01	3.79E-01	4.52E-01	6.32E-01
Mu					2.98E-01	3.41E-01	5.08E-01
Omega						3.00E-01	6.16E-01
Sigma							7.75E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.50	2.00	2.50	3.00	3.50	4.00
N_1	0.5000	0.3750	0.2500	0.1563	0.0938	0.0547	0.0313
N_2	0.2500	0.3750	0.3750	0.3125	0.2344	0.1641	0.1094
N_3		0.1250	0.2500	0.3125	0.3125	0.2734	0.2188

N₄			0.0625	0.1563	0.2344	0.2734	0.2734
N₅				0.0313	0.0938	0.1641	0.2188
N₆					0.0156	0.0547	0.1094
N₇						0.0078	0.0313
N₈							0.0039

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.7.2.1 CCW-HTX-HT: CCW Heat Exchangers Loss of Heat Transfer

Generic CCF Parameters

System Group: Clean Water
System: Component Cooling Water
Component Group: Other
Component Type: Heat Exchanger
Failure Mode: Loss of Heat Transfer
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 11.5

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9317504	0.9795474	0.9876821	0.9995977	0.9795918	3.441E+01	7.185E-01
α_2	4.00E-04	2.05E-02	1.23E-02	6.82E-02	2.04E-02	7.185E-01	3.441E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9470854	0.9789201	0.9829008	0.9971422	0.9724138	7.560E+01	1.628E+00
α_2	1.31E-03	1.59E-02	1.19E-02	4.39E-02	2.07E-02	1.226E+00	7.601E+01
α_3	5.61E-06	5.20E-03	1.91E-03	2.15E-02	6.90E-03	4.018E-01	7.683E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9518503	0.9778458	0.9805242	0.9946917	0.9712794	1.139E+02	2.581E+00
α_2	1.91E-03	1.40E-02	1.14E-02	3.53E-02	1.57E-02	1.635E+00	1.149E+02
α_3	7.50E-05	5.60E-03	3.14E-03	1.95E-02	1.04E-02	6.524E-01	1.159E+02
α_4	2.25E-07	2.52E-03	5.98E-04	1.16E-02	2.61E-03	2.940E-01	1.162E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9640684	0.9810498	0.9824614	0.9931999	0.9726604	2.197E+02	4.245E+00
α_2	2.04E-03	9.99E-03	8.57E-03	2.28E-02	1.05E-02	2.237E+00	2.218E+02
α_3	6.06E-04	6.08E-03	4.69E-03	1.63E-02	1.05E-02	1.362E+00	2.226E+02
α_4	1.38E-05	2.40E-03	1.17E-03	8.98E-03	5.26E-03	5.385E-01	2.235E+02
α_5	2.45E-15	4.82E-04	4.46E-06	2.79E-03	1.05E-03	1.080E-01	2.239E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9670226	0.9821367	0.9833358	0.9931416	0.9749009	2.598E+02	4.726E+00
α_2	1.25E-03	7.32E-03	6.12E-03	1.75E-02	6.61E-03	1.935E+00	2.626E+02
α_3	6.91E-04	5.74E-03	4.56E-03	1.49E-02	8.81E-03	1.520E+00	2.630E+02
α_4	9.68E-05	3.14E-03	2.01E-03	1.00E-02	6.61E-03	8.303E-01	2.637E+02

α_5	1.97E-07	1.19E-03	3.14E-04	5.36E-03	2.64E-03	3.148E-01	2.642E+02
α_6	9.89E-14	4.74E-04	9.34E-06	2.69E-03	4.40E-04	1.254E-01	2.644E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9728353	0.9840377	0.9847997	0.9926295	0.9772684	4.121E+02	6.685E+00
α_2	1.27E-03	5.75E-03	4.98E-03	1.28E-02	3.98E-03	2.407E+00	4.164E+02
α_3	7.60E-04	4.54E-03	3.78E-03	1.09E-02	6.63E-03	1.903E+00	4.169E+02
α_4	3.20E-04	3.24E-03	2.49E-03	8.71E-03	6.63E-03	1.356E+00	4.174E+02
α_5	3.51E-05	1.74E-03	1.04E-03	5.84E-03	3.98E-03	7.294E-01	4.181E+02
α_6	8.40E-09	5.88E-04	9.98E-05	2.86E-03	1.33E-03	2.463E-01	4.185E+02
α_7	4.09E-34	1.02E-04	1.20E-10	5.06E-04	1.89E-04	4.261E-02	4.187E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9742834	0.9848887	0.9856107	0.9930220	0.9794697	4.361E+02	6.690E+00
α_2	9.24E-04	4.81E-03	4.08E-03	1.12E-02	2.33E-03	2.127E+00	4.406E+02
α_3	4.78E-04	3.63E-03	2.92E-03	9.23E-03	4.65E-03	1.609E+00	4.411E+02
α_4	2.89E-04	3.02E-03	2.31E-03	8.16E-03	5.82E-03	1.336E+00	4.414E+02
α_5	8.64E-05	2.08E-03	1.40E-03	6.41E-03	4.65E-03	9.213E-01	4.418E+02
α_6	2.55E-06	1.04E-03	4.36E-04	4.10E-03	2.33E-03	4.591E-01	4.423E+02
α_7	6.26E-13	3.14E-04	9.72E-06	1.75E-03	6.65E-04	1.391E-01	4.426E+02
α_8	8.74E-17	2.23E-04	1.21E-06	1.29E-03	8.31E-05	9.860E-02	4.426E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.80E-01	9.79E-01	9.78E-01	9.81E-01	9.82E-01	9.84E-01	9.85E-01
α_2	2.05E-02	1.59E-02	1.40E-02	9.99E-03	7.32E-03	5.75E-03	4.81E-03
α_3		5.20E-03	5.60E-03	6.08E-03	5.74E-03	4.54E-03	3.63E-03
α_4			2.52E-03	2.40E-03	3.14E-03	3.24E-03	3.02E-03
α_5				4.82E-04	1.19E-03	1.74E-03	2.08E-03
α_6					4.74E-04	5.88E-04	1.04E-03
α_7						1.02E-04	3.14E-04
α_8							2.23E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.80E-01	9.79E-01	9.78E-01	9.81E-01	9.82E-01	9.84E-01	9.85E-01
Beta	2.05E-02	2.11E-02	2.22E-02	1.90E-02	1.79E-02	1.60E-02	1.51E-02
Gamma		2.47E-01	3.67E-01	4.73E-01	5.90E-01	6.40E-01	6.82E-01
Delta			3.11E-01	3.22E-01	4.55E-01	5.55E-01	6.47E-01
Epsilon				1.67E-01	3.46E-01	4.29E-01	5.48E-01
Mu					2.85E-01	2.84E-01	4.31E-01
Omega						1.48E-01	3.41E-01
Sigma							4.15E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	11.50	17.25	23.00	28.75	34.50	40.25	46.00
N₁	0.5000	0.3750	0.2500	0.1563	0.0938	0.0547	0.0313
N₂	0.2500	0.3750	0.3750	0.3125	0.2344	0.1641	0.1094
N₃		0.1250	0.2500	0.3125	0.3125	0.2734	0.2188
N₄			0.0625	0.1563	0.2344	0.2734	0.2734
N₅				0.0313	0.0938	0.1641	0.2188
N₆					0.0156	0.0547	0.1094
N₇						0.0078	0.0313
N₈							0.0039

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 1.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.122

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9639105	0.9906807	0.9958370	0.9999690	5.139E+01	4.834E-01	--
α_2	3.10E-05	9.32E-03	4.16E-03	3.61E-02	4.834E-01	5.139E+01	0.883

CCCG = 3, Gamma = 0.124

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9816950	0.9934181	0.9950795	0.9994635	1.850E+02	1.226E+00	--
α_2	2.68E-04	5.51E-03	3.79E-03	1.66E-02	9.769E-01	1.764E+02	0.751
α_3	1.72E-08	1.08E-03	1.86E-04	5.22E-03	2.487E-01	2.309E+02	0.576

CCCG = 4, Gamma = 0.125

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9835407	0.9929776	0.9940636	0.9987020	2.909E+02	2.057E+00	--
α_2	5.45E-04	4.95E-03	3.87E-03	1.30E-02	1.442E+00	2.900E+02	0.642
α_3	1.90E-06	1.52E-03	5.70E-04	6.25E-03	4.114E-01	2.704E+02	0.690
α_4	7.27E-10	5.55E-04	6.04E-05	2.85E-03	2.036E-01	3.667E+02	0.510

CCCG = 5, Gamma = 0.126

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9895481	0.9947161	0.9951812	0.9982951	6.934E+02	3.683E+00	--
α_2	6.64E-04	3.25E-03	2.79E-03	7.44E-03	2.243E+00	6.870E+02	0.519
α_3	6.63E-05	1.32E-03	9.12E-04	3.96E-03	9.912E-01	7.505E+02	0.476
α_4	3.74E-07	5.49E-04	1.85E-04	2.33E-03	3.765E-01	6.858E+02	0.522
α_5	1.40E-21	1.62E-04	9.23E-08	9.36E-04	7.237E-02	4.465E+02	0.802

CCCG = 6, Gamma = 0.127

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9892645	0.9944010	0.9948402	0.9980371	7.351E+02	4.139E+00	--
α_2	6.17E-04	3.21E-03	2.73E-03	7.46E-03	2.128E+00	6.605E+02	0.617
α_3	8.37E-05	1.21E-03	8.83E-04	3.48E-03	1.134E+00	9.323E+02	0.438
α_4	4.48E-06	6.87E-04	3.40E-04	2.54E-03	5.533E-01	8.054E+02	0.507
α_5	1.17E-09	3.01E-04	4.02E-05	1.51E-03	2.210E-01	7.338E+02	0.557
α_6	2.36E-16	1.85E-04	1.29E-06	1.07E-03	1.027E-01	5.544E+02	0.737

CCCG = 7, Gamma = 0.127

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9916978	0.9951785	0.9954236	0.9978222	1.328E+03	6.432E+00	--
α_2	6.75E-04	2.60E-03	2.30E-03	5.53E-03	2.840E+00	1.091E+03	0.634
α_3	1.51E-04	1.02E-03	8.34E-04	2.53E-03	1.746E+00	1.709E+03	0.405
α_4	4.34E-05	6.97E-04	4.99E-04	2.03E-03	1.084E+00	1.553E+03	0.446
α_5	1.97E-06	3.47E-04	1.68E-04	1.30E-03	5.376E-01	1.549E+03	0.447
α_6	1.12E-10	1.28E-04	1.29E-05	6.60E-04	1.979E-01	1.550E+03	0.447
α_7	7.09E-53	3.17E-05	3.17E-15	1.08E-04	2.656E-02	8.388E+02	0.826

CCCG = 8, Gamma = 0.128

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9914400	0.9950865	0.9953492	0.9978360	1.238E+03	6.112E+00	--
α_2	4.92E-04	2.27E-03	1.96E-03	5.12E-03	2.364E+00	1.037E+03	0.667
α_3	1.08E-04	9.10E-04	7.19E-04	2.36E-03	1.512E+00	1.660E+03	0.417
α_4	3.69E-05	6.30E-04	4.46E-04	1.85E-03	1.056E+00	1.676E+03	0.413
α_5	6.92E-06	4.57E-04	2.60E-04	1.58E-03	6.745E-01	1.474E+03	0.470
α_6	2.49E-08	1.85E-04	4.71E-05	8.42E-04	3.076E-01	1.658E+03	0.418
α_7	4.39E-16	6.27E-05	6.19E-07	3.62E-04	1.093E-01	1.742E+03	0.398
α_8	6.10E-18	3.94E-04	1.10E-06	2.30E-03	8.885E-02	2.252E+02	3.077

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.93E-01	9.93E-01	9.95E-01	9.94E-01	9.95E-01	9.95E-01
α_2	9.32E-03	5.51E-03	4.95E-03	3.25E-03	3.21E-03	2.60E-03	2.27E-03
α_3		1.08E-03	1.52E-03	1.32E-03	1.21E-03	1.02E-03	9.10E-04
α_4			5.55E-04	5.49E-04	6.87E-04	6.97E-04	6.30E-04
α_5				1.62E-04	3.01E-04	3.47E-04	4.57E-04
α_6					1.85E-04	1.28E-04	1.85E-04
α_7						3.17E-05	6.27E-05
α_8							3.94E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.93E-01	9.93E-01	9.95E-01	9.94E-01	9.95E-01	9.95E-01
Beta	9.32E-03	6.58E-03	7.02E-03	5.28E-03	5.60E-03	4.82E-03	4.91E-03
Gamma		1.63E-01	2.95E-01	3.84E-01	4.26E-01	4.61E-01	5.37E-01
Delta			2.68E-01	3.50E-01	4.91E-01	5.41E-01	6.55E-01
Epsilon				2.28E-01	4.15E-01	4.21E-01	6.36E-01
Mu					3.81E-01	3.15E-01	5.84E-01
Omega						1.99E-01	7.11E-01
Sigma							8.63E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.50	2.25	3.00	3.75	4.50	5.25	6.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 10.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.816

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9086309	0.9782298	0.9922954	0.9999835	1.708E+01	3.801E-01	--
α_2	1.65E-05	2.18E-02	7.70E-03	9.14E-02	3.801E-01	1.708E+01	0.883

CCCG = 3, Gamma = 0.828

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9296060	0.9765582	0.9837600	0.9988905	3.999E+01	9.600E-01	--
α_2	2.60E-04	1.75E-02	1.01E-02	6.02E-02	6.673E-01	3.738E+01	0.751
α_3	5.09E-07	5.90E-03	1.40E-03	2.72E-02	2.927E-01	4.929E+01	0.576

CCCG = 4, Gamma = 0.836

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9384208	0.9752239	0.9797602	0.9965004	6.570E+01	1.669E+00	--
α_2	8.93E-04	1.56E-02	1.11E-02	4.58E-02	1.039E+00	6.551E+01	0.642
α_3	5.42E-06	6.28E-03	2.23E-03	2.63E-02	3.887E-01	6.147E+01	0.690
α_4	3.29E-08	2.88E-03	4.71E-04	1.41E-02	2.414E-01	8.356E+01	0.510

CCCG = 5, Gamma = 0.841

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9573542	0.9786342	0.9805593	0.9933341	1.597E+02	3.487E+00	--
α_2	1.73E-03	1.12E-02	9.23E-03	2.74E-02	1.791E+00	1.582E+02	0.519
α_3	5.47E-04	6.92E-03	5.15E-03	1.93E-02	1.207E+00	1.732E+02	0.476
α_4	4.80E-06	2.72E-03	1.09E-03	1.10E-02	4.340E-01	1.589E+02	0.522
α_5	1.17E-26	5.30E-04	1.88E-08	2.91E-03	5.493E-02	1.036E+02	0.802

CCCG = 6, Gamma = 0.845

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9612715	0.9800087	0.9816245	0.9932240	1.914E+02	3.905E+00	--
α_2	7.73E-04	8.03E-03	6.16E-03	2.17E-02	1.335E+00	1.649E+02	0.617
α_3	7.97E-04	6.54E-03	5.20E-03	1.69E-02	1.531E+00	2.326E+02	0.438
α_4	6.84E-05	3.56E-03	2.11E-03	1.20E-02	7.191E-01	2.014E+02	0.507
α_5	1.95E-08	1.34E-03	2.29E-04	6.51E-03	2.467E-01	1.839E+02	0.557
α_6	5.74E-21	5.23E-04	3.14E-07	3.03E-03	7.279E-02	1.390E+02	0.737

CCCG = 7, Gamma = 0.849

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9685670	0.9821291	0.9831154	0.9923224	3.171E+02	5.770E+00	--
α_2	7.80E-04	6.28E-03	5.01E-03	1.61E-02	1.549E+00	2.449E+02	0.634
α_3	9.13E-04	5.16E-03	4.33E-03	1.22E-02	1.989E+00	3.837E+02	0.405
α_4	3.29E-04	3.67E-03	2.78E-03	1.01E-02	1.287E+00	3.491E+02	0.446
α_5	3.29E-05	1.98E-03	1.15E-03	6.76E-03	6.913E-01	3.486E+02	0.447
α_6	4.91E-09	6.66E-04	1.00E-04	3.29E-03	2.327E-01	3.491E+02	0.447
α_7	7.58E-65	1.12E-04	1.69E-17	2.81E-04	2.112E-02	1.891E+02	0.826

CCCG = 8, Gamma = 0.851

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9716781	0.9831724	0.9839392	0.9920488	4.099E+02	7.016E+00	--
α_2	6.71E-04	5.22E-03	4.18E-03	1.33E-02	1.583E+00	3.014E+02	0.667
α_3	7.24E-04	4.10E-03	3.44E-03	9.73E-03	1.986E+00	4.822E+02	0.417
α_4	4.77E-04	3.42E-03	2.77E-03	8.58E-03	1.672E+00	4.870E+02	0.413
α_5	1.24E-04	2.35E-03	1.64E-03	7.01E-03	1.011E+00	4.287E+02	0.470
α_6	8.92E-06	1.18E-03	6.00E-04	4.32E-03	5.709E-01	4.828E+02	0.418
α_7	8.16E-11	3.56E-04	2.79E-05	1.88E-03	1.809E-01	5.075E+02	0.398
α_8	2.75E-107	1.90E-04	5.76E-27	1.43E-04	1.245E-02	6.563E+01	3.077

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.78E-01	9.77E-01	9.75E-01	9.79E-01	9.80E-01	9.82E-01	9.83E-01
α_2	2.18E-02	1.75E-02	1.56E-02	1.12E-02	8.03E-03	6.28E-03	5.22E-03
α_3		5.90E-03	6.28E-03	6.92E-03	6.54E-03	5.16E-03	4.10E-03
α_4			2.88E-03	2.72E-03	3.56E-03	3.67E-03	3.42E-03
α_5				5.30E-04	1.34E-03	1.98E-03	2.35E-03
α_6					5.23E-04	6.66E-04	1.18E-03
α_7						1.12E-04	3.56E-04
α_8							1.90E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.78E-01	9.77E-01	9.75E-01	9.79E-01	9.80E-01	9.82E-01	9.83E-01
Beta	2.18E-02	2.34E-02	2.48E-02	2.14E-02	2.00E-02	1.79E-02	1.68E-02
Gamma		2.52E-01	3.70E-01	4.76E-01	5.98E-01	6.48E-01	6.90E-01
Delta			3.14E-01	3.20E-01	4.53E-01	5.55E-01	6.46E-01
Epsilon				1.63E-01	3.44E-01	4.29E-01	5.44E-01
Mu					2.81E-01	2.82E-01	4.23E-01
Omega						1.44E-01	3.16E-01
Sigma							3.47E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	10.00	15.00	20.00	25.00	30.00	35.00	40.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.061

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9163711	0.9748490	0.9847664	0.9995000	2.793E+01	7.206E-01	--
α_2	5.00E-04	2.52E-02	1.52E-02	8.36E-02	7.206E-01	2.793E+01	0.883

CCCG = 3, Gamma = 0.048

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9548423	0.9821300	0.9855727	0.9976388	8.807E+01	1.603E+00	--
α_2	1.08E-03	1.41E-02	1.05E-02	3.94E-02	1.185E+00	8.306E+01	0.751
α_3	5.22E-06	3.80E-03	1.45E-03	1.55E-02	4.171E-01	1.094E+02	0.576

CCCG = 4, Gamma = 0.039

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9682921	0.9853579	0.9871119	0.9964267	1.777E+02	2.640E+00	--
α_2	1.33E-03	9.37E-03	7.63E-03	2.34E-02	1.687E+00	1.783E+02	0.642
α_3	6.40E-05	4.07E-03	2.34E-03	1.40E-02	6.807E-01	1.666E+02	0.690
α_4	5.07E-08	1.20E-03	2.49E-04	5.67E-03	2.724E-01	2.264E+02	0.510

CCCG = 5, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9815172	0.9904850	0.9912667	0.9967820	4.080E+02	3.919E+00	--
α_2	8.69E-04	4.89E-03	4.11E-03	1.16E-02	1.997E+00	4.067E+02	0.519
α_3	2.40E-04	2.82E-03	2.12E-03	7.78E-03	1.255E+00	4.443E+02	0.476
α_4	7.54E-06	1.32E-03	6.41E-04	4.94E-03	5.379E-01	4.063E+02	0.522
α_5	2.27E-13	4.91E-04	1.13E-05	2.77E-03	1.299E-01	2.647E+02	0.802

CCCG = 6, Gamma = 0.028

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9831865	0.9909239	0.9915463	0.9965354	5.145E+02	4.713E+00	--
α_2	7.38E-04	4.28E-03	3.58E-03	1.02E-02	1.948E+00	4.532E+02	0.617
α_3	2.37E-04	2.22E-03	1.72E-03	5.87E-03	1.421E+00	6.398E+02	0.438
α_4	5.94E-05	1.60E-03	1.05E-03	5.00E-03	8.853E-01	5.527E+02	0.507
α_5	2.56E-07	6.89E-04	2.09E-04	3.00E-03	3.474E-01	5.039E+02	0.557
α_6	3.33E-15	2.92E-04	3.19E-06	1.68E-03	1.113E-01	3.808E+02	0.737

CCCG = 7, Gamma = 0.024

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9868057	0.9924147	0.9928168	0.9966504	8.023E+02	6.133E+00	--
α_2	7.23E-04	3.50E-03	3.00E-03	7.96E-03	2.269E+00	6.467E+02	0.634
α_3	2.03E-04	1.57E-03	1.26E-03	4.00E-03	1.593E+00	1.014E+03	0.405
α_4	1.20E-04	1.38E-03	1.04E-03	3.79E-03	1.270E+00	9.214E+02	0.446
α_5	1.23E-05	7.49E-04	4.32E-04	2.56E-03	6.890E-01	9.190E+02	0.447
α_6	4.65E-09	2.72E-04	4.77E-05	1.32E-03	2.503E-01	9.196E+02	0.447
α_7	4.45E-25	1.22E-04	1.31E-08	6.86E-04	6.072E-02	4.978E+02	0.826

CCCG = 8, Gamma = 0.021

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9870530	0.9923810	0.9927458	0.9964635	8.853E+02	6.797E+00	--
α_2	6.91E-04	3.23E-03	2.79E-03	7.29E-03	2.338E+00	7.217E+02	0.667
α_3	1.47E-04	1.28E-03	1.01E-03	3.34E-03	1.479E+00	1.155E+03	0.417
α_4	1.05E-04	1.13E-03	8.58E-04	3.07E-03	1.315E+00	1.166E+03	0.413
α_5	4.68E-05	9.56E-04	6.58E-04	2.88E-03	9.814E-01	1.026E+03	0.470
α_6	6.86E-07	3.78E-04	1.51E-04	1.52E-03	4.365E-01	1.155E+03	0.418
α_7	7.35E-12	1.37E-04	8.07E-06	7.36E-04	1.657E-01	1.213E+03	0.398
α_8	2.93E-19	5.15E-04	7.15E-07	3.00E-03	8.073E-02	1.568E+02	3.077

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.75E-01	9.82E-01	9.85E-01	9.90E-01	9.91E-01	9.92E-01	9.92E-01
α_2	2.52E-02	1.41E-02	9.37E-03	4.89E-03	4.28E-03	3.50E-03	3.23E-03
α_3		3.80E-03	4.07E-03	2.82E-03	2.22E-03	1.57E-03	1.28E-03
α_4			1.20E-03	1.32E-03	1.60E-03	1.38E-03	1.13E-03
α_5				4.91E-04	6.89E-04	7.49E-04	9.56E-04
α_6					2.92E-04	2.72E-04	3.78E-04
α_7						1.22E-04	1.37E-04
α_8							5.15E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.75E-01	9.82E-01	9.85E-01	9.90E-01	9.91E-01	9.92E-01	9.92E-01
Beta	2.52E-02	1.79E-02	1.46E-02	9.52E-03	9.08E-03	7.59E-03	7.62E-03
Gamma		2.13E-01	3.60E-01	4.87E-01	5.28E-01	5.39E-01	5.76E-01
Delta			2.28E-01	3.92E-01	5.38E-01	6.16E-01	7.09E-01
Epsilon				2.71E-01	3.80E-01	4.54E-01	6.38E-01
Mu					2.98E-01	3.45E-01	5.18E-01
Omega						3.10E-01	6.33E-01
Sigma							7.90E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N_1	0.5000	0.3750	0.2500	0.1563	0.0938	0.0547	0.0313
N_2	0.2500	0.3750	0.3750	0.3125	0.2344	0.1641	0.1094
N_3		0.1250	0.2500	0.3125	0.3125	0.2734	0.2188

N₄			0.0625	0.1563	0.2344	0.2734	0.2734
N₅				0.0313	0.0938	0.1641	0.2188
N₆					0.0156	0.0547	0.1094
N₇						0.0078	0.0313
N₈							0.0039

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.8 Safety and Relief Valves

2.8.1 Pooled Safety Valves

2.8.1.1 ALL-SVV-CC: All Systems Safety Valves (Direct Acting) Fail to Open

Generic CCF Parameters

Component Group: Valve
Component Type: Safety Valve (Single Acting)
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 2.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9175046	0.9780228	0.9893927	0.9998954	0.9298246	2.308E+01	5.185E-01
α_2	1.08E-04	2.20E-02	1.06E-02	8.25E-02	7.02E-02	5.185E-01	2.308E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9425571	0.9789752	0.9840158	0.9981539	0.8644068	5.884E+01	1.264E+00
α_2	8.07E-04	1.63E-02	1.13E-02	4.88E-02	1.28E-01	9.798E-01	5.913E+01
α_3	3.04E-07	4.72E-03	1.06E-03	2.20E-02	7.14E-03	2.840E-01	5.982E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9475865	0.9772110	0.9805140	0.9955455	0.8048673	9.168E+01	2.138E+00
α_2	1.82E-03	1.57E-02	1.25E-02	4.09E-02	1.74E-01	1.477E+00	9.235E+01
α_3	7.49E-06	4.57E-03	1.80E-03	1.85E-02	2.10E-02	4.288E-01	9.339E+01
α_4	1.77E-08	2.47E-03	3.71E-04	1.22E-02	4.39E-04	2.320E-01	9.359E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9621326	0.9805996	0.9822112	0.9935531	0.7522701	1.919E+02	3.798E+00
α_2	2.31E-03	1.14E-02	9.76E-03	2.60E-02	2.05E-01	2.226E+00	1.935E+02
α_3	3.74E-04	5.67E-03	4.10E-03	1.63E-02	4.10E-02	1.109E+00	1.946E+02
α_4	1.57E-06	1.97E-03	6.84E-04	8.27E-03	1.86E-03	3.850E-01	1.954E+02
α_5	3.41E-20	3.92E-04	3.65E-07	2.28E-03	0.00E+00	7.674E-02	1.957E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9646321	0.9812595	0.9826308	0.9931936	0.7075495	2.264E+02	4.324E+00
α_2	1.68E-03	8.98E-03	7.61E-03	2.10E-02	2.22E-01	2.072E+00	2.287E+02
α_3	5.35E-04	5.71E-03	4.36E-03	1.55E-02	6.57E-02	1.317E+00	2.294E+02

α_4	2.55E-05	2.62E-03	1.39E-03	9.39E-03	4.93E-03	6.042E-01	2.301E+02
α_5	3.75E-09	9.58E-04	1.28E-04	4.81E-03	0.00E+00	2.211E-01	2.305E+02
α_6	3.74E-15	4.76E-04	4.82E-06	2.74E-03	0.00E+00	1.098E-01	2.306E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9711746	0.9832496	0.9840893	0.9924440	0.6714323	3.730E+02	6.355E+00
α_2	1.71E-03	7.01E-03	6.16E-03	1.52E-02	2.25E-01	2.659E+00	3.767E+02
α_3	7.38E-04	4.75E-03	3.91E-03	1.16E-02	9.36E-02	1.803E+00	3.776E+02
α_4	1.88E-04	2.90E-03	2.09E-03	8.40E-03	1.04E-02	1.102E+00	3.783E+02
α_5	1.08E-05	1.49E-03	7.52E-04	5.47E-03	0.00E+00	5.654E-01	3.788E+02
α_6	2.77E-10	5.05E-04	4.67E-05	2.63E-03	0.00E+00	1.916E-01	3.792E+02
α_7	6.28E-41	9.17E-05	3.41E-12	4.02E-04	0.00E+00	3.480E-02	3.794E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9722130	0.9838068	0.9846087	0.9926533	0.6443595	3.913E+02	6.441E+00
α_2	1.39E-03	6.16E-03	5.35E-03	1.37E-02	2.14E-01	2.449E+00	3.953E+02
α_3	5.56E-04	4.11E-03	3.32E-03	1.04E-02	1.22E-01	1.637E+00	3.961E+02
α_4	1.79E-04	2.77E-03	1.99E-03	8.00E-03	1.91E-02	1.101E+00	3.967E+02
α_5	3.12E-05	1.77E-03	1.03E-03	6.00E-03	0.00E+00	7.026E-01	3.971E+02
α_6	3.45E-07	8.79E-04	2.70E-04	3.82E-03	0.00E+00	3.497E-01	3.974E+02
α_7	1.33E-15	2.71E-04	2.49E-06	1.57E-03	0.00E+00	1.078E-01	3.976E+02
α_8	2.77E-17	2.38E-04	1.01E-06	1.39E-03	0.00E+00	9.469E-02	3.977E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.78E-01	9.79E-01	9.77E-01	9.81E-01	9.81E-01	9.83E-01	9.84E-01
α_2	2.20E-02	1.63E-02	1.57E-02	1.14E-02	8.98E-03	7.01E-03	6.16E-03
α_3		4.72E-03	4.57E-03	5.67E-03	5.71E-03	4.75E-03	4.11E-03
α_4			2.47E-03	1.97E-03	2.62E-03	2.90E-03	2.77E-03
α_5				3.92E-04	9.58E-04	1.49E-03	1.77E-03
α_6					4.76E-04	5.05E-04	8.79E-04
α_7						9.17E-05	2.71E-04
α_8							2.38E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.78E-01	9.79E-01	9.77E-01	9.81E-01	9.81E-01	9.83E-01	9.84E-01
Beta	2.20E-02	2.10E-02	2.28E-02	1.94E-02	1.87E-02	1.68E-02	1.62E-02
Gamma		2.25E-01	3.09E-01	4.14E-01	5.21E-01	5.82E-01	6.20E-01
Delta			3.51E-01	2.94E-01	4.15E-01	5.12E-01	5.90E-01
Epsilon				1.66E-01	3.54E-01	4.18E-01	5.33E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.26	0.39	0.52	0.66	0.79	0.92	1.05
N₁	0.4000	0.4714	0.4835	0.4533	0.3956	0.3231	0.2462
N₂	0.0500	0.1286	0.2176	0.3022	0.3709	0.4154	0.4308
N₃		0.0071	0.0264	0.0604	0.1099	0.1731	0.2462
N₄			0.0005	0.0027	0.0082	0.0192	0.0385
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 2.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.368

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9640601	0.9907195	0.9958545	0.9999691	5.160E+01	4.834E-01	--
α_2	3.09E-05	9.28E-03	4.15E-03	3.59E-02	4.834E-01	5.160E+01	0.856

CCCG = 3, Gamma = 0.393

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9786288	0.9923115	0.9942488	0.9993727	1.582E+02	1.226E+00	--
α_2	2.84E-04	5.85E-03	4.03E-03	1.76E-02	9.769E-01	1.661E+02	0.786
α_3	2.94E-08	1.84E-03	3.19E-04	8.92E-03	2.487E-01	1.349E+02	0.972

CCCG = 4, Gamma = 0.419

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9789018	0.9909906	0.9923790	0.9983326	2.263E+02	2.057E+00	--
α_2	6.86E-04	6.22E-03	4.87E-03	1.64E-02	1.442E+00	2.302E+02	0.796
α_3	2.31E-06	1.84E-03	6.91E-04	7.57E-03	4.114E-01	2.230E+02	0.826
α_4	1.24E-09	9.44E-04	1.03E-04	4.84E-03	2.036E-01	2.155E+02	0.855

CCCG = 5, Gamma = 0.445

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9835388	0.9916690	0.9923983	0.9973080	4.384E+02	3.683E+00	--
α_2	1.02E-03	4.99E-03	4.28E-03	1.14E-02	2.243E+00	4.470E+02	0.790
α_3	1.14E-04	2.26E-03	1.57E-03	6.80E-03	9.912E-01	4.368E+02	0.811
α_4	6.13E-07	8.99E-04	3.04E-04	3.81E-03	3.765E-01	4.183E+02	0.848
α_5	1.52E-21	1.75E-04	9.97E-08	1.01E-03	7.237E-02	4.134E+02	0.858

CCCG = 6, Gamma = 0.471

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9839536	0.9916231	0.9922768	0.9970596	4.900E+02	4.139E+00	--
α_2	7.96E-04	4.14E-03	3.52E-03	9.61E-03	2.128E+00	5.118E+02	0.789
α_3	1.60E-04	2.32E-03	1.69E-03	6.65E-03	1.134E+00	4.872E+02	0.830
α_4	7.64E-06	1.17E-03	5.80E-04	4.33E-03	5.533E-01	4.727E+02	0.856
α_5	1.77E-09	4.55E-04	6.07E-05	2.28E-03	2.210E-01	4.856E+02	0.834
α_6	3.70E-16	2.90E-04	2.02E-06	1.68E-03	1.027E-01	3.539E+02	1.145

CCCG = 7, Gamma = 0.497

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9868932	0.9923822	0.9927674	0.9965558	8.379E+02	6.432E+00	--
α_2	8.16E-04	3.14E-03	2.78E-03	6.69E-03	2.840E+00	9.015E+02	0.761
α_3	3.25E-04	2.19E-03	1.79E-03	5.42E-03	1.746E+00	7.950E+02	0.864
α_4	8.31E-05	1.33E-03	9.55E-04	3.88E-03	1.084E+00	8.110E+02	0.848
α_5	3.69E-06	6.48E-04	3.14E-04	2.43E-03	5.376E-01	8.286E+02	0.830
α_6	2.29E-10	2.60E-04	2.63E-05	1.34E-03	1.979E-01	7.602E+02	0.905
α_7	9.56E-53	4.27E-05	4.28E-15	1.46E-04	2.656E-02	6.222E+02	1.106

CCCG = 8, Gamma = 0.522

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9871073	0.9925941	0.9929882	0.9967354	8.192E+02	6.112E+00	--
α_2	5.67E-04	2.62E-03	2.26E-03	5.89E-03	2.364E+00	9.000E+02	0.763
α_3	2.28E-04	1.92E-03	1.52E-03	4.98E-03	1.512E+00	7.863E+02	0.874
α_4	8.08E-05	1.38E-03	9.76E-04	4.05E-03	1.056E+00	7.652E+02	0.898
α_5	1.26E-05	8.32E-04	4.74E-04	2.87E-03	6.745E-01	8.103E+02	0.849
α_6	4.87E-08	3.63E-04	9.21E-05	1.65E-03	3.076E-01	8.480E+02	0.811
α_7	1.22E-15	1.74E-04	1.72E-06	1.00E-03	1.093E-01	6.287E+02	1.095
α_8	1.86E-18	1.21E-04	3.35E-07	7.04E-04	8.885E-02	7.360E+02	0.935

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.92E-01	9.91E-01	9.92E-01	9.92E-01	9.92E-01	9.93E-01
α_2	9.28E-03	5.85E-03	6.22E-03	4.99E-03	4.14E-03	3.14E-03	2.62E-03
α_3		1.84E-03	1.84E-03	2.26E-03	2.32E-03	2.19E-03	1.92E-03
α_4			9.44E-04	8.99E-04	1.17E-03	1.33E-03	1.38E-03
α_5				1.75E-04	4.55E-04	6.48E-04	8.32E-04
α_6					2.90E-04	2.60E-04	3.63E-04
α_7						4.27E-05	1.74E-04
α_8							1.21E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.92E-01	9.91E-01	9.92E-01	9.92E-01	9.92E-01	9.93E-01
Beta	9.28E-03	7.69E-03	9.01E-03	8.33E-03	8.38E-03	7.62E-03	7.41E-03
Gamma		2.39E-01	3.09E-01	4.01E-01	5.06E-01	5.88E-01	6.46E-01
Delta			3.39E-01	3.22E-01	4.52E-01	5.11E-01	5.99E-01
Epsilon				1.63E-01	3.89E-01	4.16E-01	5.19E-01
Mu					3.89E-01	3.18E-01	4.41E-01
Omega						1.41E-01	4.48E-01
Sigma							4.10E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.26	0.39	0.52	0.66	0.79	0.92	1.05
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.632

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8886369	0.9706165	0.9861199	0.9998794	1.651E+01	4.998E-01	--
α_2	1.21E-04	2.94E-02	1.39E-02	1.11E-01	4.998E-01	1.651E+01	0.856

CCCG = 3, Gamma = 0.607

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9203435	0.9703263	0.9770832	0.9971750	4.297E+01	1.314E+00	--
α_2	1.42E-03	2.31E-02	1.66E-02	6.68E-02	1.067E+00	4.518E+01	0.786
α_3	9.77E-08	6.59E-03	1.14E-03	3.21E-02	2.467E-01	3.717E+01	0.972

CCCG = 4, Gamma = 0.581

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9251173	0.9672740	0.9719165	0.9935401	6.334E+01	2.143E+00	--
α_2	2.71E-03	2.26E-02	1.80E-02	5.82E-02	1.503E+00	6.495E+01	0.796
α_3	9.30E-06	6.54E-03	2.52E-03	2.67E-02	4.191E-01	6.367E+01	0.826
α_4	1.42E-08	3.58E-03	4.82E-04	1.79E-02	2.212E-01	6.165E+01	0.855

CCCG = 5, Gamma = 0.555

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9452633	0.9717265	0.9739942	0.9904380	1.330E+02	3.871E+00	--
α_2	3.48E-03	1.65E-02	1.42E-02	3.72E-02	2.294E+00	1.368E+02	0.790
α_3	5.87E-04	8.40E-03	6.13E-03	2.39E-02	1.138E+00	1.345E+02	0.811
α_4	1.57E-06	2.82E-03	9.23E-04	1.21E-02	3.659E-01	1.293E+02	0.848
α_5	5.23E-21	5.66E-04	3.28E-07	3.28E-03	7.248E-02	1.280E+02	0.858

CCCG = 6, Gamma = 0.529

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9484453	0.9720336	0.9738915	0.9892736	1.630E+02	4.688E+00	--
α_2	2.82E-03	1.33E-02	1.15E-02	3.00E-02	2.312E+00	1.717E+02	0.789
α_3	9.64E-04	8.72E-03	6.84E-03	2.29E-02	1.442E+00	1.639E+02	0.830
α_4	4.43E-05	3.91E-03	2.13E-03	1.38E-02	6.263E-01	1.596E+02	0.856
α_5	9.65E-09	1.41E-03	2.09E-04	6.97E-03	2.313E-01	1.642E+02	0.834
α_6	5.85E-20	6.41E-04	6.05E-07	3.73E-03	7.684E-02	1.198E+02	1.145

CCCG = 7, Gamma = 0.503

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9564878	0.9742350	0.9754192	0.9879378	2.583E+02	6.830E+00	--
α_2	3.03E-03	1.08E-02	9.70E-03	2.25E-02	3.069E+00	2.805E+02	0.761
α_3	1.15E-03	7.28E-03	6.01E-03	1.77E-02	1.818E+00	2.480E+02	0.864
α_4	3.08E-04	4.45E-03	3.24E-03	1.27E-02	1.134E+00	2.535E+02	0.848
α_5	2.24E-05	2.32E-03	1.23E-03	8.33E-03	6.034E-01	2.594E+02	0.830
α_6	1.33E-10	7.47E-04	5.56E-05	3.96E-03	1.780E-01	2.382E+02	0.905
α_7	7.63E-51	1.40E-04	2.88E-14	4.95E-04	2.734E-02	1.951E+02	1.106

CCCG = 8, Gamma = 0.478

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9566289	0.9742112	0.9753743	0.9878211	2.630E+02	6.961E+00	--
α_2	2.69E-03	1.00E-02	8.93E-03	2.11E-02	2.935E+00	2.900E+02	0.763
α_3	9.04E-04	6.51E-03	5.28E-03	1.63E-02	1.665E+00	2.540E+02	0.874
α_4	2.57E-04	4.28E-03	3.05E-03	1.25E-02	1.065E+00	2.477E+02	0.898
α_5	5.74E-05	2.79E-03	1.67E-03	9.31E-03	7.337E-01	2.625E+02	0.849
α_6	1.44E-06	1.44E-03	5.21E-04	6.01E-03	3.975E-01	2.750E+02	0.811
α_7	3.78E-20	3.77E-04	3.62E-07	2.19E-03	7.703E-02	2.040E+02	1.095
α_8	3.40E-18	3.66E-04	9.15E-07	2.14E-03	8.749E-02	2.388E+02	0.935

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.71E-01	9.70E-01	9.67E-01	9.72E-01	9.72E-01	9.74E-01	9.74E-01
α_2	2.94E-02	2.31E-02	2.26E-02	1.65E-02	1.33E-02	1.08E-02	1.00E-02
α_3		6.59E-03	6.54E-03	8.40E-03	8.72E-03	7.28E-03	6.51E-03
α_4			3.58E-03	2.82E-03	3.91E-03	4.45E-03	4.28E-03
α_5				5.66E-04	1.41E-03	2.32E-03	2.79E-03
α_6					6.41E-04	7.47E-04	1.44E-03
α_7						1.40E-04	3.77E-04
α_8							3.66E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.71E-01	9.70E-01	9.67E-01	9.72E-01	9.72E-01	9.74E-01	9.74E-01
Beta	2.94E-02	2.97E-02	3.27E-02	2.83E-02	2.80E-02	2.58E-02	2.58E-02
Gamma		2.22E-01	3.09E-01	4.17E-01	5.25E-01	5.80E-01	6.11E-01
Delta			3.54E-01	2.88E-01	4.06E-01	5.13E-01	5.87E-01
Epsilon				1.67E-01	3.44E-01	4.19E-01	5.37E-01
Mu					3.13E-01	2.76E-01	4.40E-01
Omega						1.58E-01	3.40E-01
Sigma							4.92E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N_1	0.4000	0.4714	0.4835	0.4533	0.3956	0.3231	0.2462
N_2	0.0500	0.1286	0.2176	0.3022	0.3709	0.4154	0.4308
N_3		0.0071	0.0264	0.0604	0.1099	0.1731	0.2462

N₄			0.0005	0.0027	0.0082	0.0192	0.0385
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9254105	0.9808392	0.9915376	0.9999442	2.409E+01	4.706E-01	--
α_2	5.58E-05	1.92E-02	8.46E-03	7.46E-02	4.706E-01	2.409E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9492792	0.9823211	0.9871539	0.9988381	6.126E+01	1.103E+00	--
α_2	3.76E-04	1.30E-02	8.28E-03	4.17E-02	8.104E-01	6.155E+01	--
α_3	3.95E-07	4.68E-03	1.10E-03	2.16E-02	2.921E-01	6.207E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9595678	0.9829546	0.9856771	0.9970284	1.126E+02	1.953E+00	--
α_2	1.07E-03	1.15E-02	8.76E-03	3.10E-02	1.312E+00	1.132E+02	--
α_3	6.33E-06	3.76E-03	1.49E-03	1.52E-02	4.307E-01	1.141E+02	--
α_4	3.65E-09	1.83E-03	2.17E-04	9.33E-03	2.099E-01	1.143E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9696218	0.9852970	0.9867994	0.9958370	2.082E+02	3.107E+00	--
α_2	1.13E-03	7.97E-03	6.48E-03	1.99E-02	1.684E+00	2.096E+02	--
α_3	1.97E-04	4.46E-03	3.03E-03	1.36E-02	9.426E-01	2.104E+02	--
α_4	1.36E-06	1.81E-03	6.21E-04	7.62E-03	3.816E-01	2.109E+02	--
α_5	1.87E-16	4.67E-04	2.56E-06	2.72E-03	9.865E-02	2.112E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9733376	0.9863454	0.9874863	0.9954551	2.761E+02	3.822E+00	--
α_2	8.87E-04	6.12E-03	4.99E-03	1.52E-02	1.714E+00	2.782E+02	--
α_3	2.60E-04	3.96E-03	2.86E-03	1.14E-02	1.108E+00	2.788E+02	--
α_4	3.07E-05	2.33E-03	1.30E-03	8.12E-03	6.509E-01	2.793E+02	--
α_5	1.79E-08	9.06E-04	1.63E-04	4.37E-03	2.536E-01	2.797E+02	--
α_6	5.54E-17	3.42E-04	1.55E-06	1.99E-03	9.572E-02	2.798E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9771222	0.9873350	0.9881185	0.9948722	4.050E+02	5.195E+00	--
α_2	9.74E-04	5.13E-03	4.35E-03	1.20E-02	2.105E+00	4.081E+02	--
α_3	3.02E-04	3.22E-03	2.46E-03	8.74E-03	1.320E+00	4.089E+02	--
α_4	1.24E-04	2.43E-03	1.68E-03	7.28E-03	9.967E-01	4.092E+02	--
α_5	6.47E-06	1.28E-03	6.08E-04	4.83E-03	5.249E-01	4.097E+02	--
α_6	3.54E-10	4.77E-04	4.66E-05	2.47E-03	1.956E-01	4.100E+02	--
α_7	3.68E-28	1.29E-04	2.92E-09	7.00E-04	5.291E-02	4.101E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787229	0.9878938	0.9885625	0.9947813	4.759E+02	5.832E+00	--
α_2	9.39E-04	4.63E-03	3.96E-03	1.06E-02	2.229E+00	4.795E+02	--
α_3	2.24E-04	2.62E-03	1.97E-03	7.22E-03	1.260E+00	4.805E+02	--
α_4	1.23E-04	2.16E-03	1.53E-03	6.38E-03	1.042E+00	4.807E+02	--
α_5	3.72E-05	1.58E-03	9.69E-04	5.22E-03	7.626E-01	4.810E+02	--
α_6	1.55E-07	6.79E-04	1.90E-04	3.02E-03	3.271E-01	4.814E+02	--
α_7	2.70E-13	2.79E-04	7.48E-06	1.57E-03	1.344E-01	4.816E+02	--
α_8	1.44E-20	1.59E-04	1.50E-07	9.26E-04	7.682E-02	4.817E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.92E-02	1.30E-02	1.15E-02	7.97E-03	6.12E-03	5.13E-03	4.63E-03
α_3		4.68E-03	3.76E-03	4.46E-03	3.96E-03	3.22E-03	2.62E-03
α_4			1.83E-03	1.81E-03	2.33E-03	2.43E-03	2.16E-03
α_5				4.67E-04	9.06E-04	1.28E-03	1.58E-03
α_6					3.42E-04	4.77E-04	6.79E-04
α_7						1.29E-04	2.79E-04
α_8							1.59E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.92E-02	1.77E-02	1.70E-02	1.47E-02	1.37E-02	1.27E-02	1.21E-02
Gamma		2.65E-01	3.28E-01	4.58E-01	5.52E-01	5.95E-01	6.18E-01
Delta			3.28E-01	3.38E-01	4.74E-01	5.73E-01	6.50E-01
Epsilon				2.05E-01	3.49E-01	4.37E-01	5.55E-01
Mu					2.74E-01	3.21E-01	4.14E-01
Omega						2.13E-01	3.92E-01
Sigma							3.64E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.8.1.2 ALL-SVV-OO: All Systems Safety Valves (Direct Acting) Fail to Close

Generic CCF Parameters

Component Group: Valve
Component Type: Safety Valve (Single Acting)
Failure Mode: Fail to Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9235240	0.9803811	0.9913633	0.9999407	1.0000000	2.341E+01	4.685E-01
α_2	5.58E-05	1.96E-02	8.63E-03	7.65E-02	0.00E+00	4.685E-01	2.341E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9466116	0.9812328	0.9862494	0.9986987	1.0000000	5.898E+01	1.128E+00
α_2	4.76E-04	1.42E-02	9.25E-03	4.46E-02	0.00E+00	8.512E-01	5.926E+01
α_3	2.31E-07	4.61E-03	9.88E-04	2.16E-02	0.00E+00	2.768E-01	5.983E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9515956	0.9797624	0.9830751	0.9966052	1.0000000	9.168E+01	1.894E+00
α_2	1.17E-03	1.35E-02	1.02E-02	3.70E-02	0.00E+00	1.260E+00	9.231E+01
α_3	4.68E-06	4.30E-03	1.58E-03	1.78E-02	0.00E+00	4.024E-01	9.317E+01
α_4	1.72E-08	2.47E-03	3.69E-04	1.23E-02	0.00E+00	2.315E-01	9.334E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9647181	0.9824236	0.9840420	0.9945954	1.0000000	1.918E+02	3.432E+00
α_2	1.68E-03	9.85E-03	8.24E-03	2.36E-02	0.00E+00	1.924E+00	1.933E+02
α_3	3.11E-04	5.37E-03	3.81E-03	1.58E-02	0.00E+00	1.049E+00	1.942E+02
α_4	1.49E-06	1.96E-03	6.75E-04	8.26E-03	0.00E+00	3.822E-01	1.949E+02
α_5	3.41E-20	3.93E-04	3.66E-07	2.28E-03	0.00E+00	7.674E-02	1.952E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9675157	0.9833304	0.9847088	0.9944279	1.0000000	2.262E+02	3.835E+00
α_2	1.06E-03	7.39E-03	6.02E-03	1.84E-02	0.00E+00	1.701E+00	2.284E+02
α_3	4.14E-04	5.25E-03	3.90E-03	1.47E-02	0.00E+00	1.207E+00	2.288E+02
α_4	2.37E-05	2.59E-03	1.36E-03	9.33E-03	0.00E+00	5.960E-01	2.295E+02
α_5	3.76E-09	9.61E-04	1.29E-04	4.82E-03	0.00E+00	2.211E-01	2.298E+02
α_6	3.75E-15	4.77E-04	4.83E-06	2.75E-03	0.00E+00	1.098E-01	2.299E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9732470	0.9848173	0.9856609	0.9934954	1.0000000	3.728E+02	5.747E+00
α_2	1.21E-03	5.93E-03	5.08E-03	1.35E-02	0.00E+00	2.243E+00	3.763E+02
α_3	5.78E-04	4.30E-03	3.47E-03	1.09E-02	0.00E+00	1.630E+00	3.769E+02
α_4	1.78E-04	2.86E-03	2.05E-03	8.32E-03	0.00E+00	1.083E+00	3.775E+02
α_5	1.08E-05	1.49E-03	7.53E-04	5.49E-03	0.00E+00	5.654E-01	3.780E+02
α_6	2.78E-10	5.06E-04	4.68E-05	2.64E-03	0.00E+00	1.916E-01	3.784E+02
α_7	6.30E-41	9.19E-05	3.42E-12	4.03E-04	0.00E+00	3.480E-02	3.785E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9745473	0.9855687	0.9863748	0.9938356	1.0000000	3.910E+02	5.726E+00
α_2	9.17E-04	5.09E-03	4.28E-03	1.20E-02	0.00E+00	2.018E+00	3.947E+02
α_3	3.62E-04	3.50E-03	2.71E-03	9.35E-03	0.00E+00	1.391E+00	3.954E+02
α_4	1.59E-04	2.68E-03	1.90E-03	7.84E-03	0.00E+00	1.062E+00	3.957E+02
α_5	3.13E-05	1.77E-03	1.03E-03	6.01E-03	0.00E+00	7.026E-01	3.960E+02
α_6	3.46E-07	8.82E-04	2.71E-04	3.83E-03	0.00E+00	3.497E-01	3.964E+02
α_7	1.33E-15	2.72E-04	2.49E-06	1.57E-03	0.00E+00	1.078E-01	3.966E+02
α_8	2.78E-17	2.39E-04	1.01E-06	1.39E-03	0.00E+00	9.469E-02	3.967E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.80E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.96E-02	1.42E-02	1.35E-02	9.85E-03	7.39E-03	5.93E-03	5.09E-03
α_3		4.61E-03	4.30E-03	5.37E-03	5.25E-03	4.30E-03	3.50E-03
α_4			2.47E-03	1.96E-03	2.59E-03	2.86E-03	2.68E-03
α_5				3.93E-04	9.61E-04	1.49E-03	1.77E-03
α_6					4.77E-04	5.06E-04	8.82E-04
α_7						9.19E-05	2.72E-04
α_8							2.39E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.80E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.96E-02	1.88E-02	2.02E-02	1.76E-02	1.67E-02	1.52E-02	1.44E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8

Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9254105	0.9808392	0.9915376	0.9999442	2.409E+01	4.706E-01	--
α_2	5.58E-05	1.92E-02	8.46E-03	7.46E-02	4.706E-01	2.409E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9492792	0.9823211	0.9871539	0.9988381	6.126E+01	1.103E+00	--
α_2	3.76E-04	1.30E-02	8.28E-03	4.17E-02	8.104E-01	6.155E+01	--
α_3	3.95E-07	4.68E-03	1.10E-03	2.16E-02	2.921E-01	6.207E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9595678	0.9829546	0.9856771	0.9970284	1.126E+02	1.953E+00	--
α_2	1.07E-03	1.15E-02	8.76E-03	3.10E-02	1.312E+00	1.132E+02	--
α_3	6.33E-06	3.76E-03	1.49E-03	1.52E-02	4.307E-01	1.141E+02	--
α_4	3.65E-09	1.83E-03	2.17E-04	9.33E-03	2.099E-01	1.143E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9696218	0.9852970	0.9867994	0.9958370	2.082E+02	3.107E+00	--
α_2	1.13E-03	7.97E-03	6.48E-03	1.99E-02	1.684E+00	2.096E+02	--
α_3	1.97E-04	4.46E-03	3.03E-03	1.36E-02	9.426E-01	2.104E+02	--
α_4	1.36E-06	1.81E-03	6.21E-04	7.62E-03	3.816E-01	2.109E+02	--
α_5	1.87E-16	4.67E-04	2.56E-06	2.72E-03	9.865E-02	2.112E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9733376	0.9863454	0.9874863	0.9954551	2.761E+02	3.822E+00	--
α_2	8.87E-04	6.12E-03	4.99E-03	1.52E-02	1.714E+00	2.782E+02	--
α_3	2.60E-04	3.96E-03	2.86E-03	1.14E-02	1.108E+00	2.788E+02	--
α_4	3.07E-05	2.33E-03	1.30E-03	8.12E-03	6.509E-01	2.793E+02	--
α_5	1.79E-08	9.06E-04	1.63E-04	4.37E-03	2.536E-01	2.797E+02	--
α_6	5.54E-17	3.42E-04	1.55E-06	1.99E-03	9.572E-02	2.798E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9771222	0.9873350	0.9881185	0.9948722	4.050E+02	5.195E+00	--
α_2	9.74E-04	5.13E-03	4.35E-03	1.20E-02	2.105E+00	4.081E+02	--
α_3	3.02E-04	3.22E-03	2.46E-03	8.74E-03	1.320E+00	4.089E+02	--
α_4	1.24E-04	2.43E-03	1.68E-03	7.28E-03	9.967E-01	4.092E+02	--
α_5	6.47E-06	1.28E-03	6.08E-04	4.83E-03	5.249E-01	4.097E+02	--
α_6	3.54E-10	4.77E-04	4.66E-05	2.47E-03	1.956E-01	4.100E+02	--
α_7	3.68E-28	1.29E-04	2.92E-09	7.00E-04	5.291E-02	4.101E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787229	0.9878938	0.9885625	0.9947813	4.759E+02	5.832E+00	--
α_2	9.39E-04	4.63E-03	3.96E-03	1.06E-02	2.229E+00	4.795E+02	--
α_3	2.24E-04	2.62E-03	1.97E-03	7.22E-03	1.260E+00	4.805E+02	--
α_4	1.23E-04	2.16E-03	1.53E-03	6.38E-03	1.042E+00	4.807E+02	--
α_5	3.72E-05	1.58E-03	9.69E-04	5.22E-03	7.626E-01	4.810E+02	--
α_6	1.55E-07	6.79E-04	1.90E-04	3.02E-03	3.271E-01	4.814E+02	--
α_7	2.70E-13	2.79E-04	7.48E-06	1.57E-03	1.344E-01	4.816E+02	--
α_8	1.44E-20	1.59E-04	1.50E-07	9.26E-04	7.682E-02	4.817E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.92E-02	1.30E-02	1.15E-02	7.97E-03	6.12E-03	5.13E-03	4.63E-03
α_3		4.68E-03	3.76E-03	4.46E-03	3.96E-03	3.22E-03	2.62E-03
α_4			1.83E-03	1.81E-03	2.33E-03	2.43E-03	2.16E-03
α_5				4.67E-04	9.06E-04	1.28E-03	1.58E-03
α_6					3.42E-04	4.77E-04	6.79E-04
α_7						1.29E-04	2.79E-04
α_8							1.59E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.92E-02	1.77E-02	1.70E-02	1.47E-02	1.37E-02	1.27E-02	1.21E-02
Gamma		2.65E-01	3.28E-01	4.58E-01	5.52E-01	5.95E-01	6.18E-01
Delta			3.28E-01	3.38E-01	4.74E-01	5.73E-01	6.50E-01
Epsilon				2.05E-01	3.49E-01	4.37E-01	5.55E-01
Mu					2.74E-01	3.21E-01	4.14E-01
Omega						2.13E-01	3.92E-01
Sigma							3.64E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9249253	0.9803811	0.9909551	0.9999261	2.465E+01	4.932E-01	--
α_2	7.39E-05	1.96E-02	9.04E-03	7.51E-02	4.932E-01	2.465E+01	4.375

CCCG = 3, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9454337	0.9812328	0.9865440	0.9988729	5.540E+01	1.059E+00	--
α_2	2.68E-04	1.42E-02	8.45E-03	4.75E-02	7.137E-01	4.968E+01	4.940
α_3	1.67E-06	4.61E-03	1.40E-03	2.01E-02	3.458E-01	7.474E+01	3.316

CCCG = 4, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9532447	0.9797624	0.9827385	0.9960992	1.024E+02	2.115E+00	--
α_2	1.68E-03	1.35E-02	1.08E-02	3.45E-02	1.549E+00	1.135E+02	4.222
α_3	1.36E-07	4.30E-03	8.48E-04	2.05E-02	2.646E-01	6.126E+01	7.897
α_4	2.74E-07	2.47E-03	6.09E-04	1.13E-02	3.010E-01	1.214E+02	3.993

CCCG = 5, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9684869	0.9824236	0.9834746	0.9927705	2.976E+02	5.325E+00	--
α_2	3.15E-03	9.85E-03	8.98E-03	1.95E-02	3.632E+00	3.650E+02	3.810
α_3	5.30E-04	5.37E-03	4.13E-03	1.44E-02	1.354E+00	2.507E+02	5.572
α_4	1.86E-07	1.96E-03	4.69E-04	8.99E-03	2.961E-01	1.510E+02	9.284
α_5	1.17E-33	3.93E-04	4.35E-10	1.95E-03	4.243E-02	1.079E+02	13.007

CCCG = 6, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9695472	0.9833304	0.9844066	0.9934372	2.912E+02	4.936E+00	--
α_2	1.97E-03	7.39E-03	6.58E-03	1.56E-02	2.915E+00	3.913E+02	3.219
α_3	4.49E-04	5.25E-03	3.95E-03	1.45E-02	1.257E+00	2.383E+02	5.296
α_4	1.06E-05	2.59E-03	1.19E-03	9.92E-03	5.031E-01	1.937E+02	6.534
α_5	2.79E-14	9.61E-04	1.27E-05	5.52E-03	1.155E-01	1.201E+02	10.558
α_6	2.23E-12	4.77E-04	1.75E-05	2.64E-03	1.451E-01	3.039E+02	4.173

CCCG = 7, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9760771	0.9848173	0.9853228	0.9918320	6.262E+02	9.654E+00	--
α_2	2.30E-03	5.93E-03	5.53E-03	1.09E-02	4.851E+00	8.138E+02	3.338
α_3	1.10E-03	4.30E-03	3.81E-03	9.20E-03	2.800E+00	6.477E+02	4.201
α_4	2.93E-04	2.86E-03	2.21E-03	7.65E-03	1.384E+00	4.824E+02	5.648
α_5	5.30E-06	1.49E-03	6.69E-04	5.77E-03	4.902E-01	3.277E+02	8.326
α_6	1.21E-14	5.06E-04	6.43E-06	2.91E-03	1.146E-01	2.263E+02	12.068
α_7	4.85E-92	9.19E-05	9.81E-24	1.10E-04	1.464E-02	1.592E+02	17.160

CCCG = 8, Gamma = 1.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9757939	0.9855687	0.9862173	0.9931290	4.882E+02	7.148E+00	--
α_2	1.38E-03	5.09E-03	4.54E-03	1.07E-02	2.980E+00	5.829E+02	3.532
α_3	6.08E-04	3.50E-03	2.93E-03	8.35E-03	1.960E+00	5.573E+02	3.700
α_4	1.96E-04	2.68E-03	1.97E-03	7.59E-03	1.166E+00	4.344E+02	4.751
α_5	1.01E-05	1.77E-03	8.59E-04	6.62E-03	5.375E-01	3.030E+02	6.817
α_6	1.95E-10	8.82E-04	6.86E-05	4.66E-03	1.805E-01	2.046E+02	10.105
α_7	1.41E-34	2.72E-04	2.04E-10	1.33E-03	4.139E-02	1.522E+02	13.588
α_8	1.46E-08	2.39E-04	5.26E-05	1.11E-03	2.827E-01	1.184E+03	1.747

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.80E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.96E-02	1.42E-02	1.35E-02	9.85E-03	7.39E-03	5.93E-03	5.09E-03
α_3		4.61E-03	4.30E-03	5.37E-03	5.25E-03	4.30E-03	3.50E-03
α_4			2.47E-03	1.96E-03	2.59E-03	2.86E-03	2.68E-03
α_5				3.93E-04	9.61E-04	1.49E-03	1.77E-03
α_6					4.77E-04	5.06E-04	8.82E-04
α_7						9.19E-05	2.72E-04
α_8							2.39E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.80E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.96E-02	1.88E-02	2.02E-02	1.76E-02	1.67E-02	1.52E-02	1.44E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.8.2 BWR Safety Relief Valves

2.8.2.1 BWR-MSS-SRV-CC: BWR Safety Relief Valves Fail to Open

Generic CCF Parameters

Plant Type:	BWR
System Group:	Steam
System:	Main Steam
Component Group:	Valve
Component Type:	Safety Relief Valve (Dual Actuation)
Failure Mode:	Fail to Open
Date Range:	2006 through 2020
Prior:	Default 2015

Total Number of Independent Failure Events: 23.4

Total Number of Common-Cause Failure Events: 6

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9067552	0.9680089	0.9770949	0.9981705	0.9398566	3.121E+01	1.031E+00
α_2	1.83E-03	3.20E-02	2.29E-02	9.32E-02	6.01E-02	1.031E+00	3.121E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9238601	0.9649446	0.9691444	0.9916715	0.8941429	6.990E+01	2.539E+00
α_2	5.71E-03	2.93E-02	2.51E-02	6.74E-02	9.55E-02	2.124E+00	7.032E+01
α_3	7.71E-06	5.74E-03	2.19E-03	2.35E-02	1.04E-02	4.155E-01	7.202E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9256636	0.9602642	0.9630363	0.9853765	0.8550182	1.052E+02	4.352E+00
α_2	9.31E-03	3.06E-02	2.78E-02	6.16E-02	1.24E-01	3.354E+00	1.062E+02
α_3	1.14E-04	6.42E-03	3.77E-03	2.17E-02	1.77E-02	7.032E-01	1.088E+02
α_4	2.48E-07	2.69E-03	6.42E-04	1.24E-02	3.74E-03	2.949E-01	1.092E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9492088	0.9703604	0.9718074	0.9865646	0.8566978	2.084E+02	6.365E+00
α_2	6.04E-03	1.80E-02	1.65E-02	3.49E-02	9.46E-02	3.859E+00	2.109E+02
α_3	1.40E-03	8.64E-03	7.17E-03	2.09E-02	3.94E-02	1.855E+00	2.129E+02
α_4	1.51E-05	2.53E-03	1.24E-03	9.42E-03	7.85E-03	5.429E-01	2.142E+02
α_5	2.60E-15	5.03E-04	4.68E-06	2.91E-03	1.53E-03	1.081E-01	2.146E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9524670	0.9714971	0.9727290	0.9863108	0.8586992	2.457E+02	7.209E+00

α_2	4.40E-03	1.40E-02	1.27E-02	2.79E-02	7.70E-02	3.541E+00	2.494E+02
α_3	1.86E-03	8.96E-03	7.71E-03	2.04E-02	4.44E-02	2.267E+00	2.507E+02
α_4	1.76E-04	3.80E-03	2.60E-03	1.15E-02	1.53E-02	9.606E-01	2.520E+02
α_5	2.08E-07	1.25E-03	3.29E-04	5.61E-03	3.94E-03	3.152E-01	2.526E+02
α_6	1.03E-13	4.96E-04	9.77E-06	2.81E-03	6.54E-04	1.254E-01	2.528E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9628963	0.9764650	0.9772482	0.9873717	0.8612254	3.953E+02	9.526E+00
α_2	3.41E-03	9.92E-03	9.12E-03	1.91E-02	6.50E-02	4.014E+00	4.008E+02
α_3	1.82E-03	6.99E-03	6.20E-03	1.49E-02	4.41E-02	2.831E+00	4.019E+02
α_4	5.36E-04	4.01E-03	3.23E-03	1.02E-02	1.99E-02	1.624E+00	4.032E+02
α_5	4.59E-05	1.90E-03	1.17E-03	6.25E-03	7.48E-03	7.690E-01	4.040E+02
α_6	8.69E-09	6.08E-04	1.03E-04	2.96E-03	2.01E-03	2.463E-01	4.045E+02
α_7	4.23E-34	1.05E-04	1.24E-10	5.23E-04	2.87E-04	4.261E-02	4.047E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9637586	0.9768567	0.9776013	0.9874203	0.8644028	4.164E+02	9.865E+00
α_2	2.82E-03	8.70E-03	7.94E-03	1.72E-02	5.53E-02	3.707E+00	4.226E+02
α_3	1.58E-03	6.34E-03	5.59E-03	1.37E-02	4.30E-02	2.705E+00	4.236E+02
α_4	5.83E-04	4.03E-03	3.28E-03	1.00E-02	2.14E-02	1.716E+00	4.246E+02
α_5	1.33E-04	2.41E-03	1.69E-03	7.15E-03	1.07E-02	1.028E+00	4.252E+02
α_6	3.17E-06	1.11E-03	4.78E-04	4.34E-03	3.99E-03	4.717E-01	4.258E+02
α_7	6.50E-13	3.26E-04	1.01E-05	1.82E-03	1.02E-03	1.391E-01	4.261E+02
α_8	9.08E-17	2.31E-04	1.26E-06	1.34E-03	1.28E-04	9.860E-02	4.262E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.65E-01	9.60E-01	9.70E-01	9.71E-01	9.76E-01	9.77E-01
α_2	3.20E-02	2.93E-02	3.06E-02	1.80E-02	1.40E-02	9.92E-03	8.70E-03
α_3		5.74E-03	6.42E-03	8.64E-03	8.96E-03	6.99E-03	6.34E-03
α_4			2.69E-03	2.53E-03	3.80E-03	4.01E-03	4.03E-03
α_5				5.03E-04	1.25E-03	1.90E-03	2.41E-03
α_6					4.96E-04	6.08E-04	1.11E-03
α_7						1.05E-04	3.26E-04
α_8							2.31E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.65E-01	9.60E-01	9.70E-01	9.71E-01	9.76E-01	9.77E-01
Beta	3.20E-02	3.51E-02	3.97E-02	2.96E-02	2.85E-02	2.35E-02	2.31E-02
Gamma		1.64E-01	2.29E-01	3.94E-01	5.09E-01	5.79E-01	6.24E-01
Delta			2.95E-01	2.60E-01	3.82E-01	4.87E-01	5.61E-01
Epsilon				1.66E-01	3.14E-01	3.94E-01	5.03E-01
Mu					2.85E-01	2.73E-01	4.08E-01
Omega						1.48E-01	3.35E-01

Sigma							4.15E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.24	9.36	12.48	15.60	18.72	21.84	24.96
N₁	2.5561	2.5614	2.0189	1.9312	1.7871	1.6129	1.4309
N₂	0.5629	1.2727	2.0943	1.9349	1.8398	1.7703	1.6889
N₃		0.1386	0.3008	0.8056	1.0602	1.2012	1.3141
N₄			0.0634	0.1606	0.3646	0.5414	0.6542
N₅				0.0313	0.0942	0.2037	0.3255
N₆					0.0156	0.0547	0.1219
N₇						0.0078	0.0313
N₈							0.0039

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 6.1

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.282

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9449835	0.9840977	0.9909810	0.9997813	4.051E+01	6.546E-01	--
α_2	2.19E-04	1.59E-02	9.02E-03	5.50E-02	6.546E-01	4.051E+01	1.141

CCCG = 3, Gamma = 0.277

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9609005	0.9841236	0.9869626	0.9976348	1.078E+02	1.739E+00	--
α_2	1.64E-03	1.40E-02	1.11E-02	3.62E-02	1.491E+00	1.053E+02	1.261
α_3	3.07E-08	1.92E-03	3.33E-04	9.31E-03	2.487E-01	1.293E+02	1.039

CCCG = 4, Gamma = 0.271

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9568285	0.9790981	0.9812242	0.9940993	1.445E+02	3.084E+00	--
α_2	4.03E-03	1.76E-02	1.54E-02	3.89E-02	2.469E+00	1.375E+02	1.347
α_3	2.78E-06	2.22E-03	8.33E-04	9.12E-03	4.114E-01	1.851E+02	1.016
α_4	1.38E-09	1.05E-03	1.14E-04	5.38E-03	2.036E-01	1.940E+02	0.971

CCCG = 5, Gamma = 0.268

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9720499	0.9848698	0.9858920	0.9941980	3.078E+02	4.729E+00	--
α_2	2.60E-03	9.63E-03	8.59E-03	2.02E-02	2.955E+00	3.039E+02	1.172
α_3	4.03E-04	4.26E-03	3.25E-03	1.15E-02	1.325E+00	3.099E+02	1.156
α_4	7.14E-07	1.05E-03	3.54E-04	4.44E-03	3.765E-01	3.589E+02	1.001
α_5	1.70E-21	1.97E-04	1.12E-07	1.14E-03	7.237E-02	3.679E+02	0.978

CCCG = 6, Gamma = 0.266

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9735210	0.9853239	0.9862261	0.9940453	3.496E+02	5.207E+00	--
α_2	1.79E-03	7.38E-03	6.48E-03	1.60E-02	2.641E+00	3.554E+02	1.147
α_3	5.95E-04	4.66E-03	3.73E-03	1.19E-02	1.578E+00	3.374E+02	1.212
α_4	2.58E-05	1.81E-03	1.02E-03	6.26E-03	6.644E-01	3.672E+02	1.117
α_5	2.09E-09	5.36E-04	7.16E-05	2.69E-03	2.210E-01	4.120E+02	0.997
α_6	3.85E-16	3.02E-04	2.10E-06	1.75E-03	1.027E-01	3.396E+02	1.209

CCCG = 7, Gamma = 0.266

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9803846	0.9881822	0.9886893	0.9942482	6.294E+02	7.528E+00	--
α_2	1.41E-03	4.84E-03	4.35E-03	9.92E-03	3.232E+00	6.646E+02	1.040
α_3	7.43E-04	3.74E-03	3.19E-03	8.60E-03	2.190E+00	5.840E+02	1.185
α_4	1.91E-04	2.08E-03	1.58E-03	5.67E-03	1.306E+00	6.272E+02	1.105
α_5	6.49E-06	8.34E-04	4.26E-04	3.05E-03	5.746E-01	6.884E+02	1.008
α_6	2.54E-10	2.89E-04	2.92E-05	1.50E-03	1.979E-01	6.837E+02	1.016
α_7	8.98E-53	4.01E-05	4.02E-15	1.37E-04	2.656E-02	6.625E+02	1.049

CCCG = 8, Gamma = 0.266

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9808282	0.9885477	0.9890589	0.9945216	6.249E+02	7.240E+00	--
α_2	9.73E-04	3.94E-03	3.47E-03	8.52E-03	2.689E+00	6.799E+02	1.019
α_3	5.50E-04	3.28E-03	2.73E-03	7.89E-03	1.907E+00	5.792E+02	1.197
α_4	2.26E-04	2.31E-03	1.77E-03	6.21E-03	1.352E+00	5.851E+02	1.186
α_5	2.88E-05	1.17E-03	7.23E-04	3.85E-03	7.733E-01	6.580E+02	1.055
α_6	8.51E-08	4.49E-04	1.21E-04	2.01E-03	3.199E-01	7.122E+02	0.976
α_7	1.23E-15	1.76E-04	1.74E-06	1.01E-03	1.093E-01	6.216E+02	1.118
α_8	1.95E-18	1.27E-04	3.51E-07	7.38E-04	8.885E-02	7.019E+02	0.991

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.84E-01	9.79E-01	9.85E-01	9.85E-01	9.88E-01	9.89E-01
α_2	1.59E-02	1.40E-02	1.76E-02	9.63E-03	7.38E-03	4.84E-03	3.94E-03
α_3		1.92E-03	2.22E-03	4.26E-03	4.66E-03	3.74E-03	3.28E-03
α_4			1.05E-03	1.05E-03	1.81E-03	2.08E-03	2.31E-03
α_5				1.97E-04	5.36E-04	8.34E-04	1.17E-03
α_6					3.02E-04	2.89E-04	4.49E-04
α_7						4.01E-05	1.76E-04
α_8							1.27E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.84E-01	9.79E-01	9.85E-01	9.85E-01	9.88E-01	9.89E-01
Beta	1.59E-02	1.59E-02	2.09E-02	1.51E-02	1.47E-02	1.18E-02	1.15E-02
Gamma		1.21E-01	1.56E-01	3.64E-01	4.97E-01	5.91E-01	6.56E-01
Delta			3.21E-01	2.26E-01	3.62E-01	4.65E-01	5.63E-01
Epsilon				1.58E-01	3.17E-01	3.59E-01	4.55E-01
Mu					3.61E-01	2.83E-01	3.90E-01
Omega						1.22E-01	4.02E-01
Sigma							4.19E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.63	2.44	3.25	4.07	4.88	5.69	6.51
N_1	0.8394	0.7455	0.3091	0.3636	0.4091	0.4455	0.4727
N_2	0.1712	0.5136	1.0273	0.7121	0.5126	0.3918	0.3248
N_3		0.0000	0.0000	0.3333	0.4444	0.4444	0.3951

N₄			0.0000	0.0000	0.1111	0.2222	0.2963
N₅				0.0000	0.0000	0.0370	0.0988
N₆					0.0000	0.0000	0.0123
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 7.0

Total Number of Common-Cause Failure Events: 4

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.425

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8356903	0.9469197	0.9644355	0.9981995	1.501E+01	8.415E-01	--
α_2	1.80E-03	5.31E-02	3.56E-02	1.64E-01	8.415E-01	1.501E+01	1.141

CCCG = 3, Gamma = 0.414

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8599938	0.9386060	0.9471004	0.9881017	3.174E+01	2.076E+00	--
α_2	7.67E-03	5.19E-02	4.30E-02	1.27E-01	1.698E+00	3.104E+01	1.261
α_3	6.82E-06	9.53E-03	3.28E-03	4.02E-02	3.782E-01	3.932E+01	1.039

CCCG = 4, Gamma = 0.405

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8606865	0.9297698	0.9357640	0.9783301	4.408E+01	3.330E+00	--
α_2	1.19E-02	5.36E-02	4.70E-02	1.18E-01	2.352E+00	4.151E+01	1.347
α_3	2.03E-04	1.19E-02	6.98E-03	4.05E-02	6.935E-01	5.742E+01	1.016
α_4	3.02E-07	4.67E-03	1.05E-03	2.17E-02	2.841E-01	6.056E+01	0.971

CCCG = 5, Gamma = 0.397

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9067030	0.9472233	0.9501229	0.9778320	9.679E+01	5.393E+00	--
α_2	9.45E-03	3.21E-02	2.91E-02	6.54E-02	3.215E+00	9.678E+01	1.172
α_3	1.91E-03	1.53E-02	1.22E-02	3.91E-02	1.550E+00	9.986E+01	1.156
α_4	2.25E-05	4.47E-03	2.13E-03	1.69E-02	5.238E-01	1.166E+02	1.001
α_5	1.49E-15	8.66E-04	6.43E-06	5.02E-03	1.038E-01	1.198E+02	0.978

CCCG = 6, Gamma = 0.389

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9124828	0.9483484	0.9507093	0.9761468	1.194E+02	6.506E+00	--
α_2	7.65E-03	2.58E-02	2.33E-02	5.23E-02	3.268E+00	1.236E+02	1.147
α_3	2.82E-03	1.62E-02	1.36E-02	3.85E-02	1.948E+00	1.182E+02	1.212
α_4	2.39E-04	6.69E-03	4.39E-03	2.10E-02	8.716E-01	1.295E+02	1.117
α_5	4.90E-07	2.23E-03	6.19E-04	9.92E-03	3.255E-01	1.458E+02	0.997
α_6	4.28E-17	7.68E-04	2.80E-06	4.48E-03	9.247E-02	1.203E+02	1.209

CCCG = 7, Gamma = 0.381

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9317078	0.9570495	0.9585127	0.9773941	1.985E+02	8.906E+00	--
α_2	6.45E-03	1.86E-02	1.72E-02	3.58E-02	4.033E+00	2.125E+02	1.040
α_3	2.80E-03	1.26E-02	1.10E-02	2.82E-02	2.402E+00	1.877E+02	1.185
α_4	7.69E-04	7.04E-03	5.50E-03	1.85E-02	1.434E+00	2.024E+02	1.105
α_5	8.37E-05	3.45E-03	2.12E-03	1.13E-02	7.700E-01	2.226E+02	1.008
α_6	7.73E-09	1.05E-03	1.58E-04	5.19E-03	2.327E-01	2.215E+02	1.016
α_7	2.63E-40	1.64E-04	7.36E-12	7.24E-04	3.515E-02	2.148E+02	1.049

CCCG = 8, Gamma = 0.375

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9318623	0.9568144	0.9582292	0.9769349	2.051E+02	9.258E+00	--
α_2	5.66E-03	1.68E-02	1.55E-02	3.28E-02	3.868E+00	2.257E+02	1.019
α_3	2.57E-03	1.20E-02	1.03E-02	2.69E-02	2.338E+00	1.931E+02	1.197
α_4	7.22E-04	7.02E-03	5.44E-03	1.87E-02	1.385E+00	1.959E+02	1.186
α_5	2.01E-04	4.33E-03	2.96E-03	1.31E-02	9.605E-01	2.206E+02	1.055
α_6	8.98E-06	2.12E-03	9.77E-04	8.08E-03	5.071E-01	2.392E+02	0.976
α_7	2.83E-15	5.18E-04	4.87E-06	2.99E-03	1.083E-01	2.090E+02	1.118
α_8	1.49E-17	3.87E-04	1.30E-06	2.26E-03	9.140E-02	2.360E+02	0.991

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.47E-01	9.39E-01	9.30E-01	9.47E-01	9.48E-01	9.57E-01	9.57E-01
α_2	5.31E-02	5.19E-02	5.36E-02	3.21E-02	2.58E-02	1.86E-02	1.68E-02
α_3		9.53E-03	1.19E-02	1.53E-02	1.62E-02	1.26E-02	1.20E-02
α_4			4.67E-03	4.47E-03	6.69E-03	7.04E-03	7.02E-03
α_5				8.66E-04	2.23E-03	3.45E-03	4.33E-03
α_6					7.68E-04	1.05E-03	2.12E-03
α_7						1.64E-04	5.18E-04
α_8							3.87E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.47E-01	9.39E-01	9.30E-01	9.47E-01	9.48E-01	9.57E-01	9.57E-01
Beta	5.31E-02	6.14E-02	7.02E-02	5.28E-02	5.17E-02	4.30E-02	4.32E-02
Gamma		1.55E-01	2.36E-01	3.91E-01	5.01E-01	5.66E-01	6.10E-01
Delta			2.81E-01	2.59E-01	3.74E-01	4.81E-01	5.46E-01
Epsilon				1.62E-01	3.09E-01	3.98E-01	5.12E-01
Mu					2.56E-01	2.60E-01	4.11E-01
Omega						1.35E-01	3.00E-01
Sigma							4.28E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.87	2.80	3.73	4.67	5.60	6.53	7.47
N_1	1.7167	1.8159	1.7098	1.5676	1.3780	1.1674	0.9582
N_2	0.3917	0.7591	1.0670	1.2228	1.3272	1.3786	1.3641
N_3		0.1386	0.3008	0.4723	0.6158	0.7568	0.9191

N₄			0.0634	0.1606	0.2535	0.3192	0.3579
N₅				0.0313	0.0942	0.1666	0.2268
N₆					0.0156	0.0547	0.1096
N₇						0.0078	0.0313
N₈							0.0039

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.3

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.009

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.6790960	0.9212190	0.9691821	0.9999332	4.445E+00	3.801E-01	--
α_2	6.68E-05	7.88E-02	3.08E-02	3.21E-01	3.801E-01	4.445E+00	1.141

CCCG = 3, Gamma = 0.009

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7571208	0.9162748	0.9394956	0.9957773	1.051E+01	9.600E-01	--
α_2	9.66E-04	6.15E-02	3.69E-02	2.06E-01	6.673E-01	1.019E+01	1.261
α_3	1.99E-06	2.22E-02	5.46E-03	1.02E-01	2.927E-01	1.287E+01	1.039

CCCG = 4, Gamma = 0.009

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7863785	0.9112582	0.9256160	0.9868364	1.714E+01	1.669E+00	--
α_2	3.66E-03	6.12E-02	4.48E-02	1.75E-01	1.039E+00	1.594E+01	1.347
α_3	1.52E-05	1.73E-02	6.23E-03	7.21E-02	3.887E-01	2.210E+01	1.016
α_4	1.19E-07	1.03E-02	1.71E-03	5.02E-02	2.414E-01	2.331E+01	0.971

CCCG = 5, Gamma = 0.010

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8660716	0.9316982	0.9372908	0.9781807	4.756E+01	3.487E+00	--
α_2	5.67E-03	3.60E-02	3.00E-02	8.70E-02	1.791E+00	4.795E+01	1.172
α_3	1.92E-03	2.39E-02	1.80E-02	6.63E-02	1.207E+00	4.924E+01	1.156
α_4	1.32E-05	7.45E-03	2.99E-03	3.00E-02	4.340E-01	5.781E+01	1.001
α_5	2.05E-26	9.21E-04	3.28E-08	5.08E-03	5.493E-02	5.960E+01	0.978

CCCG = 6, Gamma = 0.010

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8814577	0.9378723	0.9424810	0.9785185	5.894E+01	3.905E+00	--
α_2	2.05E-03	2.10E-02	1.62E-02	5.64E-02	1.335E+00	6.212E+01	1.147
α_3	3.15E-03	2.55E-02	2.04E-02	6.51E-02	1.531E+00	5.856E+01	1.212
α_4	2.14E-04	1.10E-02	6.59E-03	3.70E-02	7.191E-01	6.449E+01	1.117
α_5	4.95E-08	3.38E-03	5.79E-04	1.64E-02	2.467E-01	7.282E+01	0.997
α_6	1.33E-20	1.21E-03	7.30E-07	7.02E-03	7.279E-02	6.014E+01	1.209

CCCG = 7, Gamma = 0.010

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9090367	0.9477368	0.9504246	0.9772508	1.046E+02	5.770E+00	--
α_2	1.66E-03	1.33E-02	1.06E-02	3.40E-02	1.549E+00	1.152E+02	1.040
α_3	3.47E-03	1.94E-02	1.64E-02	4.57E-02	1.989E+00	1.005E+02	1.185
α_4	1.06E-03	1.17E-02	8.91E-03	3.20E-02	1.287E+00	1.086E+02	1.105
α_5	9.59E-05	5.74E-03	3.33E-03	1.96E-02	6.913E-01	1.197E+02	1.008
α_6	1.44E-08	1.95E-03	2.93E-04	9.62E-03	2.327E-01	1.193E+02	1.016
α_7	1.24E-64	1.82E-04	2.76E-17	4.60E-04	2.112E-02	1.158E+02	1.049

CCCG = 8, Gamma = 0.010

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9197332	0.9518885	0.9539439	0.9770218	1.388E+02	7.016E+00	--
α_2	1.28E-03	9.93E-03	7.97E-03	2.53E-02	1.583E+00	1.578E+02	1.019
α_3	2.60E-03	1.46E-02	1.23E-02	3.46E-02	1.986E+00	1.337E+02	1.197
α_4	1.71E-03	1.22E-02	9.93E-03	3.05E-02	1.672E+00	1.352E+02	1.186
α_5	3.49E-04	6.57E-03	4.60E-03	1.96E-02	1.011E+00	1.528E+02	1.055
α_6	2.60E-05	3.43E-03	1.75E-03	1.26E-02	5.709E-01	1.658E+02	0.976
α_7	2.86E-10	1.25E-03	9.77E-05	6.59E-03	1.809E-01	1.450E+02	1.118
α_8	1.10E-107	7.60E-05	2.30E-27	5.69E-05	1.245E-02	1.639E+02	0.991

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.21E-01	9.16E-01	9.11E-01	9.32E-01	9.38E-01	9.48E-01	9.52E-01
α_2	7.88E-02	6.15E-02	6.12E-02	3.60E-02	2.10E-02	1.33E-02	9.93E-03
α_3		2.22E-02	1.73E-02	2.39E-02	2.55E-02	1.94E-02	1.46E-02
α_4			1.03E-02	7.45E-03	1.10E-02	1.17E-02	1.22E-02
α_5				9.21E-04	3.38E-03	5.74E-03	6.57E-03
α_6					1.21E-03	1.95E-03	3.43E-03
α_7						1.82E-04	1.25E-03
α_8							7.60E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.21E-01	9.16E-01	9.11E-01	9.32E-01	9.38E-01	9.48E-01	9.52E-01
Beta	7.88E-02	8.37E-02	8.87E-02	6.83E-02	6.21E-02	5.23E-02	4.81E-02
Gamma		2.66E-01	3.10E-01	4.73E-01	6.61E-01	7.46E-01	7.94E-01
Delta			3.72E-01	2.59E-01	3.80E-01	5.02E-01	6.17E-01
Epsilon				1.10E-01	2.94E-01	4.02E-01	4.81E-01
Mu					2.64E-01	2.71E-01	4.20E-01
Omega						8.57E-02	2.78E-01
Sigma							5.75E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.08	0.12	0.16	0.20	0.24	0.28	0.32
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 6.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.185

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9205639	0.9795823	0.9909668	0.9999404	2.258E+01	4.706E-01	--
α_2	5.96E-05	2.04E-02	9.03E-03	7.94E-02	4.706E-01	2.258E+01	1.141

CCCG = 3, Gamma = 0.195

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9415594	0.9796018	0.9851537	0.9986560	5.295E+01	1.103E+00	--
α_2	4.56E-04	1.57E-02	1.00E-02	5.04E-02	8.104E-01	5.072E+01	1.261
α_3	3.94E-07	4.67E-03	1.10E-03	2.15E-02	2.921E-01	6.221E+01	1.039

CCCG = 4, Gamma = 0.204

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516698	0.9795940	0.9828337	0.9964344	9.374E+01	1.953E+00	--
α_2	1.40E-03	1.50E-02	1.15E-02	4.05E-02	1.312E+00	8.633E+01	1.347
α_3	6.24E-06	3.71E-03	1.47E-03	1.50E-02	4.307E-01	1.157E+02	1.016
α_4	3.44E-09	1.73E-03	2.04E-04	8.79E-03	2.099E-01	1.214E+02	0.971

CCCG = 5, Gamma = 0.212

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9660821	0.9835729	0.9852460	0.9953446	1.860E+02	3.107E+00	--
α_2	1.30E-03	9.15E-03	7.45E-03	2.29E-02	1.684E+00	1.823E+02	1.172
α_3	2.24E-04	5.05E-03	3.43E-03	1.54E-02	9.426E-01	1.856E+02	1.156
α_4	1.33E-06	1.77E-03	6.09E-04	7.48E-03	3.816E-01	2.150E+02	1.001
α_5	1.79E-16	4.47E-04	2.45E-06	2.60E-03	9.865E-02	2.205E+02	0.978

CCCG = 6, Gamma = 0.218

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9698548	0.9845520	0.9858383	0.9948538	2.436E+02	3.822E+00	--
α_2	1.00E-03	6.90E-03	5.63E-03	1.71E-02	1.714E+00	2.468E+02	1.147
α_3	3.09E-04	4.71E-03	3.40E-03	1.36E-02	1.108E+00	2.342E+02	1.212
α_4	3.37E-05	2.55E-03	1.42E-03	8.90E-03	6.509E-01	2.547E+02	1.117
α_5	1.76E-08	8.86E-04	1.60E-04	4.27E-03	2.536E-01	2.859E+02	0.997
α_6	6.58E-17	4.06E-04	1.84E-06	2.36E-03	9.572E-02	2.357E+02	1.209

CCCG = 7, Gamma = 0.223

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9755328	0.9864514	0.9872881	0.9945125	3.782E+02	5.195E+00	--
α_2	9.99E-04	5.26E-03	4.46E-03	1.23E-02	2.105E+00	3.980E+02	1.040
α_3	3.53E-04	3.76E-03	2.87E-03	1.02E-02	1.320E+00	3.499E+02	1.185
α_4	1.35E-04	2.65E-03	1.84E-03	7.93E-03	9.967E-01	3.755E+02	1.105
α_5	6.43E-06	1.27E-03	6.04E-04	4.80E-03	5.249E-01	4.122E+02	1.008
α_6	3.55E-10	4.77E-04	4.67E-05	2.47E-03	1.956E-01	4.096E+02	1.016
α_7	3.80E-28	1.33E-04	3.02E-09	7.23E-04	5.291E-02	3.969E+02	1.049

CCCG = 8, Gamma = 0.227

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9771161	0.9869761	0.9876942	0.9943838	4.420E+02	5.832E+00	--
α_2	9.43E-04	4.65E-03	3.98E-03	1.06E-02	2.229E+00	4.775E+02	1.019
α_3	2.65E-04	3.09E-03	2.32E-03	8.51E-03	1.260E+00	4.071E+02	1.197
α_4	1.44E-04	2.53E-03	1.78E-03	7.46E-03	1.042E+00	4.111E+02	1.186
α_5	3.87E-05	1.65E-03	1.01E-03	5.43E-03	7.626E-01	4.622E+02	1.055
α_6	1.49E-07	6.53E-04	1.82E-04	2.90E-03	3.271E-01	5.005E+02	0.976
α_7	2.98E-13	3.08E-04	8.24E-06	1.73E-03	1.344E-01	4.368E+02	1.118
α_8	1.40E-20	1.56E-04	1.46E-07	9.04E-04	7.682E-02	4.933E+02	0.991

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.80E-01	9.80E-01	9.80E-01	9.84E-01	9.85E-01	9.86E-01	9.87E-01
α_2	2.04E-02	1.57E-02	1.50E-02	9.15E-03	6.90E-03	5.26E-03	4.65E-03
α_3		4.67E-03	3.71E-03	5.05E-03	4.71E-03	3.76E-03	3.09E-03
α_4			1.73E-03	1.77E-03	2.55E-03	2.65E-03	2.53E-03
α_5				4.47E-04	8.86E-04	1.27E-03	1.65E-03
α_6					4.06E-04	4.77E-04	6.53E-04
α_7						1.33E-04	3.08E-04
α_8							1.56E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.80E-01	9.80E-01	9.80E-01	9.84E-01	9.85E-01	9.86E-01	9.87E-01
Beta	2.04E-02	2.04E-02	2.04E-02	1.64E-02	1.54E-02	1.35E-02	1.30E-02
Gamma		2.29E-01	2.66E-01	4.43E-01	5.53E-01	6.12E-01	6.43E-01
Delta			3.18E-01	3.05E-01	4.49E-01	5.46E-01	6.32E-01
Epsilon				2.02E-01	3.36E-01	4.16E-01	5.22E-01
Mu					3.14E-01	3.24E-01	4.04E-01
Omega						2.18E-01	4.15E-01
Sigma							3.36E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.73	2.60	3.47	4.33	5.20	6.07	6.93
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 3.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9802848	0.9948816	0.9976845	0.9999811	9.587E+01	4.932E-01	--
α_2	1.89E-05	5.12E-03	2.32E-03	1.97E-02	4.932E-01	9.587E+01	1.141

CCCG = 3, Gamma = 0.105

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9852166	0.9949509	0.9964105	0.9997007	2.088E+02	1.059E+00	--
α_2	6.75E-05	3.61E-03	2.13E-03	1.22E-02	7.137E-01	1.971E+02	1.261
α_3	5.18E-07	1.44E-03	4.36E-04	6.29E-03	3.458E-01	2.396E+02	1.039

CCCG = 4, Gamma = 0.110

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9873528	0.9945610	0.9953823	0.9989616	3.867E+02	2.115E+00	--
α_2	5.31E-04	4.29E-03	3.41E-03	1.10E-02	1.549E+00	3.599E+02	1.347
α_3	1.73E-08	5.53E-04	1.08E-04	2.63E-03	2.646E-01	4.786E+02	1.016
α_4	6.63E-08	6.00E-04	1.47E-04	2.74E-03	3.010E-01	5.010E+02	0.971

CCCG = 5, Gamma = 0.114

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9921094	0.9956170	0.9958859	0.9982065	1.209E+03	5.325E+00	--
α_2	9.66E-04	3.03E-03	2.76E-03	6.02E-03	3.632E+00	1.195E+03	1.172
α_3	1.09E-04	1.11E-03	8.55E-04	3.00E-03	1.354E+00	1.215E+03	1.156
α_4	2.00E-08	2.11E-04	5.03E-05	9.69E-04	2.961E-01	1.404E+03	1.001
α_5	8.78E-35	2.95E-05	3.25E-11	1.46E-04	4.243E-02	1.438E+03	0.978

CCCG = 6, Gamma = 0.117

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9917444	0.9954985	0.9957960	0.9982365	1.092E+03	4.936E+00	--
α_2	7.00E-04	2.63E-03	2.34E-03	5.56E-03	2.915E+00	1.105E+03	1.147
α_3	1.02E-04	1.20E-03	9.01E-04	3.31E-03	1.257E+00	1.047E+03	1.212
α_4	1.80E-06	4.42E-04	2.02E-04	1.69E-03	5.031E-01	1.137E+03	1.117
α_5	2.62E-15	9.06E-05	1.19E-06	5.19E-04	1.155E-01	1.275E+03	0.997
α_6	6.46E-13	1.38E-04	5.06E-06	7.65E-04	1.451E-01	1.051E+03	1.209

CCCG = 7, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9939218	0.9961530	0.9962840	0.9979371	2.500E+03	9.654E+00	--
α_2	7.15E-04	1.85E-03	1.72E-03	3.40E-03	4.851E+00	2.624E+03	1.040
α_3	3.11E-04	1.21E-03	1.07E-03	2.60E-03	2.800E+00	2.305E+03	1.185
α_4	5.72E-05	5.59E-04	4.32E-04	1.50E-03	1.384E+00	2.473E+03	1.105
α_5	6.40E-07	1.81E-04	8.08E-05	6.99E-04	4.902E-01	2.711E+03	1.008
α_6	1.01E-15	4.26E-05	5.39E-07	2.44E-04	1.146E-01	2.692E+03	1.016
α_7	2.95E-93	5.61E-06	5.97E-25	6.67E-06	1.464E-02	2.608E+03	1.049

CCCG = 8, Gamma = 0.122

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9936399	0.9962193	0.9963928	0.9982063	1.884E+03	7.148E+00	--
α_2	3.97E-04	1.47E-03	1.31E-03	3.08E-03	2.980E+00	2.031E+03	1.019
α_3	1.96E-04	1.13E-03	9.47E-04	2.70E-03	1.960E+00	1.730E+03	1.197
α_4	4.88E-05	6.67E-04	4.89E-04	1.89E-03	1.166E+00	1.746E+03	1.186
α_5	1.55E-06	2.74E-04	1.33E-04	1.02E-03	5.375E-01	1.962E+03	1.055
α_6	1.88E-11	8.50E-05	6.60E-06	4.49E-04	1.805E-01	2.123E+03	0.976
α_7	1.16E-35	2.23E-05	1.67E-11	1.09E-04	4.139E-02	1.853E+03	1.118
α_8	8.24E-09	1.35E-04	2.98E-05	6.30E-04	2.827E-01	2.091E+03	0.991

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.95E-01	9.96E-01	9.96E-01
α_2	5.12E-03	3.61E-03	4.29E-03	3.03E-03	2.63E-03	1.85E-03	1.47E-03
α_3		1.44E-03	5.53E-04	1.11E-03	1.20E-03	1.21E-03	1.13E-03
α_4			6.00E-04	2.11E-04	4.42E-04	5.59E-04	6.67E-04
α_5				2.95E-05	9.06E-05	1.81E-04	2.74E-04
α_6					1.38E-04	4.26E-05	8.50E-05
α_7						5.61E-06	2.23E-05
α_8							1.35E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.95E-01	9.96E-01	9.96E-01
Beta	5.12E-03	5.05E-03	5.44E-03	4.38E-03	4.50E-03	3.85E-03	3.78E-03
Gamma		2.85E-01	2.12E-01	3.09E-01	4.15E-01	5.20E-01	6.12E-01
Delta			5.21E-01	1.78E-01	3.59E-01	3.94E-01	5.11E-01
Epsilon				1.23E-01	3.41E-01	2.90E-01	4.36E-01
Mu					6.04E-01	2.10E-01	4.70E-01
Omega						1.16E-01	6.49E-01
Sigma							8.58E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.93	1.40	1.87	2.33	2.80	3.27	3.73
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.8.2.2 BWR-MSS-SRV-OO: BWR Safety Relief Valves Fail to Close

Generic CCF Parameters

Plant Type: BWR
 System Group: Steam
 System: Main Steam
 Component Group: Valve
 Component Type: Safety Relief Valve (Dual Actuation)
 Failure Mode: Fail to Close
 Date Range: 2006 through 2020
 Prior: Default 2015

Total Number of Independent Failure Events: 2.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9282864	0.9816130	0.9919194	0.9999444	1.0000000	2.501E+01	4.685E-01
α_2	5.22E-05	1.84E-02	8.08E-03	7.17E-02	0.00E+00	4.685E-01	2.501E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9479827	0.9817194	0.9866098	0.9987321	1.0000000	6.058E+01	1.128E+00
α_2	4.63E-04	1.38E-02	9.01E-03	4.35E-02	0.00E+00	8.512E-01	6.086E+01
α_3	2.24E-07	4.49E-03	9.62E-04	2.10E-02	0.00E+00	2.768E-01	6.143E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9524020	0.9801027	0.9833617	0.9966630	1.0000000	9.328E+01	1.894E+00
α_2	1.15E-03	1.32E-02	1.00E-02	3.63E-02	0.00E+00	1.260E+00	9.391E+01
α_3	4.60E-06	4.23E-03	1.55E-03	1.75E-02	0.00E+00	4.024E-01	9.477E+01
α_4	1.69E-08	2.43E-03	3.63E-04	1.20E-02	0.00E+00	2.315E-01	9.494E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9650030	0.9825664	0.9841721	0.9946398	1.0000000	1.934E+02	3.432E+00
α_2	1.66E-03	9.77E-03	8.17E-03	2.34E-02	0.00E+00	1.924E+00	1.949E+02
α_3	3.09E-04	5.33E-03	3.77E-03	1.57E-02	0.00E+00	1.049E+00	1.958E+02
α_4	1.48E-06	1.94E-03	6.69E-04	8.19E-03	0.00E+00	3.822E-01	1.965E+02
α_5	3.39E-20	3.90E-04	3.63E-07	2.27E-03	0.00E+00	7.674E-02	1.968E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9677388	0.9834455	0.9848147	0.9944665	1.0000000	2.278E+02	3.835E+00
α_2	1.05E-03	7.34E-03	5.98E-03	1.83E-02	0.00E+00	1.701E+00	2.300E+02
α_3	4.11E-04	5.21E-03	3.87E-03	1.46E-02	0.00E+00	1.207E+00	2.304E+02

α_4	2.36E-05	2.57E-03	1.35E-03	9.27E-03	0.00E+00	5.960E-01	2.311E+02
α_5	3.74E-09	9.54E-04	1.28E-04	4.79E-03	0.00E+00	2.211E-01	2.314E+02
α_6	3.73E-15	4.74E-04	4.80E-06	2.73E-03	0.00E+00	1.098E-01	2.315E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9733593	0.9848812	0.9857214	0.9935230	1.0000000	3.744E+02	5.747E+00
α_2	1.21E-03	5.90E-03	5.06E-03	1.35E-02	0.00E+00	2.243E+00	3.779E+02
α_3	5.75E-04	4.29E-03	3.45E-03	1.08E-02	0.00E+00	1.630E+00	3.785E+02
α_4	1.77E-04	2.85E-03	2.04E-03	8.29E-03	0.00E+00	1.083E+00	3.791E+02
α_5	1.08E-05	1.49E-03	7.50E-04	5.46E-03	0.00E+00	5.654E-01	3.796E+02
α_6	2.77E-10	5.04E-04	4.66E-05	2.63E-03	0.00E+00	1.916E-01	3.800E+02
α_7	6.27E-41	9.15E-05	3.41E-12	4.02E-04	0.00E+00	3.480E-02	3.801E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9746444	0.9856267	0.9864296	0.9938603	1.0000000	3.926E+02	5.726E+00
α_2	9.13E-04	5.07E-03	4.27E-03	1.20E-02	0.00E+00	2.018E+00	3.963E+02
α_3	3.60E-04	3.49E-03	2.70E-03	9.31E-03	0.00E+00	1.391E+00	3.970E+02
α_4	1.59E-04	2.67E-03	1.89E-03	7.81E-03	0.00E+00	1.062E+00	3.973E+02
α_5	3.11E-05	1.76E-03	1.03E-03	5.99E-03	0.00E+00	7.026E-01	3.976E+02
α_6	3.45E-07	8.78E-04	2.69E-04	3.82E-03	0.00E+00	3.497E-01	3.980E+02
α_7	1.32E-15	2.71E-04	2.48E-06	1.56E-03	0.00E+00	1.078E-01	3.982E+02
α_8	2.77E-17	2.38E-04	1.01E-06	1.38E-03	0.00E+00	9.469E-02	3.983E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.84E-02	1.38E-02	1.32E-02	9.77E-03	7.34E-03	5.90E-03	5.07E-03
α_3		4.49E-03	4.23E-03	5.33E-03	5.21E-03	4.29E-03	3.49E-03
α_4			2.43E-03	1.94E-03	2.57E-03	2.85E-03	2.67E-03
α_5				3.90E-04	9.54E-04	1.49E-03	1.76E-03
α_6					4.74E-04	5.04E-04	8.78E-04
α_7						9.15E-05	2.71E-04
α_8							2.38E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.84E-02	1.83E-02	1.99E-02	1.74E-02	1.66E-02	1.51E-02	1.44E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.60	2.60	2.60	2.60	2.60	2.60	2.60
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9384541	0.9844698	0.9934645	0.9999653	2.851E+01	4.498E-01	--
α_2	3.47E-05	1.55E-02	6.54E-03	6.15E-02	4.498E-01	2.851E+01	0.522

CCCG = 3, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9570460	0.9846971	0.9886472	0.9988408	7.582E+01	1.178E+00	--
α_2	5.53E-04	1.25E-02	8.54E-03	3.82E-02	9.387E-01	7.396E+01	0.491
α_3	2.90E-08	2.77E-03	4.46E-04	1.36E-02	2.396E-01	8.627E+01	0.425

CCCG = 4, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9592120	0.9829572	0.9857539	0.9971353	1.095E+02	1.898E+00	--
α_2	1.07E-03	1.19E-02	9.04E-03	3.25E-02	1.285E+00	1.068E+02	0.492
α_3	3.10E-06	3.37E-03	1.20E-03	1.41E-02	3.927E-01	1.163E+02	0.456
α_4	6.85E-09	1.78E-03	2.38E-04	8.96E-03	2.207E-01	1.235E+02	0.430

CCCG = 5, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9688939	0.9844261	0.9858376	0.9951349	2.216E+02	3.506E+00	--
α_2	1.64E-03	9.21E-03	7.74E-03	2.18E-02	1.992E+00	2.144E+02	0.509
α_3	2.72E-04	4.41E-03	3.15E-03	1.28E-02	1.078E+00	2.436E+02	0.450
α_4	8.11E-07	1.55E-03	5.00E-04	6.64E-03	3.632E-01	2.345E+02	0.469
α_5	3.84E-21	4.16E-04	2.40E-07	2.40E-03	7.248E-02	1.744E+02	0.631

CCCG = 6, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9703678	0.9844343	0.9856155	0.9944651	2.656E+02	4.199E+00	--
α_2	1.38E-03	8.02E-03	6.71E-03	1.91E-02	1.941E+00	2.401E+02	0.567
α_3	4.04E-04	4.23E-03	3.23E-03	1.14E-02	1.332E+00	3.139E+02	0.436
α_4	2.22E-05	2.07E-03	1.12E-03	7.38E-03	6.181E-01	2.973E+02	0.461
α_5	5.62E-09	8.21E-04	1.22E-04	4.07E-03	2.313E-01	2.815E+02	0.487
α_6	3.89E-20	4.26E-04	4.01E-07	2.48E-03	7.684E-02	1.802E+02	0.762

CCCG = 7, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9743090	0.9851493	0.9859144	0.9933767	4.128E+02	6.223E+00	--
α_2	1.77E-03	7.24E-03	6.37E-03	1.57E-02	2.654E+00	3.638E+02	0.589
α_3	4.71E-04	3.46E-03	2.80E-03	8.74E-03	1.645E+00	4.733E+02	0.455
α_4	1.59E-04	2.39E-03	1.73E-03	6.88E-03	1.115E+00	4.654E+02	0.463
α_5	1.22E-05	1.26E-03	6.68E-04	4.53E-03	6.034E-01	4.774E+02	0.452
α_6	6.96E-11	3.92E-04	2.92E-05	2.08E-03	1.780E-01	4.537E+02	0.476
α_7	5.42E-51	9.96E-05	2.04E-14	3.52E-04	2.734E-02	2.746E+02	0.786

CCCG = 8, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9743828	0.9851796	0.9859404	0.9933782	4.152E+02	6.246E+00	--
α_2	1.56E-03	6.78E-03	5.91E-03	1.50E-02	2.504E+00	3.670E+02	0.605
α_3	3.23E-04	3.02E-03	2.35E-03	8.00E-03	1.419E+00	4.689E+02	0.475
α_4	1.15E-04	2.10E-03	1.47E-03	6.22E-03	1.027E+00	4.886E+02	0.456
α_5	3.21E-05	1.56E-03	9.36E-04	5.22E-03	7.337E-01	4.690E+02	0.476
α_6	7.58E-07	7.61E-04	2.74E-04	3.17E-03	3.975E-01	5.217E+02	0.428
α_7	1.65E-20	1.65E-04	1.59E-07	9.61E-04	7.703E-02	4.655E+02	0.480
α_8	4.09E-18	4.40E-04	1.10E-06	2.57E-03	8.749E-02	1.987E+02	1.124

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.85E-01	9.83E-01	9.84E-01	9.84E-01	9.85E-01	9.85E-01
α_2	1.55E-02	1.25E-02	1.19E-02	9.21E-03	8.02E-03	7.24E-03	6.78E-03
α_3		2.77E-03	3.37E-03	4.41E-03	4.23E-03	3.46E-03	3.02E-03
α_4			1.78E-03	1.55E-03	2.07E-03	2.39E-03	2.10E-03
α_5				4.16E-04	8.21E-04	1.26E-03	1.56E-03
α_6					4.26E-04	3.92E-04	7.61E-04
α_7						9.96E-05	1.65E-04
α_8							4.40E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.85E-01	9.83E-01	9.84E-01	9.84E-01	9.85E-01	9.85E-01
Beta	1.55E-02	1.53E-02	1.70E-02	1.56E-02	1.56E-02	1.49E-02	1.48E-02
Gamma		1.81E-01	3.02E-01	4.09E-01	4.85E-01	5.12E-01	5.43E-01
Delta			3.46E-01	3.08E-01	4.40E-01	5.45E-01	6.25E-01
Epsilon				2.12E-01	3.75E-01	4.23E-01	5.83E-01
Mu					3.42E-01	2.80E-01	4.67E-01
Omega						2.02E-01	4.43E-01
Sigma							7.27E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8709314	0.9691325	0.9889053	0.9999762	1.193E+01	3.801E-01	--
α_2	2.38E-05	3.09E-02	1.11E-02	1.29E-01	3.801E-01	1.193E+01	0.522

CCCG = 3, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9072068	0.9689733	0.9783925	0.9985200	2.998E+01	9.600E-01	--
α_2	3.36E-04	2.25E-02	1.30E-02	7.70E-02	6.673E-01	2.901E+01	0.491
α_3	7.41E-07	8.54E-03	2.03E-03	3.93E-02	2.927E-01	3.398E+01	0.425

CCCG = 4, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9172344	0.9665613	0.9725891	0.9952462	4.825E+01	1.669E+00	--
α_2	1.24E-03	2.16E-02	1.54E-02	6.31E-02	1.039E+00	4.711E+01	0.492
α_3	6.46E-06	7.48E-03	2.65E-03	3.13E-02	3.887E-01	5.159E+01	0.456
α_4	5.02E-08	4.38E-03	7.19E-04	2.14E-02	2.414E-01	5.488E+01	0.430

CCCG = 5, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9430042	0.9713676	0.9739112	0.9910347	1.183E+02	3.487E+00	--
α_2	2.39E-03	1.54E-02	1.27E-02	3.76E-02	1.791E+00	1.144E+02	0.509
α_3	7.28E-04	9.19E-03	6.85E-03	2.57E-02	1.207E+00	1.302E+02	0.450
α_4	6.07E-06	3.44E-03	1.37E-03	1.39E-02	4.340E-01	1.257E+02	0.469
α_5	1.30E-26	5.87E-04	2.09E-08	3.23E-03	5.493E-02	9.360E+01	0.631

CCCG = 6, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9492663	0.9737536	0.9758493	0.9910778	1.449E+02	3.905E+00	--
α_2	9.93E-04	1.03E-02	7.91E-03	2.77E-02	1.335E+00	1.284E+02	0.567
α_3	1.11E-03	9.06E-03	7.21E-03	2.33E-02	1.531E+00	1.674E+02	0.436
α_4	8.67E-05	4.50E-03	2.67E-03	1.51E-02	7.191E-01	1.589E+02	0.461
α_5	2.38E-08	1.63E-03	2.79E-04	7.94E-03	2.467E-01	1.507E+02	0.487
α_6	8.28E-21	7.54E-04	4.53E-07	4.37E-03	7.279E-02	9.652E+01	0.762

CCCG = 7, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9590032	0.9766530	0.9779277	0.9899491	2.414E+02	5.770E+00	--
α_2	9.29E-04	7.47E-03	5.96E-03	1.92E-02	1.549E+00	2.058E+02	0.589
α_3	1.31E-03	7.40E-03	6.22E-03	1.75E-02	1.989E+00	2.667E+02	0.455
α_4	4.37E-04	4.88E-03	3.70E-03	1.33E-02	1.287E+00	2.627E+02	0.463
α_5	4.25E-05	2.56E-03	1.48E-03	8.73E-03	6.913E-01	2.698E+02	0.452
α_6	6.68E-09	9.06E-04	1.36E-04	4.48E-03	2.327E-01	2.566E+02	0.476
α_7	9.23E-65	1.36E-04	2.06E-17	3.42E-04	2.112E-02	1.554E+02	0.786

CCCG = 8, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9640135	0.9785913	0.9795579	0.9898684	3.207E+02	7.016E+00	--
α_2	7.54E-04	5.87E-03	4.70E-03	1.50E-02	1.583E+00	2.680E+02	0.605
α_3	1.02E-03	5.79E-03	4.86E-03	1.37E-02	1.986E+00	3.411E+02	0.475
α_4	6.53E-04	4.68E-03	3.79E-03	1.17E-02	1.672E+00	3.556E+02	0.456
α_5	1.56E-04	2.95E-03	2.06E-03	8.79E-03	1.011E+00	3.417E+02	0.476
α_6	1.13E-05	1.50E-03	7.62E-04	5.49E-03	5.709E-01	3.803E+02	0.428
α_7	1.22E-10	5.33E-04	4.17E-05	2.82E-03	1.809E-01	3.394E+02	0.480
α_8	1.24E-107	8.58E-05	2.60E-27	6.43E-05	1.245E-02	1.450E+02	1.124

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.69E-01	9.69E-01	9.67E-01	9.71E-01	9.74E-01	9.77E-01	9.79E-01
α_2	3.09E-02	2.25E-02	2.16E-02	1.54E-02	1.03E-02	7.47E-03	5.87E-03
α_3		8.54E-03	7.48E-03	9.19E-03	9.06E-03	7.40E-03	5.79E-03
α_4			4.38E-03	3.44E-03	4.50E-03	4.88E-03	4.68E-03
α_5				5.87E-04	1.63E-03	2.56E-03	2.95E-03
α_6					7.54E-04	9.06E-04	1.50E-03
α_7						1.36E-04	5.33E-04
α_8							8.58E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.69E-01	9.69E-01	9.67E-01	9.71E-01	9.74E-01	9.77E-01	9.79E-01
Beta	3.09E-02	3.10E-02	3.34E-02	2.86E-02	2.62E-02	2.33E-02	2.14E-02
Gamma		2.75E-01	3.55E-01	4.62E-01	6.08E-01	6.80E-01	7.26E-01
Delta			3.69E-01	3.05E-01	4.32E-01	5.34E-01	6.27E-01
Epsilon				1.46E-01	3.46E-01	4.25E-01	5.20E-01
Mu					3.16E-01	2.90E-01	4.18E-01
Omega						1.30E-01	2.92E-01
Sigma							1.39E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9254105	0.9808392	0.9915376	0.9999442	2.409E+01	4.706E-01	--
α_2	5.58E-05	1.92E-02	8.46E-03	7.46E-02	4.706E-01	2.409E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9492792	0.9823211	0.9871539	0.9988381	6.126E+01	1.103E+00	--
α_2	3.76E-04	1.30E-02	8.28E-03	4.17E-02	8.104E-01	6.155E+01	--
α_3	3.95E-07	4.68E-03	1.10E-03	2.16E-02	2.921E-01	6.207E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9595678	0.9829546	0.9856771	0.9970284	1.126E+02	1.953E+00	--
α_2	1.07E-03	1.15E-02	8.76E-03	3.10E-02	1.312E+00	1.132E+02	--
α_3	6.33E-06	3.76E-03	1.49E-03	1.52E-02	4.307E-01	1.141E+02	--
α_4	3.65E-09	1.83E-03	2.17E-04	9.33E-03	2.099E-01	1.143E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9696218	0.9852970	0.9867994	0.9958370	2.082E+02	3.107E+00	--
α_2	1.13E-03	7.97E-03	6.48E-03	1.99E-02	1.684E+00	2.096E+02	--
α_3	1.97E-04	4.46E-03	3.03E-03	1.36E-02	9.426E-01	2.104E+02	--
α_4	1.36E-06	1.81E-03	6.21E-04	7.62E-03	3.816E-01	2.109E+02	--
α_5	1.87E-16	4.67E-04	2.56E-06	2.72E-03	9.865E-02	2.112E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9733376	0.9863454	0.9874863	0.9954551	2.761E+02	3.822E+00	--
α_2	8.87E-04	6.12E-03	4.99E-03	1.52E-02	1.714E+00	2.782E+02	--
α_3	2.60E-04	3.96E-03	2.86E-03	1.14E-02	1.108E+00	2.788E+02	--
α_4	3.07E-05	2.33E-03	1.30E-03	8.12E-03	6.509E-01	2.793E+02	--
α_5	1.79E-08	9.06E-04	1.63E-04	4.37E-03	2.536E-01	2.797E+02	--
α_6	5.54E-17	3.42E-04	1.55E-06	1.99E-03	9.572E-02	2.798E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9771222	0.9873350	0.9881185	0.9948722	4.050E+02	5.195E+00	--
α_2	9.74E-04	5.13E-03	4.35E-03	1.20E-02	2.105E+00	4.081E+02	--
α_3	3.02E-04	3.22E-03	2.46E-03	8.74E-03	1.320E+00	4.089E+02	--
α_4	1.24E-04	2.43E-03	1.68E-03	7.28E-03	9.967E-01	4.092E+02	--
α_5	6.47E-06	1.28E-03	6.08E-04	4.83E-03	5.249E-01	4.097E+02	--
α_6	3.54E-10	4.77E-04	4.66E-05	2.47E-03	1.956E-01	4.100E+02	--
α_7	3.68E-28	1.29E-04	2.92E-09	7.00E-04	5.291E-02	4.101E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787229	0.9878938	0.9885625	0.9947813	4.759E+02	5.832E+00	--
α_2	9.39E-04	4.63E-03	3.96E-03	1.06E-02	2.229E+00	4.795E+02	--
α_3	2.24E-04	2.62E-03	1.97E-03	7.22E-03	1.260E+00	4.805E+02	--
α_4	1.23E-04	2.16E-03	1.53E-03	6.38E-03	1.042E+00	4.807E+02	--
α_5	3.72E-05	1.58E-03	9.69E-04	5.22E-03	7.626E-01	4.810E+02	--
α_6	1.55E-07	6.79E-04	1.90E-04	3.02E-03	3.271E-01	4.814E+02	--
α_7	2.70E-13	2.79E-04	7.48E-06	1.57E-03	1.344E-01	4.816E+02	--
α_8	1.44E-20	1.59E-04	1.50E-07	9.26E-04	7.682E-02	4.817E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.92E-02	1.30E-02	1.15E-02	7.97E-03	6.12E-03	5.13E-03	4.63E-03
α_3		4.68E-03	3.76E-03	4.46E-03	3.96E-03	3.22E-03	2.62E-03
α_4			1.83E-03	1.81E-03	2.33E-03	2.43E-03	2.16E-03
α_5				4.67E-04	9.06E-04	1.28E-03	1.58E-03
α_6					3.42E-04	4.77E-04	6.79E-04
α_7						1.29E-04	2.79E-04
α_8							1.59E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.92E-02	1.77E-02	1.70E-02	1.47E-02	1.37E-02	1.27E-02	1.21E-02
Gamma		2.65E-01	3.28E-01	4.58E-01	5.52E-01	5.95E-01	6.18E-01
Delta			3.28E-01	3.38E-01	4.74E-01	5.73E-01	6.50E-01
Epsilon				2.05E-01	3.49E-01	4.37E-01	5.55E-01
Mu					2.74E-01	3.21E-01	4.14E-01
Omega						2.13E-01	3.92E-01
Sigma							3.64E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.231

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9909460	0.9976522	0.9989417	0.9999914	2.096E+02	4.932E-01	--
α_2	8.61E-06	2.35E-03	1.06E-03	9.05E-03	4.932E-01	2.096E+02	0.522

CCCG = 3, Gamma = 0.231

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941357	0.9980002	0.9985810	0.9998818	5.287E+02	1.059E+00	--
α_2	2.63E-05	1.41E-03	8.30E-04	4.76E-03	7.137E-01	5.059E+02	0.491
α_3	2.12E-07	5.91E-04	1.79E-04	2.58E-03	3.458E-01	5.848E+02	0.425

CCCG = 4, Gamma = 0.231

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9951426	0.9979141	0.9982309	0.9996026	1.012E+03	2.115E+00	--
α_2	1.94E-04	1.57E-03	1.25E-03	4.05E-03	1.549E+00	9.846E+02	0.492
α_3	7.76E-09	2.49E-04	4.86E-05	1.18E-03	2.646E-01	1.064E+03	0.456
α_4	2.94E-08	2.67E-04	6.54E-05	1.22E-03	3.010E-01	1.129E+03	0.430

CCCG = 5, Gamma = 0.231

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9966338	0.9981316	0.9982468	0.9992362	2.844E+03	5.325E+00	--
α_2	4.20E-04	1.32E-03	1.20E-03	2.62E-03	3.632E+00	2.755E+03	0.509
α_3	4.26E-05	4.34E-04	3.33E-04	1.17E-03	1.354E+00	3.119E+03	0.450
α_4	9.38E-09	9.89E-05	2.36E-05	4.54E-04	2.961E-01	2.994E+03	0.469
α_5	5.68E-35	1.91E-05	2.10E-11	9.45E-05	4.243E-02	2.224E+03	0.631

CCCG = 6, Gamma = 0.231

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9962389	0.9979508	0.9980869	0.9991980	2.404E+03	4.936E+00	--
α_2	3.47E-04	1.30E-03	1.16E-03	2.76E-03	2.915E+00	2.234E+03	0.567
α_3	3.68E-05	4.32E-04	3.24E-04	1.19E-03	1.257E+00	2.911E+03	0.436
α_4	7.43E-07	1.83E-04	8.36E-05	7.01E-04	5.031E-01	2.752E+03	0.461
α_5	1.28E-15	4.44E-05	5.85E-07	2.54E-04	1.155E-01	2.603E+03	0.487
α_6	4.07E-13	8.71E-05	3.19E-06	4.83E-04	1.451E-01	1.665E+03	0.762

CCCG = 7, Gamma = 0.231

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9970728	0.9981482	0.9982115	0.9990076	5.204E+03	9.654E+00	--
α_2	4.05E-04	1.05E-03	9.75E-04	1.93E-03	4.851E+00	4.632E+03	0.589
α_3	1.19E-04	4.66E-04	4.12E-04	9.97E-04	2.800E+00	6.007E+03	0.455
α_4	2.39E-05	2.34E-04	1.81E-04	6.27E-04	1.384E+00	5.902E+03	0.463
α_5	2.87E-07	8.10E-05	3.62E-05	3.14E-04	4.902E-01	6.048E+03	0.452
α_6	4.75E-16	2.00E-05	2.53E-07	1.14E-04	1.146E-01	5.743E+03	0.476
α_7	2.22E-93	4.21E-06	4.48E-25	5.01E-06	1.464E-02	3.475E+03	0.786

CCCG = 8, Gamma = 0.231

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9967978	0.9980974	0.9981850	0.9990979	3.750E+03	7.148E+00	--
α_2	2.36E-04	8.71E-04	7.76E-04	1.83E-03	2.980E+00	3.418E+03	0.605
α_3	7.80E-05	4.50E-04	3.76E-04	1.07E-03	1.960E+00	4.352E+03	0.475
α_4	1.88E-05	2.57E-04	1.89E-04	7.30E-04	1.166E+00	4.532E+03	0.456
α_5	7.02E-07	1.24E-04	5.98E-05	4.63E-04	5.375E-01	4.349E+03	0.476
α_6	8.25E-12	3.73E-05	2.90E-06	1.97E-04	1.805E-01	4.833E+03	0.428
α_7	4.97E-36	9.60E-06	7.18E-12	4.70E-05	4.139E-02	4.310E+03	0.480
α_8	9.37E-09	1.54E-04	3.39E-05	7.16E-04	2.827E-01	1.840E+03	1.124

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.98E-01	9.98E-01	9.98E-01	9.98E-01	9.98E-01	9.98E-01
α_2	2.35E-03	1.41E-03	1.57E-03	1.32E-03	1.30E-03	1.05E-03	8.71E-04
α_3		5.91E-04	2.49E-04	4.34E-04	4.32E-04	4.66E-04	4.50E-04
α_4			2.67E-04	9.89E-05	1.83E-04	2.34E-04	2.57E-04
α_5				1.91E-05	4.44E-05	8.10E-05	1.24E-04
α_6					8.71E-05	2.00E-05	3.73E-05
α_7						4.21E-06	9.60E-06
α_8							1.54E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.98E-01	9.98E-01	9.98E-01	9.98E-01	9.98E-01	9.98E-01
Beta	2.35E-03	2.00E-03	2.09E-03	1.87E-03	2.05E-03	1.85E-03	1.90E-03
Gamma		2.96E-01	2.47E-01	2.95E-01	3.64E-01	4.35E-01	5.42E-01
Delta			5.18E-01	2.14E-01	4.21E-01	4.22E-01	5.64E-01
Epsilon				1.62E-01	4.18E-01	3.10E-01	5.58E-01
Mu					6.63E-01	2.30E-01	6.19E-01
Omega						1.74E-01	8.14E-01
Sigma							9.41E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.60	0.60	0.60	0.60	0.60	0.60	0.60
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.9 Power-Operated Relief Valves

2.9.1 Pooled Power-Operated Relief Valves

2.9.1.1 ALL-PORV-CC: All Systems Power-Operated Relief Valves Fail to Open

Generic CCF Parameters

Component Group: Valve
Component Type: Power Operated Relief Valve
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 75.3

Total Number of Common-Cause Failure Events: 3

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9213506	0.9693569	0.9755046	0.9963205	0.9604371	4.746E+01	1.500E+00
α_2	3.68E-03	3.06E-02	2.45E-02	7.86E-02	3.96E-02	1.500E+00	4.746E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9482718	0.9772370	0.9804138	0.9953446	0.9716005	9.546E+01	2.223E+00
α_2	4.36E-04	9.69E-03	6.61E-03	2.95E-02	2.47E-03	9.467E-01	9.673E+01
α_3	1.16E-03	1.31E-02	9.93E-03	3.57E-02	2.59E-02	1.277E+00	9.640E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9556447	0.9785205	0.9807011	0.9939357	0.9766642	1.405E+02	3.085E+00
α_2	1.13E-03	1.01E-02	7.93E-03	2.65E-02	3.74E-03	1.451E+00	1.422E+02
α_3	2.48E-04	6.28E-03	4.19E-03	1.95E-02	9.80E-03	9.024E-01	1.427E+02
α_4	1.04E-04	5.09E-03	3.06E-03	1.70E-02	9.80E-03	7.315E-01	1.429E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9660604	0.9815948	0.9828243	0.9929204	0.9793346	2.530E+02	4.744E+00
α_2	1.76E-03	8.66E-03	7.43E-03	1.98E-02	4.86E-03	2.232E+00	2.555E+02
α_3	4.63E-04	5.05E-03	3.84E-03	1.38E-02	3.99E-03	1.302E+00	2.564E+02
α_4	1.26E-04	3.42E-03	2.25E-03	1.07E-02	7.88E-03	8.822E-01	2.569E+02
α_5	2.88E-07	1.27E-03	3.54E-04	5.64E-03	3.94E-03	3.267E-01	2.574E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9688210	0.9826358	0.9836781	0.9928777	0.9807583	2.996E+02	5.295E+00
α_2	1.38E-03	7.06E-03	6.01E-03	1.63E-02	5.95E-03	2.152E+00	3.028E+02
α_3	4.25E-04	4.40E-03	3.37E-03	1.19E-02	1.76E-03	1.340E+00	3.036E+02

α_4	1.52E-04	3.18E-03	2.19E-03	9.62E-03	4.94E-03	9.711E-01	3.039E+02
α_5	1.79E-05	1.95E-03	1.03E-03	7.04E-03	4.94E-03	5.961E-01	3.043E+02
α_6	6.31E-09	7.70E-04	1.18E-04	3.80E-03	1.65E-03	2.348E-01	3.047E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9736095	0.9841512	0.9848366	0.9923440	0.9814728	4.584E+02	7.382E+00
α_2	1.61E-03	6.14E-03	5.45E-03	1.30E-02	7.01E-03	2.862E+00	4.629E+02
α_3	5.27E-04	3.67E-03	2.98E-03	9.13E-03	8.85E-04	1.708E+00	4.641E+02
α_4	2.74E-04	2.86E-03	2.19E-03	7.75E-03	2.84E-03	1.333E+00	4.645E+02
α_5	8.86E-05	2.02E-03	1.37E-03	6.18E-03	4.25E-03	9.404E-01	4.648E+02
α_6	1.85E-06	9.48E-04	3.84E-04	3.80E-03	2.83E-03	4.416E-01	4.653E+02
α_7	5.54E-17	2.09E-04	1.05E-06	1.21E-03	7.08E-04	9.730E-02	4.657E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9747591	0.9847655	0.9854097	0.9925646	0.9817489	4.888E+02	7.561E+00
α_2	1.48E-03	5.70E-03	5.05E-03	1.21E-02	8.05E-03	2.828E+00	4.935E+02
α_3	3.23E-04	2.92E-03	2.28E-03	7.68E-03	5.61E-04	1.447E+00	4.949E+02
α_4	1.97E-04	2.46E-03	1.83E-03	6.86E-03	1.56E-03	1.219E+00	4.951E+02
α_5	1.09E-04	2.05E-03	1.43E-03	6.09E-03	3.11E-03	1.015E+00	4.953E+02
α_6	1.88E-05	1.33E-03	7.51E-04	4.63E-03	3.11E-03	6.622E-01	4.957E+02
α_7	1.63E-08	5.32E-04	1.04E-04	2.53E-03	1.55E-03	2.641E-01	4.961E+02
α_8	5.83E-14	2.54E-04	5.10E-06	1.44E-03	3.11E-04	1.259E-01	4.962E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.69E-01	9.77E-01	9.79E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01
α_2	3.06E-02	9.69E-03	1.01E-02	8.66E-03	7.06E-03	6.14E-03	5.70E-03
α_3		1.31E-02	6.28E-03	5.05E-03	4.40E-03	3.67E-03	2.92E-03
α_4			5.09E-03	3.42E-03	3.18E-03	2.86E-03	2.46E-03
α_5				1.27E-03	1.95E-03	2.02E-03	2.05E-03
α_6					7.70E-04	9.48E-04	1.33E-03
α_7						2.09E-04	5.32E-04
α_8							2.54E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.69E-01	9.77E-01	9.79E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01
Beta	3.06E-02	2.28E-02	2.15E-02	1.84E-02	1.74E-02	1.58E-02	1.52E-02
Gamma		5.74E-01	5.30E-01	5.29E-01	5.93E-01	6.12E-01	6.26E-01
Delta			4.48E-01	4.81E-01	5.73E-01	6.22E-01	6.94E-01
Epsilon				2.70E-01	4.61E-01	5.26E-01	6.29E-01
Mu					2.83E-01	3.64E-01	5.09E-01
Omega						1.81E-01	3.71E-01
Sigma							3.23E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	23.78	35.67	47.56	59.45	71.34	83.23	95.12
N₁	1.2697	1.8091	2.2848	2.7053	3.0685	3.3757	3.6283
N₂	1.0318	0.0955	0.1909	0.3082	0.4512	0.6188	0.8096
N₃		1.0000	0.5000	0.2533	0.1334	0.0781	0.0564
N₄			0.5000	0.5000	0.3751	0.2504	0.1571
N₅				0.2500	0.3750	0.3750	0.3125
N₆					0.1250	0.2500	0.3125
N₇						0.0625	0.1563
N₈							0.0313

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 29.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.389

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9584727	0.9891378	0.9949886	0.9999566	4.554E+01	5.001E-01	--
α_2	4.34E-05	1.09E-02	5.01E-03	4.15E-02	5.001E-01	4.554E+01	1.183

CCCG = 3, Gamma = 0.394

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9778213	0.9919090	0.9938724	0.9992853	1.564E+02	1.276E+00	--
α_2	2.97E-04	5.40E-03	3.80E-03	1.60E-02	1.027E+00	1.891E+02	0.768
α_3	4.31E-08	2.69E-03	4.68E-04	1.30E-02	2.487E-01	9.220E+01	1.580

CCCG = 4, Gamma = 0.396

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9767756	0.9899303	0.9914099	0.9980261	2.120E+02	2.157E+00	--
α_2	7.65E-04	6.21E-03	4.94E-03	1.60E-02	1.542E+00	2.468E+02	0.822
α_3	3.04E-06	2.42E-03	9.10E-04	9.95E-03	4.114E-01	1.695E+02	1.202
α_4	1.89E-09	1.44E-03	1.57E-04	7.38E-03	2.036E-01	1.414E+02	1.442

CCCG = 5, Gamma = 0.398

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9805941	0.9900603	0.9908922	0.9966844	3.828E+02	3.843E+00	--
α_2	1.27E-03	5.77E-03	5.00E-03	1.29E-02	2.400E+00	4.138E+02	0.912
α_3	1.27E-04	2.50E-03	1.73E-03	7.50E-03	9.945E-01	3.964E+02	0.955
α_4	9.13E-07	1.34E-03	4.52E-04	5.67E-03	3.765E-01	2.810E+02	1.349
α_5	2.88E-21	3.32E-04	1.90E-07	1.92E-03	7.237E-02	2.178E+02	1.742

CCCG = 6, Gamma = 0.398

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9810307	0.9899505	0.9906913	0.9963397	4.306E+02	4.372E+00	--
α_2	1.11E-03	5.16E-03	4.45E-03	1.16E-02	2.352E+00	4.537E+02	0.953
α_3	1.64E-04	2.34E-03	1.70E-03	6.67E-03	1.142E+00	4.878E+02	0.889
α_4	9.39E-06	1.44E-03	7.12E-04	5.32E-03	5.534E-01	3.848E+02	1.128
α_5	2.90E-09	7.44E-04	9.93E-05	3.73E-03	2.210E-01	2.969E+02	1.463
α_6	4.80E-16	3.77E-04	2.62E-06	2.18E-03	1.027E-01	2.726E+02	1.594

CCCG = 7, Gamma = 0.399

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9840570	0.9906282	0.9910786	0.9956617	7.134E+02	6.749E+00	--
α_2	1.23E-03	4.34E-03	3.89E-03	8.97E-03	3.141E+00	7.213E+02	0.998
α_3	3.31E-04	2.20E-03	1.81E-03	5.44E-03	1.762E+00	7.976E+02	0.904
α_4	9.32E-05	1.49E-03	1.07E-03	4.35E-03	1.084E+00	7.246E+02	0.996
α_5	5.05E-06	8.88E-04	4.30E-04	3.32E-03	5.376E-01	6.049E+02	1.194
α_6	3.43E-10	3.90E-04	3.94E-05	2.02E-03	1.979E-01	5.067E+02	1.426
α_7	1.35E-52	6.01E-05	6.03E-15	2.06E-04	2.656E-02	4.416E+02	1.636

CCCG = 8, Gamma = 0.400

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9844088	0.9909053	0.9913575	0.9958576	7.108E+02	6.524E+00	--
α_2	9.96E-04	3.95E-03	3.48E-03	8.48E-03	2.749E+00	6.937E+02	1.044
α_3	2.28E-04	1.86E-03	1.48E-03	4.81E-03	1.537E+00	8.242E+02	0.881
α_4	8.07E-05	1.37E-03	9.73E-04	4.03E-03	1.057E+00	7.684E+02	0.945
α_5	1.51E-05	9.98E-04	5.68E-04	3.44E-03	6.745E-01	6.752E+02	1.076
α_6	7.19E-08	5.35E-04	1.36E-04	2.43E-03	3.076E-01	5.751E+02	1.264
α_7	1.54E-15	2.20E-04	2.17E-06	1.27E-03	1.093E-01	4.974E+02	1.462
α_8	2.47E-18	1.60E-04	4.43E-07	9.31E-04	8.885E-02	5.563E+02	1.307

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.92E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	5.40E-03	6.21E-03	5.77E-03	5.16E-03	4.34E-03	3.95E-03
α_3		2.69E-03	2.42E-03	2.50E-03	2.34E-03	2.20E-03	1.86E-03
α_4			1.44E-03	1.34E-03	1.44E-03	1.49E-03	1.37E-03
α_5				3.32E-04	7.44E-04	8.88E-04	9.98E-04
α_6					3.77E-04	3.90E-04	5.35E-04
α_7						6.01E-05	2.20E-04
α_8							1.60E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.92E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	8.09E-03	1.01E-02	9.94E-03	1.00E-02	9.37E-03	9.09E-03
Gamma		3.32E-01	3.83E-01	4.20E-01	4.87E-01	5.37E-01	5.66E-01
Delta			3.73E-01	4.00E-01	5.22E-01	5.62E-01	6.38E-01
Epsilon				1.99E-01	4.38E-01	4.73E-01	5.82E-01
Mu					3.36E-01	3.37E-01	4.78E-01
Omega						1.33E-01	4.15E-01
Sigma							4.21E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	9.16	13.74	18.32	22.89	27.47	32.05	36.63
N_1	0.9667	1.4000	1.8000	2.1750	2.5230	2.8454	3.1435
N_2	0.0167	0.0500	0.1000	0.1567	0.2239	0.3006	0.3854
N_3		0.0000	0.0000	0.0033	0.0084	0.0156	0.0251

N₄			0.0000	0.0000	0.0001	0.0004	0.0009
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 13.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.197

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7756483	0.9108837	0.9274037	0.9893800	1.482E+01	1.450E+00	--
α_2	1.06E-02	8.91E-02	7.26E-02	2.24E-01	1.450E+00	1.482E+01	1.183

CCCG = 3, Gamma = 0.187

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8598174	0.9375967	0.9458178	0.9871994	3.273E+01	2.178E+00	--
α_2	7.44E-04	1.68E-02	1.15E-02	5.10E-02	9.387E-01	5.496E+01	0.768
α_3	3.94E-03	4.56E-02	3.49E-02	1.24E-01	1.240E+00	2.594E+01	1.580

CCCG = 4, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8929412	0.9484424	0.9536898	0.9859814	5.332E+01	2.898E+00	--
α_2	1.55E-03	1.72E-02	1.31E-02	4.68E-02	1.285E+00	7.346E+01	0.822
α_3	6.75E-04	1.75E-02	1.17E-02	5.40E-02	8.927E-01	5.025E+01	1.202
α_4	3.33E-04	1.69E-02	1.02E-02	5.65E-02	7.207E-01	4.189E+01	1.442

CCCG = 5, Gamma = 0.179

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9259290	0.9600555	0.9627493	0.9849736	1.083E+02	4.506E+00	--
α_2	2.69E-03	1.51E-02	1.27E-02	3.56E-02	1.992E+00	1.301E+02	0.912
α_3	1.01E-03	1.05E-02	8.08E-03	2.84E-02	1.328E+00	1.248E+02	0.955
α_4	3.37E-04	9.67E-03	6.33E-03	3.04E-02	8.632E-01	8.843E+01	1.349
α_5	9.54E-07	4.66E-03	1.28E-03	2.08E-02	3.225E-01	6.881E+01	1.742

CCCG = 6, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9344651	0.9634378	0.9655925	0.9850475	1.370E+02	5.199E+00	--
α_2	2.13E-03	1.24E-02	1.04E-02	2.94E-02	1.941E+00	1.551E+02	0.953
α_3	9.73E-04	8.65E-03	6.80E-03	2.27E-02	1.457E+00	1.670E+02	0.889
α_4	3.80E-04	7.48E-03	5.20E-03	2.24E-02	9.931E-01	1.317E+02	1.128
α_5	5.88E-05	5.92E-03	3.16E-03	2.12E-02	6.063E-01	1.017E+02	1.463
α_6	2.51E-09	2.15E-03	2.30E-04	1.11E-02	2.018E-01	9.373E+01	1.594

CCCG = 7, Gamma = 0.175

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9459639	0.9675507	0.9689426	0.9843840	2.154E+02	7.223E+00	--
α_2	2.81E-03	1.15E-02	1.01E-02	2.49E-02	2.654E+00	2.283E+02	0.998
α_3	9.66E-04	6.70E-03	5.46E-03	1.67E-02	1.708E+00	2.531E+02	0.904
α_4	5.91E-04	5.90E-03	4.55E-03	1.58E-02	1.365E+00	2.300E+02	0.996
α_5	2.47E-04	5.07E-03	3.49E-03	1.53E-02	9.784E-01	1.920E+02	1.194
α_6	4.28E-06	2.65E-03	1.04E-03	1.07E-02	4.280E-01	1.612E+02	1.426
α_7	1.42E-17	6.38E-04	1.92E-06	3.73E-03	8.984E-02	1.407E+02	1.636

CCCG = 8, Gamma = 0.174

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9477632	0.9686191	0.9699638	0.9848823	2.236E+02	7.246E+00	--
α_2	2.52E-03	1.09E-02	9.51E-03	2.40E-02	2.504E+00	2.273E+02	1.044
α_3	5.92E-04	5.32E-03	4.17E-03	1.40E-02	1.450E+00	2.710E+02	0.881
α_4	3.53E-04	4.66E-03	3.44E-03	1.31E-02	1.183E+00	2.527E+02	0.945
α_5	2.70E-04	4.69E-03	3.32E-03	1.38E-02	1.046E+00	2.220E+02	1.076
α_6	6.87E-05	3.74E-03	2.20E-03	1.26E-02	7.100E-01	1.891E+02	1.264
α_7	1.08E-08	1.42E-03	2.15E-04	7.02E-03	2.333E-01	1.639E+02	1.462
α_8	3.72E-14	6.47E-04	9.83E-06	3.70E-03	1.187E-01	1.834E+02	1.307

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.11E-01	9.38E-01	9.48E-01	9.60E-01	9.63E-01	9.68E-01	9.69E-01
α_2	8.91E-02	1.68E-02	1.72E-02	1.51E-02	1.24E-02	1.15E-02	1.09E-02
α_3		4.56E-02	1.75E-02	1.05E-02	8.65E-03	6.70E-03	5.32E-03
α_4			1.69E-02	9.67E-03	7.48E-03	5.90E-03	4.66E-03
α_5				4.66E-03	5.92E-03	5.07E-03	4.69E-03
α_6					2.15E-03	2.65E-03	3.74E-03
α_7						6.38E-04	1.42E-03
α_8							6.47E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.11E-01	9.38E-01	9.48E-01	9.60E-01	9.63E-01	9.68E-01	9.69E-01
Beta	8.91E-02	6.24E-02	5.16E-02	3.99E-02	3.66E-02	3.24E-02	3.14E-02
Gamma		7.31E-01	6.67E-01	6.22E-01	6.62E-01	6.46E-01	6.53E-01
Delta			4.92E-01	5.76E-01	6.43E-01	6.80E-01	7.40E-01
Epsilon				3.25E-01	5.19E-01	5.86E-01	6.93E-01
Mu					2.66E-01	3.93E-01	5.53E-01
Omega						1.94E-01	3.56E-01
Sigma							3.13E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.14	6.21	8.27	10.34	12.41	14.48	16.55
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		1.0000	0.5000	0.2500	0.1250	0.0625	0.0313

N₄			0.5000	0.5000	0.3750	0.2500	0.1563
N₅				0.2500	0.3750	0.3750	0.3125
N₆					0.1250	0.2500	0.3125
N₇						0.0625	0.1563
N₈							0.0313

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 4.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7253088	0.9330720	0.9743741	0.9999446	5.299E+00	3.801E-01	--
α_2	5.54E-05	6.69E-02	2.56E-02	2.75E-01	3.801E-01	5.299E+00	1.183

CCCG = 3, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8151736	0.9370801	0.9551954	0.9968968	1.430E+01	9.600E-01	--
α_2	5.01E-04	3.31E-02	1.93E-02	1.13E-01	6.673E-01	1.951E+01	0.768
α_3	2.72E-06	2.98E-02	7.44E-03	1.37E-01	2.927E-01	9.516E+00	1.580

CCCG = 4, Gamma = 0.051

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8391963	0.9339779	0.9451668	0.9903784	2.361E+01	1.669E+00	--
α_2	1.97E-03	3.38E-02	2.43E-02	9.81E-02	1.039E+00	2.972E+01	0.822
α_3	1.63E-05	1.85E-02	6.68E-03	7.70E-02	3.887E-01	2.066E+01	1.202
α_4	1.62E-07	1.38E-02	2.32E-03	6.74E-02	2.414E-01	1.729E+01	1.442

CCCG = 5, Gamma = 0.051

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8886836	0.9434872	0.9482319	0.9820549	5.821E+01	3.487E+00	--
α_2	4.16E-03	2.66E-02	2.21E-02	6.46E-02	1.791E+00	6.549E+01	0.912
α_3	1.50E-03	1.88E-02	1.41E-02	5.22E-02	1.207E+00	6.303E+01	0.955
α_4	1.70E-05	9.54E-03	3.84E-03	3.84E-02	4.340E-01	4.505E+01	1.349
α_5	3.49E-26	1.56E-03	5.60E-08	8.64E-03	5.493E-02	3.516E+01	1.742

CCCG = 6, Gamma = 0.051

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9017560	0.9487145	0.9526071	0.9823589	7.223E+01	3.905E+00	--
α_2	1.61E-03	1.66E-02	1.28E-02	4.47E-02	1.335E+00	7.889E+01	0.953
α_3	2.19E-03	1.78E-02	1.42E-02	4.57E-02	1.531E+00	8.448E+01	0.889
α_4	2.06E-04	1.06E-02	6.33E-03	3.56E-02	7.191E-01	6.707E+01	1.128
α_5	6.94E-08	4.72E-03	8.12E-04	2.29E-02	2.467E-01	5.202E+01	1.463
α_6	1.68E-20	1.52E-03	9.18E-07	8.82E-03	7.279E-02	4.790E+01	1.594

CCCG = 7, Gamma = 0.051

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9193060	0.9537228	0.9561332	0.9799027	1.189E+02	5.770E+00	--
α_2	1.53E-03	1.23E-02	9.82E-03	3.15E-02	1.549E+00	1.244E+02	0.998
α_3	2.55E-03	1.43E-02	1.21E-02	3.38E-02	1.989E+00	1.370E+02	0.904
α_4	9.18E-04	1.02E-02	7.75E-03	2.78E-02	1.287E+00	1.249E+02	0.996
α_5	1.10E-04	6.57E-03	3.82E-03	2.24E-02	6.913E-01	1.046E+02	1.194
α_6	1.95E-08	2.64E-03	3.99E-04	1.31E-02	2.327E-01	8.793E+01	1.426
α_7	1.87E-64	2.75E-04	4.18E-17	6.94E-04	2.112E-02	7.679E+01	1.636

CCCG = 8, Gamma = 0.051

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9292955	0.9576897	0.9595196	0.9798329	1.588E+02	7.016E+00	--
α_2	1.27E-03	9.89E-03	7.93E-03	2.52E-02	1.583E+00	1.585E+02	1.044
α_3	1.86E-03	1.05E-02	8.80E-03	2.48E-02	1.986E+00	1.878E+02	0.881
α_4	1.32E-03	9.45E-03	7.68E-03	2.37E-02	1.672E+00	1.752E+02	0.945
α_5	3.45E-04	6.51E-03	4.55E-03	1.94E-02	1.011E+00	1.543E+02	1.076
α_6	3.28E-05	4.32E-03	2.20E-03	1.58E-02	5.709E-01	1.317E+02	1.264
α_7	3.64E-10	1.58E-03	1.24E-04	8.37E-03	1.809E-01	1.142E+02	1.462
α_8	1.41E-107	9.74E-05	2.95E-27	7.30E-05	1.245E-02	1.279E+02	1.307

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.33E-01	9.37E-01	9.34E-01	9.43E-01	9.49E-01	9.54E-01	9.58E-01
α_2	6.69E-02	3.31E-02	3.38E-02	2.66E-02	1.66E-02	1.23E-02	9.89E-03
α_3		2.98E-02	1.85E-02	1.88E-02	1.78E-02	1.43E-02	1.05E-02
α_4			1.38E-02	9.54E-03	1.06E-02	1.02E-02	9.45E-03
α_5				1.56E-03	4.72E-03	6.57E-03	6.51E-03
α_6					1.52E-03	2.64E-03	4.32E-03
α_7						2.75E-04	1.58E-03
α_8							9.74E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.33E-01	9.37E-01	9.34E-01	9.43E-01	9.49E-01	9.54E-01	9.58E-01
Beta	6.69E-02	6.29E-02	6.60E-02	5.65E-02	5.13E-02	4.63E-02	4.23E-02
Gamma		4.74E-01	4.88E-01	5.29E-01	6.76E-01	7.34E-01	7.66E-01
Delta			4.27E-01	3.71E-01	4.86E-01	5.79E-01	6.77E-01
Epsilon				1.40E-01	3.70E-01	4.82E-01	5.69E-01
Mu					2.43E-01	3.07E-01	4.80E-01
Omega						9.43E-02	2.80E-01
Sigma							5.80E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.29	1.94	2.59	3.24	3.88	4.53	5.18
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 22.6

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9308803	0.9820503	0.9918535	0.9999379	2.658E+01	4.858E-01	--
α_2	6.21E-05	1.79E-02	8.15E-03	6.91E-02	4.858E-01	2.658E+01	1.183

CCCG = 3, Gamma = 0.289

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9568763	0.9847755	0.9888015	0.9989090	7.425E+01	1.148E+00	--
α_2	3.04E-04	8.95E-03	5.84E-03	2.82E-02	8.559E-01	9.482E+01	0.768
α_3	5.32E-07	6.28E-03	1.48E-03	2.89E-02	2.921E-01	4.623E+01	1.580

CCCG = 4, Gamma = 0.291

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9643031	0.9847462	0.9870856	0.9971880	1.319E+02	2.044E+00	--
α_2	9.39E-04	8.91E-03	6.94E-03	2.36E-02	1.403E+00	1.560E+02	0.822
α_3	6.73E-06	4.00E-03	1.58E-03	1.62E-02	4.307E-01	1.073E+02	1.202
α_4	4.67E-09	2.34E-03	2.77E-04	1.19E-02	2.099E-01	8.951E+01	1.442

CCCG = 5, Gamma = 0.292

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9710694	0.9858121	0.9871972	0.9958210	2.264E+02	3.258E+00	--
α_2	1.16E-03	7.28E-03	6.03E-03	1.77E-02	1.836E+00	2.502E+02	0.912
α_3	1.73E-04	3.92E-03	2.66E-03	1.20E-02	9.426E-01	2.397E+02	0.955
α_4	1.68E-06	2.24E-03	7.71E-04	9.45E-03	3.816E-01	1.700E+02	1.349
α_5	2.99E-16	7.48E-04	4.10E-06	4.35E-03	9.865E-02	1.318E+02	1.742

CCCG = 6, Gamma = 0.292

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9739468	0.9864527	0.9875223	0.9953041	2.949E+02	4.049E+00	--
α_2	1.05E-03	6.12E-03	5.12E-03	1.46E-02	1.941E+00	3.150E+02	0.953
α_3	2.14E-04	3.26E-03	2.35E-03	9.41E-03	1.108E+00	3.387E+02	0.889
α_4	3.21E-05	2.43E-03	1.35E-03	8.48E-03	6.509E-01	2.672E+02	1.128
α_5	2.43E-08	1.23E-03	2.21E-04	5.92E-03	2.536E-01	2.063E+02	1.463
α_6	8.19E-17	5.05E-04	2.30E-06	2.94E-03	9.572E-02	1.895E+02	1.594

CCCG = 7, Gamma = 0.293

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9771479	0.9871664	0.9879147	0.9946291	4.241E+02	5.513E+00	--
α_2	1.23E-03	5.54E-03	4.81E-03	1.24E-02	2.423E+00	4.346E+02	0.998
α_3	2.57E-04	2.74E-03	2.09E-03	7.44E-03	1.320E+00	4.809E+02	0.904
α_4	1.16E-04	2.28E-03	1.58E-03	6.82E-03	9.967E-01	4.368E+02	0.996
α_5	7.27E-06	1.44E-03	6.83E-04	5.42E-03	5.249E-01	3.647E+02	1.194
α_6	4.76E-10	6.40E-04	6.26E-05	3.32E-03	1.956E-01	3.056E+02	1.426
α_7	5.67E-28	1.99E-04	4.50E-09	1.08E-03	5.291E-02	2.664E+02	1.636

CCCG = 8, Gamma = 0.293

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9783623	0.9874855	0.9881298	0.9944085	4.937E+02	6.256E+00	--
α_2	1.32E-03	5.42E-03	4.76E-03	1.18E-02	2.653E+00	4.868E+02	1.044
α_3	1.86E-04	2.17E-03	1.63E-03	5.99E-03	1.260E+00	5.790E+02	0.881
α_4	1.09E-04	1.93E-03	1.36E-03	5.68E-03	1.042E+00	5.397E+02	0.945
α_5	3.77E-05	1.61E-03	9.82E-04	5.29E-03	7.626E-01	4.742E+02	1.076
α_6	1.85E-07	8.09E-04	2.26E-04	3.60E-03	3.271E-01	4.040E+02	1.264
α_7	3.73E-13	3.84E-04	1.03E-05	2.16E-03	1.344E-01	3.495E+02	1.462
α_8	1.77E-20	1.96E-04	1.84E-07	1.14E-03	7.682E-02	3.909E+02	1.307

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.85E-01	9.85E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01
α_2	1.79E-02	8.95E-03	8.91E-03	7.28E-03	6.12E-03	5.54E-03	5.42E-03
α_3		6.28E-03	4.00E-03	3.92E-03	3.26E-03	2.74E-03	2.17E-03
α_4			2.34E-03	2.24E-03	2.43E-03	2.28E-03	1.93E-03
α_5				7.48E-04	1.23E-03	1.44E-03	1.61E-03
α_6					5.05E-04	6.40E-04	8.09E-04
α_7						1.99E-04	3.84E-04
α_8							1.96E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.85E-01	9.85E-01	9.86E-01	9.86E-01	9.87E-01	9.87E-01
Beta	1.79E-02	1.52E-02	1.53E-02	1.42E-02	1.35E-02	1.28E-02	1.25E-02
Gamma		4.12E-01	4.16E-01	4.87E-01	5.48E-01	5.68E-01	5.67E-01
Delta			3.69E-01	4.33E-01	5.61E-01	6.24E-01	6.94E-01
Epsilon				2.50E-01	4.16E-01	5.00E-01	6.09E-01
Mu					2.91E-01	3.68E-01	4.64E-01
Omega						2.37E-01	4.18E-01
Sigma							3.38E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.14	10.71	14.27	17.84	21.41	24.98	28.55
N_1	0.3030	0.4091	0.4848	0.5303	0.5455	0.5303	0.4848
N_2	0.0152	0.0455	0.0909	0.1515	0.2273	0.3182	0.4242
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 6.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.079

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9797619	0.9947456	0.9976226	0.9999806	9.337E+01	4.932E-01	--
α_2	1.94E-05	5.25E-03	2.38E-03	2.02E-02	4.932E-01	9.337E+01	1.183

CCCG = 3, Gamma = 0.080

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9872246	0.9956382	0.9969005	0.9997416	2.418E+02	1.059E+00	--
α_2	4.08E-05	2.18E-03	1.29E-03	7.38E-03	7.137E-01	3.260E+02	0.768
α_3	7.84E-07	2.18E-03	6.59E-04	9.50E-03	3.458E-01	1.585E+02	1.580

CCCG = 4, Gamma = 0.080

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9903601	0.9958566	0.9964837	0.9992096	5.082E+02	2.115E+00	--
α_2	3.23E-04	2.61E-03	2.07E-03	6.71E-03	1.549E+00	5.931E+02	0.822
α_3	2.03E-08	6.50E-04	1.27E-04	3.09E-03	2.646E-01	4.066E+02	1.202
α_4	9.82E-08	8.88E-04	2.18E-04	4.06E-03	3.010E-01	3.387E+02	1.442

CCCG = 5, Gamma = 0.081

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9935068	0.9963941	0.9966156	0.9985249	1.471E+03	5.325E+00	--
α_2	7.50E-04	2.35E-03	2.14E-03	4.67E-03	3.632E+00	1.541E+03	0.912
α_3	9.02E-05	9.18E-04	7.05E-04	2.47E-03	1.354E+00	1.473E+03	0.955
α_4	2.69E-08	2.84E-04	6.77E-05	1.30E-03	2.961E-01	1.044E+03	1.349
α_5	1.56E-34	5.25E-05	5.78E-11	2.60E-04	4.243E-02	8.084E+02	1.742

CCCG = 6, Gamma = 0.081

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9929983	0.9961830	0.9964357	0.9985051	1.288E+03	4.936E+00	--
α_2	5.80E-04	2.18E-03	1.94E-03	4.61E-03	2.915E+00	1.334E+03	0.953
α_3	7.48E-05	8.77E-04	6.59E-04	2.42E-03	1.257E+00	1.432E+03	0.889
α_4	1.81E-06	4.45E-04	2.04E-04	1.71E-03	5.031E-01	1.129E+03	1.128
α_5	3.84E-15	1.33E-04	1.75E-06	7.60E-04	1.155E-01	8.709E+02	1.463
α_6	8.49E-13	1.82E-04	6.65E-06	1.01E-03	1.451E-01	7.992E+02	1.594

CCCG = 7, Gamma = 0.081

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9945063	0.9965232	0.9966417	0.9981358	2.767E+03	9.654E+00	--
α_2	6.84E-04	1.77E-03	1.65E-03	3.26E-03	4.851E+00	2.740E+03	0.998
α_3	2.37E-04	9.24E-04	8.17E-04	1.98E-03	2.800E+00	3.026E+03	0.904
α_4	5.14E-05	5.03E-04	3.89E-04	1.35E-03	1.384E+00	2.749E+03	0.996
α_5	7.56E-07	2.14E-04	9.55E-05	8.27E-04	4.902E-01	2.294E+03	1.194
α_6	1.42E-15	5.97E-05	7.56E-07	3.42E-04	1.146E-01	1.921E+03	1.426
α_7	4.60E-93	8.75E-06	9.31E-25	1.04E-05	1.464E-02	1.674E+03	1.636

CCCG = 8, Gamma = 0.082

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941840	0.9965430	0.9967017	0.9983601	2.061E+03	7.148E+00	--
α_2	4.06E-04	1.50E-03	1.34E-03	3.15E-03	2.980E+00	1.985E+03	1.044
α_3	1.44E-04	8.32E-04	6.95E-04	1.98E-03	1.960E+00	2.355E+03	0.881
α_4	3.88E-05	5.31E-04	3.89E-04	1.51E-03	1.166E+00	2.195E+03	0.945
α_5	1.58E-06	2.79E-04	1.35E-04	1.04E-03	5.375E-01	1.929E+03	1.076
α_6	2.43E-11	1.10E-04	8.53E-06	5.81E-04	1.805E-01	1.642E+03	1.264
α_7	1.51E-35	2.91E-05	2.18E-11	1.43E-04	4.139E-02	1.420E+03	1.462
α_8	1.09E-08	1.78E-04	3.93E-05	8.30E-04	2.827E-01	1.588E+03	1.307

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
α_2	5.25E-03	2.18E-03	2.61E-03	2.35E-03	2.18E-03	1.77E-03	1.50E-03
α_3		2.18E-03	6.50E-04	9.18E-04	8.77E-04	9.24E-04	8.32E-04
α_4			8.88E-04	2.84E-04	4.45E-04	5.03E-04	5.31E-04
α_5				5.25E-05	1.33E-04	2.14E-04	2.79E-04
α_6					1.82E-04	5.97E-05	1.10E-04
α_7						8.75E-06	2.91E-05
α_8							1.78E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
Beta	5.25E-03	4.36E-03	4.14E-03	3.61E-03	3.82E-03	3.48E-03	3.46E-03
Gamma		4.99E-01	3.71E-01	3.48E-01	4.29E-01	4.92E-01	5.66E-01
Delta			5.77E-01	2.68E-01	4.64E-01	4.59E-01	5.75E-01
Epsilon				1.56E-01	4.14E-01	3.59E-01	5.29E-01
Mu					5.78E-01	2.43E-01	5.32E-01
Omega						1.28E-01	6.53E-01
Sigma							8.59E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.05	3.08	4.11	5.13	6.16	7.18	8.21
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.9.1.2 ALL-PORV-OO: All Systems Power-Operated Relief Valves Fail to Close

Generic CCF Parameters

Component Group: Valve
Component Type: Power Operated Relief Valve
Failure Mode: Fail to Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 24.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9609552	0.9900274	0.9956666	0.9999697	1.0000000	4.651E+01	4.685E-01
α_2	2.79E-05	9.97E-03	4.33E-03	3.90E-02	0.00E+00	4.685E-01	4.651E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9613298	0.9864430	0.9900939	0.9990638	1.0000000	8.208E+01	1.128E+00
α_2	3.42E-04	1.02E-02	6.66E-03	3.23E-02	0.00E+00	8.512E-01	8.236E+01
α_3	1.66E-07	3.33E-03	7.12E-04	1.56E-02	0.00E+00	2.768E-01	8.293E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9611134	0.9837694	0.9864453	0.9972849	1.0000000	1.148E+02	1.894E+00
α_2	9.33E-04	1.08E-02	8.16E-03	2.97E-02	0.00E+00	1.260E+00	1.154E+02
α_3	3.75E-06	3.45E-03	1.27E-03	1.43E-02	0.00E+00	4.024E-01	1.163E+02
α_4	1.38E-08	1.98E-03	2.96E-04	9.83E-03	0.00E+00	2.315E-01	1.164E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9684290	0.9842829	0.9857400	0.9951723	1.0000000	2.149E+02	3.432E+00
α_2	1.50E-03	8.81E-03	7.36E-03	2.11E-02	0.00E+00	1.924E+00	2.164E+02
α_3	2.78E-04	4.80E-03	3.40E-03	1.41E-02	0.00E+00	1.049E+00	2.173E+02
α_4	1.33E-06	1.75E-03	6.03E-04	7.38E-03	0.00E+00	3.822E-01	2.180E+02
α_5	3.05E-20	3.51E-04	3.27E-07	2.04E-03	0.00E+00	7.674E-02	2.183E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9704641	0.9848515	0.9861078	0.9949443	1.0000000	2.493E+02	3.835E+00
α_2	9.63E-04	6.72E-03	5.47E-03	1.67E-02	0.00E+00	1.701E+00	2.515E+02
α_3	3.76E-04	4.77E-03	3.54E-03	1.33E-02	0.00E+00	1.207E+00	2.519E+02
α_4	2.16E-05	2.35E-03	1.24E-03	8.48E-03	0.00E+00	5.960E-01	2.526E+02
α_5	3.42E-09	8.73E-04	1.17E-04	4.38E-03	0.00E+00	2.211E-01	2.529E+02
α_6	3.41E-15	4.34E-04	4.39E-06	2.50E-03	0.00E+00	1.098E-01	2.530E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9747789	0.9856905	0.9864871	0.9938754	1.0000000	3.959E+02	5.747E+00
α_2	1.14E-03	5.58E-03	4.79E-03	1.28E-02	0.00E+00	2.243E+00	3.994E+02
α_3	5.44E-04	4.06E-03	3.27E-03	1.03E-02	0.00E+00	1.630E+00	4.000E+02
α_4	1.68E-04	2.70E-03	1.93E-03	7.84E-03	0.00E+00	1.083E+00	4.006E+02
α_5	1.02E-05	1.41E-03	7.10E-04	5.17E-03	0.00E+00	5.654E-01	4.011E+02
α_6	2.62E-10	4.77E-04	4.41E-05	2.49E-03	0.00E+00	1.916E-01	4.015E+02
α_7	5.93E-41	8.66E-05	3.22E-12	3.80E-04	0.00E+00	3.480E-02	4.016E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9759419	0.9863627	0.9871258	0.9941762	1.0000000	4.141E+02	5.726E+00
α_2	8.67E-04	4.81E-03	4.05E-03	1.13E-02	0.00E+00	2.018E+00	4.178E+02
α_3	3.42E-04	3.31E-03	2.56E-03	8.84E-03	0.00E+00	1.391E+00	4.185E+02
α_4	1.50E-04	2.53E-03	1.80E-03	7.41E-03	0.00E+00	1.062E+00	4.188E+02
α_5	2.95E-05	1.67E-03	9.78E-04	5.68E-03	0.00E+00	7.026E-01	4.191E+02
α_6	3.27E-07	8.33E-04	2.56E-04	3.62E-03	0.00E+00	3.497E-01	4.195E+02
α_7	1.26E-15	2.57E-04	2.36E-06	1.48E-03	0.00E+00	1.078E-01	4.197E+02
α_8	2.62E-17	2.26E-04	9.55E-07	1.31E-03	0.00E+00	9.469E-02	4.198E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.86E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
α_2	9.97E-03	1.02E-02	1.08E-02	8.81E-03	6.72E-03	5.58E-03	4.81E-03
α_3		3.33E-03	3.45E-03	4.80E-03	4.77E-03	4.06E-03	3.31E-03
α_4			1.98E-03	1.75E-03	2.35E-03	2.70E-03	2.53E-03
α_5				3.51E-04	8.73E-04	1.41E-03	1.67E-03
α_6					4.34E-04	4.77E-04	8.33E-04
α_7						8.66E-05	2.57E-04
α_8							2.26E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.86E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
Beta	9.97E-03	1.36E-02	1.62E-02	1.57E-02	1.51E-02	1.43E-02	1.36E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8

Adj. Ind	24.10	24.10	24.10	24.10	24.10	24.10	24.10
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 10.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.415

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9715379	0.9926566	0.9967282	0.9999756	6.534E+01	4.834E-01	--
α_2	2.44E-05	7.34E-03	3.27E-03	2.85E-02	4.834E-01	6.534E+01	0.825

CCCG = 3, Gamma = 0.415

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9747726	0.9909179	0.9932012	0.9992581	1.337E+02	1.226E+00	--
α_2	3.45E-04	7.08E-03	4.88E-03	2.13E-02	9.769E-01	1.370E+02	1.021
α_3	3.20E-08	2.00E-03	3.48E-04	9.71E-03	2.487E-01	1.240E+02	1.135

CCCG = 4, Gamma = 0.415

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9723203	0.9881655	0.9899801	0.9978057	1.718E+02	2.057E+00	--
α_2	8.89E-04	8.05E-03	6.31E-03	2.12E-02	1.442E+00	1.777E+02	1.083
α_3	3.12E-06	2.49E-03	9.36E-04	1.02E-02	4.114E-01	1.649E+02	1.174
α_4	1.70E-09	1.29E-03	1.41E-04	6.64E-03	2.036E-01	1.571E+02	1.233

CCCG = 5, Gamma = 0.415

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9765424	0.9881130	0.9891466	0.9961524	3.062E+02	3.683E+00	--
α_2	1.43E-03	6.98E-03	5.99E-03	1.59E-02	2.243E+00	3.191E+02	1.134
α_3	1.69E-04	3.36E-03	2.33E-03	1.01E-02	9.912E-01	2.937E+02	1.236
α_4	8.89E-07	1.30E-03	4.40E-04	5.52E-03	3.765E-01	2.886E+02	1.261
α_5	2.08E-21	2.40E-04	1.37E-07	1.39E-03	7.237E-02	3.014E+02	1.208

CCCG = 6, Gamma = 0.415

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9777195	0.9883557	0.9892587	0.9959067	3.513E+02	4.139E+00	--
α_2	1.06E-03	5.50E-03	4.68E-03	1.28E-02	2.128E+00	3.845E+02	1.072
α_3	2.37E-04	3.43E-03	2.50E-03	9.81E-03	1.134E+00	3.295E+02	1.253
α_4	1.10E-05	1.68E-03	8.34E-04	6.23E-03	5.533E-01	3.284E+02	1.260
α_5	2.56E-09	6.58E-04	8.79E-05	3.30E-03	2.210E-01	3.355E+02	1.234
α_6	4.72E-16	3.71E-04	2.58E-06	2.15E-03	1.027E-01	2.770E+02	1.496

CCCG = 7, Gamma = 0.415

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9812991	0.9891206	0.9896673	0.9950754	5.848E+02	6.432E+00	--
α_2	1.13E-03	4.35E-03	3.85E-03	9.26E-03	2.840E+00	6.502E+02	1.068
α_3	4.68E-04	3.15E-03	2.58E-03	7.80E-03	1.746E+00	5.524E+02	1.259
α_4	1.23E-04	1.97E-03	1.41E-03	5.72E-03	1.084E+00	5.502E+02	1.265
α_5	5.63E-06	9.89E-04	4.79E-04	3.70E-03	5.376E-01	5.431E+02	1.283
α_6	3.28E-10	3.73E-04	3.76E-05	1.93E-03	1.979E-01	5.306E+02	1.314
α_7	1.16E-52	5.19E-05	5.20E-15	1.77E-04	2.656E-02	5.115E+02	1.364

CCCG = 8, Gamma = 0.415

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9821279	0.9897252	0.9902689	0.9954660	5.888E+02	6.112E+00	--
α_2	7.69E-04	3.55E-03	3.07E-03	7.99E-03	2.364E+00	6.632E+02	1.048
α_3	3.13E-04	2.63E-03	2.08E-03	6.83E-03	1.512E+00	5.731E+02	1.213
α_4	1.14E-04	1.94E-03	1.37E-03	5.69E-03	1.056E+00	5.437E+02	1.280
α_5	1.83E-05	1.21E-03	6.88E-04	4.16E-03	6.745E-01	5.579E+02	1.248
α_6	7.63E-08	5.68E-04	1.44E-04	2.58E-03	3.076E-01	5.415E+02	1.287
α_7	1.54E-15	2.20E-04	2.17E-06	1.27E-03	1.093E-01	4.965E+02	1.404
α_8	2.43E-18	1.58E-04	4.38E-07	9.20E-04	8.885E-02	5.632E+02	1.238

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.91E-01	9.88E-01	9.88E-01	9.88E-01	9.89E-01	9.90E-01
α_2	7.34E-03	7.08E-03	8.05E-03	6.98E-03	5.50E-03	4.35E-03	3.55E-03
α_3		2.00E-03	2.49E-03	3.36E-03	3.43E-03	3.15E-03	2.63E-03
α_4			1.29E-03	1.30E-03	1.68E-03	1.97E-03	1.94E-03
α_5				2.40E-04	6.58E-04	9.89E-04	1.21E-03
α_6					3.71E-04	3.73E-04	5.68E-04
α_7						5.19E-05	2.20E-04
α_8							1.58E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.91E-01	9.88E-01	9.88E-01	9.88E-01	9.89E-01	9.90E-01
Beta	7.34E-03	9.08E-03	1.18E-02	1.19E-02	1.16E-02	1.09E-02	1.03E-02
Gamma		2.20E-01	3.20E-01	4.13E-01	5.27E-01	6.00E-01	6.54E-01
Delta			3.42E-01	3.14E-01	4.41E-01	5.18E-01	6.09E-01
Epsilon				1.56E-01	3.80E-01	4.18E-01	5.26E-01
Mu					3.60E-01	3.00E-01	4.39E-01
Omega						1.22E-01	4.00E-01
Sigma							4.17E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	10.00	10.00	10.00	10.00	10.00	10.00	10.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 4.4

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.183

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9206861	0.9799463	0.9915060	0.9999549	2.198E+01	4.498E-01	--
α_2	4.51E-05	2.01E-02	8.49E-03	7.93E-02	4.498E-01	2.198E+01	0.825

CCCG = 3, Gamma = 0.183

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9146428	0.9693495	0.9770642	0.9976457	3.726E+01	1.178E+00	--
α_2	1.07E-03	2.39E-02	1.64E-02	7.23E-02	9.387E-01	3.837E+01	1.021
α_3	7.16E-08	6.77E-03	1.10E-03	3.32E-02	2.396E-01	3.515E+01	1.135

CCCG = 4, Gamma = 0.183

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9109923	0.9624570	0.9683915	0.9935989	4.867E+01	1.898E+00	--
α_2	2.23E-03	2.46E-02	1.88E-02	6.67E-02	1.285E+00	5.097E+01	1.083
α_3	7.56E-06	8.14E-03	2.93E-03	3.40E-02	3.927E-01	4.782E+01	1.174
α_4	1.86E-08	4.81E-03	6.47E-04	2.42E-02	2.207E-01	4.568E+01	1.233

CCCG = 5, Gamma = 0.183

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9277754	0.9635584	0.9667293	0.9884977	9.269E+01	3.506E+00	--
α_2	3.56E-03	1.99E-02	1.68E-02	4.68E-02	1.992E+00	9.813E+01	1.134
α_3	7.29E-04	1.17E-02	8.43E-03	3.41E-02	1.078E+00	9.074E+01	1.236
α_4	2.12E-06	4.03E-03	1.31E-03	1.73E-02	3.632E-01	8.968E+01	1.261
α_5	7.14E-21	7.72E-04	4.47E-07	4.47E-03	7.248E-02	9.387E+01	1.208

CCCG = 6, Gamma = 0.183

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9337535	0.9649661	0.9675245	0.9874331	1.157E+02	4.199E+00	--
α_2	2.55E-03	1.48E-02	1.24E-02	3.52E-02	1.941E+00	1.293E+02	1.072
α_3	1.14E-03	1.19E-02	9.12E-03	3.20E-02	1.332E+00	1.109E+02	1.253
α_4	5.95E-05	5.53E-03	2.99E-03	1.97E-02	6.181E-01	1.111E+02	1.260
α_5	1.39E-08	2.03E-03	3.02E-04	1.01E-02	2.313E-01	1.137E+02	1.234
α_6	7.47E-20	8.17E-04	7.71E-07	4.75E-03	7.684E-02	9.400E+01	1.496

CCCG = 7, Gamma = 0.183

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9422531	0.9664353	0.9681007	0.9849283	1.792E+02	6.223E+00	--
α_2	3.17E-03	1.29E-02	1.14E-02	2.80E-02	2.654E+00	2.027E+02	1.068
α_3	1.29E-03	9.44E-03	7.64E-03	2.37E-02	1.645E+00	1.726E+02	1.259
α_4	4.29E-04	6.43E-03	4.66E-03	1.85E-02	1.115E+00	1.722E+02	1.265
α_5	3.42E-05	3.53E-03	1.87E-03	1.27E-02	6.034E-01	1.703E+02	1.283
α_6	1.90E-10	1.07E-03	7.96E-05	5.66E-03	1.780E-01	1.667E+02	1.314
α_7	9.27E-51	1.70E-04	3.49E-14	6.01E-04	2.734E-02	1.608E+02	1.364

CCCG = 8, Gamma = 0.183

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9446355	0.9678062	0.9694023	0.9855249	1.878E+02	6.246E+00	--
α_2	2.67E-03	1.16E-02	1.01E-02	2.55E-02	2.504E+00	2.140E+02	1.048
α_3	8.15E-04	7.59E-03	5.92E-03	2.01E-02	1.419E+00	1.856E+02	1.213
α_4	3.19E-04	5.79E-03	4.07E-03	1.71E-02	1.027E+00	1.762E+02	1.280
α_5	8.33E-05	4.04E-03	2.42E-03	1.35E-02	7.337E-01	1.810E+02	1.248
α_6	2.25E-06	2.25E-03	8.15E-04	9.38E-03	3.975E-01	1.759E+02	1.287
α_7	4.78E-20	4.77E-04	4.58E-07	2.77E-03	7.703E-02	1.615E+02	1.404
α_8	4.43E-18	4.77E-04	1.19E-06	2.79E-03	8.749E-02	1.832E+02	1.238

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.80E-01	9.69E-01	9.62E-01	9.64E-01	9.65E-01	9.66E-01	9.68E-01
α_2	2.01E-02	2.39E-02	2.46E-02	1.99E-02	1.48E-02	1.29E-02	1.16E-02
α_3		6.77E-03	8.14E-03	1.17E-02	1.19E-02	9.44E-03	7.59E-03
α_4			4.81E-03	4.03E-03	5.53E-03	6.43E-03	5.79E-03
α_5				7.72E-04	2.03E-03	3.53E-03	4.04E-03
α_6					8.17E-04	1.07E-03	2.25E-03
α_7						1.70E-04	4.77E-04
α_8							4.77E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.80E-01	9.69E-01	9.62E-01	9.64E-01	9.65E-01	9.66E-01	9.68E-01
Beta	2.01E-02	3.07E-02	3.75E-02	3.64E-02	3.50E-02	3.36E-02	3.22E-02
Gamma		2.21E-01	3.45E-01	4.54E-01	5.78E-01	6.15E-01	6.41E-01
Delta			3.71E-01	2.90E-01	4.14E-01	5.43E-01	6.32E-01
Epsilon				1.61E-01	3.40E-01	4.26E-01	5.56E-01
Mu					2.87E-01	2.59E-01	4.43E-01
Omega						1.37E-01	2.97E-01
Sigma							5.00E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.40	4.40	4.40	4.40	4.40	4.40	4.40
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 4.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.187

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9478414	0.9866364	0.9941446	0.9999614	3.474E+01	4.706E-01	--
α_2	3.86E-05	1.34E-02	5.86E-03	5.22E-02	4.706E-01	3.474E+01	0.825

CCCG = 3, Gamma = 0.187

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9502557	0.9826645	0.9874060	0.9988611	6.250E+01	1.103E+00	--
α_2	3.58E-04	1.24E-02	7.89E-03	3.97E-02	8.104E-01	6.466E+01	1.021
α_3	4.18E-07	4.96E-03	1.17E-03	2.29E-02	2.921E-01	5.864E+01	1.135

CCCG = 4, Gamma = 0.187

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9564910	0.9816466	0.9845712	0.9967975	1.044E+02	1.953E+00	--
α_2	1.12E-03	1.19E-02	9.13E-03	3.23E-02	1.312E+00	1.086E+02	1.083
α_3	7.15E-06	4.25E-03	1.68E-03	1.72E-02	4.307E-01	1.010E+02	1.174
α_4	4.34E-09	2.17E-03	2.57E-04	1.11E-02	2.099E-01	9.636E+01	1.233

CCCG = 5, Gamma = 0.187

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9648512	0.9829728	0.9847051	0.9951730	1.794E+02	3.107E+00	--
α_2	1.25E-03	8.85E-03	7.20E-03	2.21E-02	1.684E+00	1.887E+02	1.134
α_3	2.39E-04	5.40E-03	3.67E-03	1.65E-02	9.426E-01	1.736E+02	1.236
α_4	1.68E-06	2.23E-03	7.67E-04	9.41E-03	3.816E-01	1.708E+02	1.261
α_5	2.21E-16	5.52E-04	3.03E-06	3.21E-03	9.865E-02	1.785E+02	1.208

CCCG = 6, Gamma = 0.187

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9691147	0.9841705	0.9854877	0.9947258	2.376E+02	3.822E+00	--
α_2	9.36E-04	6.46E-03	5.27E-03	1.61E-02	1.714E+00	2.636E+02	1.072
α_3	3.21E-04	4.88E-03	3.53E-03	1.41E-02	1.108E+00	2.258E+02	1.253
α_4	3.81E-05	2.88E-03	1.61E-03	1.01E-02	6.509E-01	2.251E+02	1.260
α_5	2.18E-08	1.10E-03	1.98E-04	5.31E-03	2.536E-01	2.301E+02	1.234
α_6	8.17E-17	5.03E-04	2.29E-06	2.93E-03	9.572E-02	1.901E+02	1.496

CCCG = 7, Gamma = 0.187

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9731268	0.9851128	0.9860298	0.9939671	3.438E+02	5.195E+00	--
α_2	1.03E-03	5.42E-03	4.60E-03	1.26E-02	2.105E+00	3.862E+02	1.068
α_3	3.76E-04	4.01E-03	3.06E-03	1.09E-02	1.320E+00	3.281E+02	1.259
α_4	1.55E-04	3.04E-03	2.11E-03	9.11E-03	9.967E-01	3.268E+02	1.265
α_5	8.22E-06	1.62E-03	7.72E-04	6.13E-03	5.249E-01	3.227E+02	1.283
α_6	4.61E-10	6.20E-04	6.07E-05	3.21E-03	1.956E-01	3.154E+02	1.314
α_7	4.97E-28	1.74E-04	3.94E-09	9.44E-04	5.291E-02	3.040E+02	1.364

CCCG = 8, Gamma = 0.187

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9752400	0.9859038	0.9866794	0.9939189	4.079E+02	5.832E+00	--
α_2	9.75E-04	4.80E-03	4.11E-03	1.10E-02	2.229E+00	4.619E+02	1.048
α_3	2.70E-04	3.14E-03	2.37E-03	8.68E-03	1.260E+00	3.995E+02	1.213
α_4	1.56E-04	2.74E-03	1.94E-03	8.09E-03	1.042E+00	3.789E+02	1.280
α_5	4.60E-05	1.96E-03	1.20E-03	6.45E-03	7.626E-01	3.888E+02	1.248
α_6	1.98E-07	8.66E-04	2.42E-04	3.85E-03	3.271E-01	3.775E+02	1.287
α_7	3.76E-13	3.88E-04	1.04E-05	2.18E-03	1.344E-01	3.462E+02	1.404
α_8	1.76E-20	1.96E-04	1.83E-07	1.14E-03	7.682E-02	3.928E+02	1.238

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.83E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.34E-02	1.24E-02	1.19E-02	8.85E-03	6.46E-03	5.42E-03	4.80E-03
α_3		4.96E-03	4.25E-03	5.40E-03	4.88E-03	4.01E-03	3.14E-03
α_4			2.17E-03	2.23E-03	2.88E-03	3.04E-03	2.74E-03
α_5				5.52E-04	1.10E-03	1.62E-03	1.96E-03
α_6					5.03E-04	6.20E-04	8.66E-04
α_7						1.74E-04	3.88E-04
α_8							1.96E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.83E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.34E-02	1.73E-02	1.84E-02	1.70E-02	1.58E-02	1.49E-02	1.41E-02
Gamma		2.86E-01	3.50E-01	4.80E-01	5.92E-01	6.36E-01	6.59E-01
Delta			3.39E-01	3.40E-01	4.79E-01	5.77E-01	6.62E-01
Epsilon				1.99E-01	3.57E-01	4.43E-01	5.54E-01
Mu					3.14E-01	3.28E-01	4.25E-01
Omega						2.19E-01	4.03E-01
Sigma							3.35E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.50	4.50	4.50	4.50	4.50	4.50	4.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 5.2

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.216

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9862621	0.9964358	0.9983909	0.9999869	1.379E+02	4.932E-01	--
α_2	1.31E-05	3.56E-03	1.61E-03	1.37E-02	4.932E-01	1.379E+02	0.825

CCCG = 3, Gamma = 0.216

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9870279	0.9955709	0.9968525	0.9997376	2.382E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.72E-03	7.137E-01	2.472E+02	1.021
α_3	5.58E-07	1.55E-03	4.69E-04	6.76E-03	3.458E-01	2.228E+02	1.135

CCCG = 4, Gamma = 0.216

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9888025	0.9951858	0.9959136	0.9990813	4.371E+02	2.115E+00	--
α_2	4.24E-04	3.42E-03	2.73E-03	8.81E-03	1.549E+00	4.510E+02	1.083
α_3	1.98E-08	6.34E-04	1.24E-04	3.02E-03	2.646E-01	4.173E+02	1.174
α_4	8.37E-08	7.57E-04	1.86E-04	3.46E-03	3.010E-01	3.972E+02	1.233

CCCG = 5, Gamma = 0.216

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9920554	0.9955870	0.9958577	0.9981942	1.201E+03	5.325E+00	--
α_2	9.32E-04	2.92E-03	2.66E-03	5.81E-03	3.632E+00	1.239E+03	1.134
α_3	1.17E-04	1.19E-03	9.12E-04	3.20E-03	1.354E+00	1.138E+03	1.236
α_4	2.51E-08	2.65E-04	6.33E-05	1.22E-03	2.961E-01	1.117E+03	1.261
α_5	1.08E-34	3.64E-05	4.01E-11	1.80E-04	4.243E-02	1.166E+03	1.208

CCCG = 6, Gamma = 0.216

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9917982	0.9955279	0.9958235	0.9982481	1.099E+03	4.936E+00	--
α_2	6.53E-04	2.45E-03	2.18E-03	5.19E-03	2.915E+00	1.185E+03	1.072
α_3	1.06E-04	1.24E-03	9.30E-04	3.42E-03	1.257E+00	1.015E+03	1.253
α_4	2.02E-06	4.98E-04	2.28E-04	1.91E-03	5.031E-01	1.010E+03	1.260
α_5	3.24E-15	1.12E-04	1.48E-06	6.42E-04	1.155E-01	1.031E+03	1.234
α_6	7.97E-13	1.70E-04	6.24E-06	9.44E-04	1.451E-01	8.512E+02	1.496

CCCG = 7, Gamma = 0.216

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9935021	0.9958871	0.9960271	0.9977943	2.338E+03	9.654E+00	--
α_2	7.33E-04	1.89E-03	1.77E-03	3.49E-03	4.851E+00	2.558E+03	1.068
α_3	3.30E-04	1.29E-03	1.14E-03	2.76E-03	2.800E+00	2.171E+03	1.259
α_4	6.54E-05	6.40E-04	4.94E-04	1.71E-03	1.384E+00	2.162E+03	1.265
α_5	8.13E-07	2.30E-04	1.03E-04	8.89E-04	4.902E-01	2.133E+03	1.283
α_6	1.31E-15	5.50E-05	6.97E-07	3.16E-04	1.146E-01	2.083E+03	1.314
α_7	3.84E-93	7.29E-06	7.76E-25	8.67E-06	1.464E-02	2.007E+03	1.364

CCCG = 8, Gamma = 0.216

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9932633	0.9959952	0.9961789	0.9980999	1.778E+03	7.148E+00	--
α_2	4.08E-04	1.51E-03	1.34E-03	3.16E-03	2.980E+00	1.976E+03	1.048
α_3	1.99E-04	1.15E-03	9.59E-04	2.74E-03	1.960E+00	1.707E+03	1.213
α_4	5.26E-05	7.20E-04	5.28E-04	2.04E-03	1.166E+00	1.619E+03	1.280
α_5	1.84E-06	3.24E-04	1.57E-04	1.21E-03	5.375E-01	1.661E+03	1.248
α_6	2.48E-11	1.12E-04	8.69E-06	5.92E-04	1.805E-01	1.611E+03	1.287
α_7	1.45E-35	2.80E-05	2.10E-11	1.37E-04	4.139E-02	1.477E+03	1.404
α_8	1.03E-08	1.69E-04	3.72E-05	7.87E-04	2.827E-01	1.675E+03	1.238

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.96E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	3.56E-03	2.88E-03	3.42E-03	2.92E-03	2.45E-03	1.89E-03	1.51E-03
α_3		1.55E-03	6.34E-04	1.19E-03	1.24E-03	1.29E-03	1.15E-03
α_4			7.57E-04	2.65E-04	4.98E-04	6.40E-04	7.20E-04
α_5				3.64E-05	1.12E-04	2.30E-04	3.24E-04
α_6					1.70E-04	5.50E-05	1.12E-04
α_7						7.29E-06	2.80E-05
α_8							1.69E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.96E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	3.56E-03	4.43E-03	4.81E-03	4.41E-03	4.47E-03	4.11E-03	4.00E-03
Gamma		3.50E-01	2.89E-01	3.38E-01	4.51E-01	5.40E-01	6.24E-01
Delta			5.44E-01	2.02E-01	3.87E-01	4.20E-01	5.41E-01
Epsilon				1.21E-01	3.62E-01	3.13E-01	4.68E-01
Mu					6.03E-01	2.13E-01	4.88E-01
Omega						1.17E-01	6.37E-01
Sigma							8.58E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.20	5.20	5.20	5.20	5.20	5.20	5.20
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.9.2 PWR Main Steam PORV

2.9.2.1 PWR-MSS-PRV-CC: PWR MSS Power-Operated Relief Valves Fail to Open

Generic CCF Parameters

Plant Type:	PWR
System Group:	Steam
System:	Main Steam
Component Group:	Valve
Component Type:	Power Operated Relief Valve
Failure Mode:	Fail to Open
Date Range:	2006 through 2020
Prior:	Default 2015

Total Number of Independent Failure Events: 59.2

Total Number of Common-Cause Failure Events: 3

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9123953	0.9658062	0.9726178	0.9958771	0.9508570	4.238E+01	1.500E+00
α_2	4.12E-03	3.42E-02	2.74E-02	8.76E-02	4.91E-02	1.500E+00	4.238E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9439384	0.9753092	0.9787424	0.9949437	0.9646018	8.783E+01	2.223E+00
α_2	4.73E-04	1.05E-02	7.18E-03	3.19E-02	3.08E-03	9.467E-01	8.911E+01
α_3	1.26E-03	1.42E-02	1.08E-02	3.87E-02	3.23E-02	1.277E+00	8.878E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9522948	0.9768836	0.9792279	0.9934641	0.9708576	1.304E+02	3.085E+00
α_2	1.22E-03	1.09E-02	8.54E-03	2.85E-02	4.67E-03	1.451E+00	1.320E+02
α_3	2.67E-04	6.76E-03	4.51E-03	2.09E-02	1.22E-02	9.024E-01	1.325E+02
α_4	1.12E-04	5.48E-03	3.29E-03	1.83E-02	1.22E-02	7.315E-01	1.327E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9643160	0.9806400	0.9819311	0.9925503	0.9741592	2.403E+02	4.744E+00
α_2	1.86E-03	9.11E-03	7.81E-03	2.08E-02	6.07E-03	2.232E+00	2.428E+02
α_3	4.87E-04	5.32E-03	4.04E-03	1.45E-02	4.99E-03	1.302E+00	2.437E+02
α_4	1.33E-04	3.60E-03	2.37E-03	1.13E-02	9.85E-03	8.822E-01	2.441E+02
α_5	3.03E-07	1.33E-03	3.72E-04	5.93E-03	4.93E-03	3.267E-01	2.447E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9671883	0.9817214	0.9828168	0.9925000	0.9759163	2.844E+02	5.295E+00

α_2	1.45E-03	7.43E-03	6.33E-03	1.72E-02	7.44E-03	2.152E+00	2.875E+02
α_3	4.48E-04	4.63E-03	3.55E-03	1.25E-02	2.20E-03	1.340E+00	2.883E+02
α_4	1.60E-04	3.35E-03	2.30E-03	1.01E-02	6.19E-03	9.711E-01	2.887E+02
α_5	1.89E-05	2.06E-03	1.08E-03	7.42E-03	6.19E-03	5.961E-01	2.891E+02
α_6	6.64E-09	8.11E-04	1.24E-04	4.00E-03	2.06E-03	2.348E-01	2.894E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9725653	0.9835216	0.9842335	0.9920340	0.9767925	4.406E+02	7.382E+00
α_2	1.67E-03	6.39E-03	5.67E-03	1.36E-02	8.78E-03	2.862E+00	4.451E+02
α_3	5.48E-04	3.81E-03	3.10E-03	9.50E-03	1.11E-03	1.708E+00	4.463E+02
α_4	2.85E-04	2.98E-03	2.28E-03	8.06E-03	3.55E-03	1.333E+00	4.467E+02
α_5	9.21E-05	2.10E-03	1.42E-03	6.42E-03	5.32E-03	9.404E-01	4.470E+02
α_6	1.92E-06	9.86E-04	3.99E-04	3.96E-03	3.55E-03	4.416E-01	4.475E+02
α_7	5.76E-17	2.17E-04	1.09E-06	1.26E-03	8.87E-04	9.730E-02	4.479E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9736850	0.9841146	0.9847854	0.9922465	0.9771234	4.684E+02	7.561E+00
α_2	1.54E-03	5.94E-03	5.26E-03	1.27E-02	1.01E-02	2.828E+00	4.732E+02
α_3	3.36E-04	3.04E-03	2.38E-03	8.00E-03	7.03E-04	1.447E+00	4.745E+02
α_4	2.06E-04	2.56E-03	1.91E-03	7.15E-03	1.96E-03	1.219E+00	4.748E+02
α_5	1.14E-04	2.13E-03	1.49E-03	6.35E-03	3.89E-03	1.015E+00	4.750E+02
α_6	1.97E-05	1.39E-03	7.84E-04	4.83E-03	3.89E-03	6.622E-01	4.753E+02
α_7	1.70E-08	5.55E-04	1.08E-04	2.64E-03	1.95E-03	2.641E-01	4.757E+02
α_8	6.08E-14	2.65E-04	5.31E-06	1.50E-03	3.89E-04	1.259E-01	4.759E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.66E-01	9.75E-01	9.77E-01	9.81E-01	9.82E-01	9.84E-01	9.84E-01
α_2	3.42E-02	1.05E-02	1.09E-02	9.11E-03	7.43E-03	6.39E-03	5.94E-03
α_3		1.42E-02	6.76E-03	5.32E-03	4.63E-03	3.81E-03	3.04E-03
α_4			5.48E-03	3.60E-03	3.35E-03	2.98E-03	2.56E-03
α_5				1.33E-03	2.06E-03	2.10E-03	2.13E-03
α_6					8.11E-04	9.86E-04	1.39E-03
α_7						2.17E-04	5.55E-04
α_8							2.65E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.66E-01	9.75E-01	9.77E-01	9.81E-01	9.82E-01	9.84E-01	9.84E-01
Beta	3.42E-02	2.47E-02	2.31E-02	1.94E-02	1.83E-02	1.65E-02	1.59E-02
Gamma		5.74E-01	5.30E-01	5.29E-01	5.93E-01	6.12E-01	6.26E-01
Delta			4.48E-01	4.81E-01	5.73E-01	6.22E-01	6.94E-01
Epsilon				2.70E-01	4.61E-01	5.26E-01	6.29E-01
Mu					2.83E-01	3.64E-01	5.09E-01
Omega						1.81E-01	3.71E-01

Sigma							3.23E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	18.69	28.04	37.39	46.74	56.08	65.43	74.78
N₁	1.2697	1.8091	2.2848	2.7053	3.0685	3.3757	3.6283
N₂	1.0318	0.0955	0.1909	0.3082	0.4512	0.6188	0.8096
N₃		1.0000	0.5000	0.2533	0.1334	0.0781	0.0564
N₄			0.5000	0.5000	0.3751	0.2504	0.1571
N₅				0.2500	0.3750	0.3750	0.3125
N₆					0.1250	0.2500	0.3125
N₇						0.0625	0.1563
N₈							0.0313

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 24.4

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.414

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9557627	0.9884252	0.9946550	0.9999537	4.270E+01	5.001E-01	--
α_2	4.63E-05	1.16E-02	5.35E-03	4.42E-02	5.001E-01	4.270E+01	1.227

CCCG = 3, Gamma = 0.420

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9761125	0.9912829	0.9933961	0.9992296	1.451E+02	1.276E+00	--
α_2	3.28E-04	5.96E-03	4.19E-03	1.76E-02	1.027E+00	1.713E+02	0.835
α_3	4.42E-08	2.76E-03	4.80E-04	1.34E-02	2.487E-01	8.990E+01	1.597

CCCG = 4, Gamma = 0.424

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9749862	0.9891508	0.9907427	0.9978722	1.967E+02	2.157E+00	--
α_2	8.40E-04	6.81E-03	5.43E-03	1.75E-02	1.542E+00	2.248E+02	0.889
α_3	3.20E-06	2.55E-03	9.60E-04	1.05E-02	4.114E-01	1.608E+02	1.249
α_4	1.95E-09	1.48E-03	1.62E-04	7.62E-03	2.036E-01	1.370E+02	1.467

CCCG = 5, Gamma = 0.426

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794270	0.9894603	0.9903415	0.9964833	3.608E+02	3.843E+00	--
α_2	1.36E-03	6.15E-03	5.33E-03	1.38E-02	2.400E+00	3.876E+02	0.964
α_3	1.36E-04	2.68E-03	1.86E-03	8.04E-03	9.945E-01	3.699E+02	1.014
α_4	9.41E-07	1.38E-03	4.66E-04	5.85E-03	3.765E-01	2.727E+02	1.377
α_5	2.83E-21	3.26E-04	1.86E-07	1.89E-03	7.237E-02	2.218E+02	1.694

CCCG = 6, Gamma = 0.427

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9799415	0.9893714	0.9901540	0.9961278	4.069E+02	4.372E+00	--
α_2	1.17E-03	5.44E-03	4.70E-03	1.22E-02	2.352E+00	4.302E+02	0.995
α_3	1.77E-04	2.53E-03	1.84E-03	7.22E-03	1.142E+00	4.508E+02	0.952
α_4	9.95E-06	1.52E-03	7.55E-04	5.63E-03	5.534E-01	3.633E+02	1.183
α_5	2.95E-09	7.59E-04	1.01E-04	3.81E-03	2.210E-01	2.911E+02	1.477
α_6	4.88E-16	3.83E-04	2.67E-06	2.22E-03	1.027E-01	2.680E+02	1.605

CCCG = 7, Gamma = 0.428

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9833292	0.9901992	0.9906698	0.9954624	6.818E+02	6.749E+00	--
α_2	1.27E-03	4.48E-03	4.02E-03	9.27E-03	3.141E+00	6.977E+02	1.024
α_3	3.54E-04	2.36E-03	1.93E-03	5.81E-03	1.762E+00	7.461E+02	0.960
α_4	9.87E-05	1.58E-03	1.13E-03	4.60E-03	1.084E+00	6.842E+02	1.047
α_5	5.25E-06	9.23E-04	4.47E-04	3.45E-03	5.376E-01	5.822E+02	1.232
α_6	3.51E-10	3.99E-04	4.03E-05	2.06E-03	1.979E-01	4.960E+02	1.446
α_7	1.35E-52	6.02E-05	6.03E-15	2.06E-04	2.656E-02	4.413E+02	1.626

CCCG = 8, Gamma = 0.428

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9836781	0.9904779	0.9909510	0.9956623	6.786E+02	6.524E+00	--
α_2	1.03E-03	4.08E-03	3.60E-03	8.77E-03	2.749E+00	6.712E+02	1.071
α_3	2.43E-04	1.98E-03	1.58E-03	5.12E-03	1.537E+00	7.730E+02	0.932
α_4	8.66E-05	1.47E-03	1.04E-03	4.33E-03	1.057E+00	7.162E+02	1.006
α_5	1.59E-05	1.05E-03	5.97E-04	3.61E-03	6.745E-01	6.433E+02	1.121
α_6	7.42E-08	5.52E-04	1.40E-04	2.50E-03	3.076E-01	5.572E+02	1.294
α_7	1.59E-15	2.27E-04	2.24E-06	1.31E-03	1.093E-01	4.809E+02	1.500
α_8	2.44E-18	1.58E-04	4.39E-07	9.21E-04	8.885E-02	5.623E+02	1.283

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.91E-01	9.89E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01
α_2	1.16E-02	5.96E-03	6.81E-03	6.15E-03	5.44E-03	4.48E-03	4.08E-03
α_3		2.76E-03	2.55E-03	2.68E-03	2.53E-03	2.36E-03	1.98E-03
α_4			1.48E-03	1.38E-03	1.52E-03	1.58E-03	1.47E-03
α_5				3.26E-04	7.59E-04	9.23E-04	1.05E-03
α_6					3.83E-04	3.99E-04	5.52E-04
α_7						6.02E-05	2.27E-04
α_8							1.58E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.91E-01	9.89E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01
Beta	1.16E-02	8.72E-03	1.08E-02	1.05E-02	1.06E-02	9.80E-03	9.52E-03
Gamma		3.16E-01	3.72E-01	4.16E-01	4.88E-01	5.43E-01	5.72E-01
Delta			3.68E-01	3.89E-01	5.13E-01	5.57E-01	6.35E-01
Epsilon				1.91E-01	4.29E-01	4.66E-01	5.74E-01
Mu					3.36E-01	3.32E-01	4.72E-01
Omega						1.31E-01	4.11E-01
Sigma							4.10E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.71	11.56	15.41	19.26	23.12	26.97	30.82
N_1	0.9667	1.4000	1.8000	2.1750	2.5230	2.8454	3.1435
N_2	0.0167	0.0500	0.1000	0.1567	0.2239	0.3006	0.3854
N_3		0.0000	0.0000	0.0033	0.0084	0.0156	0.0251

N₄			0.0000	0.0000	0.0001	0.0004	0.0009
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 12.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.230

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7640601	0.9060283	0.9232736	0.9887548	1.398E+01	1.450E+00	--
α_2	1.12E-02	9.40E-02	7.67E-02	2.36E-01	1.450E+00	1.398E+01	1.227

CCCG = 3, Gamma = 0.218

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8540623	0.9349557	0.9434786	0.9866343	3.131E+01	2.178E+00	--
α_2	8.19E-04	1.85E-02	1.26E-02	5.60E-02	9.387E-01	4.993E+01	0.835
α_3	4.02E-03	4.66E-02	3.57E-02	1.26E-01	1.240E+00	2.537E+01	1.597

CCCG = 4, Gamma = 0.211

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8869834	0.9455077	0.9510206	0.9851591	5.029E+01	2.898E+00	--
α_2	1.70E-03	1.88E-02	1.43E-02	5.11E-02	1.285E+00	6.713E+01	0.889
α_3	7.09E-04	1.83E-02	1.23E-02	5.66E-02	8.927E-01	4.782E+01	1.249
α_4	3.42E-04	1.74E-02	1.05E-02	5.80E-02	7.207E-01	4.074E+01	1.467

CCCG = 5, Gamma = 0.208

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9225567	0.9582107	0.9610182	0.9842670	1.033E+02	4.506E+00	--
α_2	2.87E-03	1.60E-02	1.35E-02	3.78E-02	1.992E+00	1.222E+02	0.964
α_3	1.08E-03	1.12E-02	8.63E-03	3.04E-02	1.328E+00	1.167E+02	1.014
α_4	3.46E-04	9.93E-03	6.51E-03	3.12E-02	8.632E-01	8.605E+01	1.377
α_5	9.34E-07	4.56E-03	1.26E-03	2.04E-02	3.225E-01	7.032E+01	1.694

CCCG = 6, Gamma = 0.206

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9312102	0.9615993	0.9638538	0.9842839	1.302E+02	5.199E+00	--
α_2	2.24E-03	1.30E-02	1.09E-02	3.09E-02	1.941E+00	1.476E+02	0.995
α_3	1.05E-03	9.32E-03	7.33E-03	2.44E-02	1.457E+00	1.548E+02	0.952
α_4	4.01E-04	7.90E-03	5.49E-03	2.36E-02	9.931E-01	1.248E+02	1.183
α_5	5.97E-05	6.02E-03	3.21E-03	2.15E-02	6.063E-01	1.001E+02	1.477
α_6	2.54E-09	2.18E-03	2.33E-04	1.12E-02	2.018E-01	9.247E+01	1.605

CCCG = 7, Gamma = 0.204

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9436941	0.9661748	0.9676215	0.9837143	2.063E+02	7.223E+00	--
α_2	2.90E-03	1.19E-02	1.04E-02	2.57E-02	2.654E+00	2.213E+02	1.024
α_3	1.03E-03	7.15E-03	5.83E-03	1.78E-02	1.708E+00	2.372E+02	0.960
α_4	6.24E-04	6.23E-03	4.81E-03	1.67E-02	1.365E+00	2.176E+02	1.047
α_5	2.56E-04	5.26E-03	3.62E-03	1.58E-02	9.784E-01	1.852E+02	1.232
α_6	4.36E-06	2.70E-03	1.06E-03	1.09E-02	4.280E-01	1.581E+02	1.446
α_7	1.42E-17	6.37E-04	1.91E-06	3.72E-03	8.984E-02	1.409E+02	1.626

CCCG = 8, Gamma = 0.203

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9455201	0.9672592	0.9686583	0.9842199	2.141E+02	7.246E+00	--
α_2	2.59E-03	1.12E-02	9.80E-03	2.47E-02	2.504E+00	2.205E+02	1.071
α_3	6.30E-04	5.66E-03	4.44E-03	1.49E-02	1.450E+00	2.548E+02	0.932
α_4	3.78E-04	4.99E-03	3.68E-03	1.40E-02	1.183E+00	2.361E+02	1.006
α_5	2.83E-04	4.91E-03	3.47E-03	1.44E-02	1.046E+00	2.120E+02	1.121
α_6	7.07E-05	3.85E-03	2.27E-03	1.30E-02	7.100E-01	1.837E+02	1.294
α_7	1.12E-08	1.47E-03	2.22E-04	7.24E-03	2.333E-01	1.589E+02	1.500
α_8	3.67E-14	6.38E-04	9.70E-06	3.65E-03	1.187E-01	1.859E+02	1.283

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.06E-01	9.35E-01	9.46E-01	9.58E-01	9.62E-01	9.66E-01	9.67E-01
α_2	9.40E-02	1.85E-02	1.88E-02	1.60E-02	1.30E-02	1.19E-02	1.12E-02
α_3		4.66E-02	1.83E-02	1.12E-02	9.32E-03	7.15E-03	5.66E-03
α_4			1.74E-02	9.93E-03	7.90E-03	6.23E-03	4.99E-03
α_5				4.56E-03	6.02E-03	5.26E-03	4.91E-03
α_6					2.18E-03	2.70E-03	3.85E-03
α_7						6.37E-04	1.47E-03
α_8							6.38E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.06E-01	9.35E-01	9.46E-01	9.58E-01	9.62E-01	9.66E-01	9.67E-01
Beta	9.40E-02	6.50E-02	5.45E-02	4.18E-02	3.84E-02	3.38E-02	3.27E-02
Gamma		7.16E-01	6.55E-01	6.16E-01	6.62E-01	6.50E-01	6.57E-01
Delta			4.87E-01	5.63E-01	6.33E-01	6.75E-01	7.37E-01
Epsilon				3.15E-01	5.09E-01	5.80E-01	6.85E-01
Mu					2.66E-01	3.88E-01	5.48E-01
Omega						1.91E-01	3.53E-01
Sigma							3.03E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.82	5.73	7.64	9.55	11.46	13.37	15.28
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		1.0000	0.5000	0.2500	0.1250	0.0625	0.0313

N₄			0.5000	0.5000	0.3750	0.2500	0.1563
N₅				0.2500	0.3750	0.3750	0.3125
N₆					0.1250	0.2500	0.3125
N₇						0.0625	0.1563
N₈							0.0313

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 2.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.032

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.6874552	0.9233812	0.9701456	0.9999353	4.581E+00	3.801E-01	--
α_2	6.47E-05	7.66E-02	2.99E-02	3.13E-01	3.801E-01	4.581E+00	1.227

CCCG = 3, Gamma = 0.032

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7941226	0.9296028	0.9496058	0.9965002	1.268E+01	9.600E-01	--
α_2	5.84E-04	3.83E-02	2.25E-02	1.30E-01	6.673E-01	1.676E+01	0.835
α_3	2.94E-06	3.21E-02	8.05E-03	1.47E-01	2.927E-01	8.823E+00	1.597

CCCG = 4, Gamma = 0.032

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8218995	0.9266008	0.9388579	0.9892420	2.107E+01	1.669E+00	--
α_2	2.25E-03	3.85E-02	2.77E-02	1.11E-01	1.039E+00	2.598E+01	0.889
α_3	1.79E-05	2.02E-02	7.32E-03	8.42E-02	3.887E-01	1.885E+01	1.249
α_4	1.74E-07	1.47E-02	2.49E-03	7.22E-02	2.414E-01	1.613E+01	1.467

CCCG = 5, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8802525	0.9391046	0.9441703	0.9806201	5.377E+01	3.487E+00	--
α_2	4.53E-03	2.89E-02	2.40E-02	7.00E-02	1.791E+00	6.023E+01	0.964
α_3	1.64E-03	2.05E-02	1.53E-02	5.68E-02	1.207E+00	5.777E+01	1.014
α_4	1.78E-05	1.00E-02	4.02E-03	4.02E-02	4.340E-01	4.298E+01	1.377
α_5	3.48E-26	1.56E-03	5.59E-08	8.62E-03	5.493E-02	3.523E+01	1.694

CCCG = 6, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8943638	0.9447764	0.9489334	0.9809686	6.680E+01	3.905E+00	--
α_2	1.73E-03	1.78E-02	1.37E-02	4.78E-02	1.335E+00	7.361E+01	0.995
α_3	2.41E-03	1.95E-02	1.56E-02	5.01E-02	1.531E+00	7.678E+01	0.952
α_4	2.21E-04	1.14E-02	6.82E-03	3.82E-02	7.191E-01	6.232E+01	1.183
α_5	7.19E-08	4.89E-03	8.41E-04	2.38E-02	2.467E-01	5.023E+01	1.477
α_6	1.73E-20	1.57E-03	9.48E-07	9.12E-03	7.279E-02	4.638E+01	1.605

CCCG = 7, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9144344	0.9508860	0.9534289	0.9786475	1.117E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.03E-02	3.29E-02	1.549E+00	1.191E+02	1.024
α_3	2.76E-03	1.55E-02	1.30E-02	3.65E-02	1.989E+00	1.267E+02	0.960
α_4	9.83E-04	1.09E-02	8.30E-03	2.98E-02	1.287E+00	1.166E+02	1.047
α_5	1.15E-04	6.89E-03	4.01E-03	2.35E-02	6.913E-01	9.958E+01	1.232
α_6	2.02E-08	2.73E-03	4.12E-04	1.35E-02	2.327E-01	8.514E+01	1.446
α_7	1.89E-64	2.78E-04	4.23E-17	7.02E-04	2.112E-02	7.592E+01	1.626

CCCG = 8, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9250944	0.9551434	0.9570731	0.9786004	1.494E+02	7.016E+00	--
α_2	1.33E-03	1.03E-02	8.26E-03	2.62E-02	1.583E+00	1.522E+02	1.071
α_3	1.99E-03	1.12E-02	9.45E-03	2.66E-02	1.986E+00	1.748E+02	0.932
α_4	1.43E-03	1.02E-02	8.30E-03	2.55E-02	1.672E+00	1.620E+02	1.006
α_5	3.65E-04	6.88E-03	4.81E-03	2.05E-02	1.011E+00	1.459E+02	1.121
α_6	3.41E-05	4.49E-03	2.29E-03	1.64E-02	5.709E-01	1.267E+02	1.294
α_7	3.79E-10	1.65E-03	1.29E-04	8.72E-03	1.809E-01	1.096E+02	1.500
α_8	1.40E-107	9.70E-05	2.94E-27	7.27E-05	1.245E-02	1.283E+02	1.283

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.23E-01	9.30E-01	9.27E-01	9.39E-01	9.45E-01	9.51E-01	9.55E-01
α_2	7.66E-02	3.83E-02	3.85E-02	2.89E-02	1.78E-02	1.28E-02	1.03E-02
α_3		3.21E-02	2.02E-02	2.05E-02	1.95E-02	1.55E-02	1.12E-02
α_4			1.47E-02	1.00E-02	1.14E-02	1.09E-02	1.02E-02
α_5				1.56E-03	4.89E-03	6.89E-03	6.88E-03
α_6					1.57E-03	2.73E-03	4.49E-03
α_7						2.78E-04	1.65E-03
α_8							9.70E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.23E-01	9.30E-01	9.27E-01	9.39E-01	9.45E-01	9.51E-01	9.55E-01
Beta	7.66E-02	7.04E-02	7.34E-02	6.09E-02	5.52E-02	4.91E-02	4.49E-02
Gamma		4.56E-01	4.76E-01	5.26E-01	6.77E-01	7.38E-01	7.71E-01
Delta			4.22E-01	3.61E-01	4.77E-01	5.74E-01	6.75E-01
Epsilon				1.35E-01	3.61E-01	4.76E-01	5.62E-01
Mu					2.43E-01	3.03E-01	4.75E-01
Omega						9.26E-02	2.80E-01
Sigma							5.56E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.66	0.99	1.33	1.66	1.99	2.32	2.65
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 15.6

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9230672	0.9800022	0.9908991	0.9999305	2.380E+01	4.858E-01	--
α_2	6.95E-05	2.00E-02	9.10E-03	7.69E-02	4.858E-01	2.380E+01	1.227

CCCG = 3, Gamma = 0.253

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9523857	0.9831764	0.9876139	0.9987926	6.709E+01	1.148E+00	--
α_2	3.46E-04	1.02E-02	6.65E-03	3.21E-02	8.559E-01	8.321E+01	0.835
α_3	5.63E-07	6.64E-03	1.57E-03	3.06E-02	2.921E-01	4.368E+01	1.597

CCCG = 4, Gamma = 0.255

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9608307	0.9832513	0.9858131	0.9969094	1.200E+02	2.044E+00	--
α_2	1.05E-03	9.98E-03	7.77E-03	2.65E-02	1.403E+00	1.392E+02	0.889
α_3	7.25E-06	4.30E-03	1.70E-03	1.74E-02	4.307E-01	9.965E+01	1.249
α_4	4.92E-09	2.46E-03	2.92E-04	1.25E-02	2.099E-01	8.498E+01	1.467

CCCG = 5, Gamma = 0.256

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9689504	0.9847669	0.9862511	0.9955108	2.106E+02	3.258E+00	--
α_2	1.26E-03	7.89E-03	6.53E-03	1.92E-02	1.836E+00	2.309E+02	0.964
α_3	1.88E-04	4.26E-03	2.89E-03	1.30E-02	9.426E-01	2.204E+02	1.014
α_4	1.76E-06	2.34E-03	8.06E-04	9.88E-03	3.816E-01	1.625E+02	1.377
α_5	2.98E-16	7.45E-04	4.09E-06	4.34E-03	9.865E-02	1.323E+02	1.694

CCCG = 6, Gamma = 0.257

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9721232	0.9854996	0.9866424	0.9949716	2.752E+02	4.049E+00	--
α_2	1.12E-03	6.54E-03	5.47E-03	1.56E-02	1.941E+00	2.950E+02	0.995
α_3	2.34E-04	3.57E-03	2.58E-03	1.03E-02	1.108E+00	3.092E+02	0.952
α_4	3.44E-05	2.61E-03	1.45E-03	9.09E-03	6.509E-01	2.492E+02	1.183
α_5	2.51E-08	1.27E-03	2.29E-04	6.11E-03	2.536E-01	1.998E+02	1.477
α_6	8.44E-17	5.20E-04	2.36E-06	3.03E-03	9.572E-02	1.840E+02	1.605

CCCG = 7, Gamma = 0.257

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9758609	0.9864406	0.9872301	0.9943238	4.011E+02	5.513E+00	--
α_2	1.29E-03	5.79E-03	5.03E-03	1.29E-02	2.423E+00	4.158E+02	1.024
α_3	2.78E-04	2.96E-03	2.26E-03	8.03E-03	1.320E+00	4.450E+02	0.960
α_4	1.24E-04	2.44E-03	1.69E-03	7.30E-03	9.967E-01	4.079E+02	1.047
α_5	7.64E-06	1.51E-03	7.17E-04	5.70E-03	5.249E-01	3.472E+02	1.232
α_6	4.91E-10	6.61E-04	6.47E-05	3.42E-03	1.956E-01	2.959E+02	1.446
α_7	5.74E-28	2.01E-04	4.56E-09	1.09E-03	5.291E-02	2.633E+02	1.626

CCCG = 8, Gamma = 0.257

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9771469	0.9867798	0.9874595	0.9940917	4.670E+02	6.256E+00	--
α_2	1.38E-03	5.66E-03	4.97E-03	1.23E-02	2.653E+00	4.665E+02	1.071
α_3	2.01E-04	2.34E-03	1.76E-03	6.45E-03	1.260E+00	5.380E+02	0.932
α_4	1.19E-04	2.09E-03	1.47E-03	6.16E-03	1.042E+00	4.983E+02	1.006
α_5	3.99E-05	1.70E-03	1.04E-03	5.61E-03	7.626E-01	4.475E+02	1.121
α_6	1.93E-07	8.43E-04	2.35E-04	3.75E-03	3.271E-01	3.878E+02	1.294
α_7	3.89E-13	4.01E-04	1.08E-05	2.25E-03	1.344E-01	3.347E+02	1.500
α_8	1.77E-20	1.96E-04	1.84E-07	1.14E-03	7.682E-02	3.914E+02	1.283

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01
α_2	2.00E-02	1.02E-02	9.98E-03	7.89E-03	6.54E-03	5.79E-03	5.66E-03
α_3		6.64E-03	4.30E-03	4.26E-03	3.57E-03	2.96E-03	2.34E-03
α_4			2.46E-03	2.34E-03	2.61E-03	2.44E-03	2.09E-03
α_5				7.45E-04	1.27E-03	1.51E-03	1.70E-03
α_6					5.20E-04	6.61E-04	8.43E-04
α_7						2.01E-04	4.01E-04
α_8							1.96E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01
Beta	2.00E-02	1.68E-02	1.67E-02	1.52E-02	1.45E-02	1.36E-02	1.32E-02
Gamma		3.95E-01	4.04E-01	4.82E-01	5.49E-01	5.73E-01	5.72E-01
Delta			3.64E-01	4.20E-01	5.52E-01	6.19E-01	6.91E-01
Epsilon				2.41E-01	4.07E-01	4.93E-01	6.01E-01
Mu					2.91E-01	3.63E-01	4.59E-01
Omega						2.33E-01	4.15E-01
Sigma							3.28E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.93	7.39	9.85	12.32	14.78	17.24	19.71
N_1	0.3030	0.4091	0.4848	0.5303	0.5455	0.5303	0.4848
N_2	0.0152	0.0455	0.0909	0.1515	0.2273	0.3182	0.4242
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 5.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.075

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9789214	0.9945269	0.9975229	0.9999798	8.962E+01	4.932E-01	--
α_2	2.02E-05	5.47E-03	2.48E-03	2.11E-02	4.932E-01	8.962E+01	1.227

CCCG = 3, Gamma = 0.077

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9865677	0.9954134	0.9967403	0.9997282	2.299E+02	1.059E+00	--
α_2	4.45E-05	2.38E-03	1.40E-03	8.04E-03	7.137E-01	2.990E+02	0.835
α_3	7.94E-07	2.21E-03	6.68E-04	9.62E-03	3.458E-01	1.564E+02	1.597

CCCG = 4, Gamma = 0.077

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9897531	0.9955952	0.9962616	0.9991596	4.780E+02	2.115E+00	--
α_2	3.50E-04	2.82E-03	2.25E-03	7.26E-03	1.549E+00	5.472E+02	0.889
α_3	2.11E-08	6.77E-04	1.32E-04	3.22E-03	2.646E-01	3.905E+02	1.249
α_4	1.00E-07	9.05E-04	2.22E-04	4.14E-03	3.010E-01	3.323E+02	1.467

CCCG = 5, Gamma = 0.078

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931518	0.9961967	0.9964303	0.9984440	1.395E+03	5.325E+00	--
α_2	7.93E-04	2.49E-03	2.26E-03	4.94E-03	3.632E+00	1.457E+03	0.964
α_3	9.58E-05	9.75E-04	7.49E-04	2.63E-03	1.354E+00	1.387E+03	1.014
α_4	2.75E-08	2.90E-04	6.91E-05	1.33E-03	2.961E-01	1.022E+03	1.377
α_5	1.52E-34	5.11E-05	5.63E-11	2.53E-04	4.243E-02	8.308E+02	1.694

CCCG = 6, Gamma = 0.078

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9926559	0.9959961	0.9962610	0.9984318	1.228E+03	4.936E+00	--
α_2	6.06E-04	2.28E-03	2.03E-03	4.82E-03	2.915E+00	1.276E+03	0.995
α_3	8.02E-05	9.40E-04	7.06E-04	2.60E-03	1.257E+00	1.335E+03	0.952
α_4	1.90E-06	4.68E-04	2.14E-04	1.79E-03	5.031E-01	1.075E+03	1.183
α_5	3.88E-15	1.34E-04	1.77E-06	7.69E-04	1.155E-01	8.615E+02	1.477
α_6	8.56E-13	1.83E-04	6.70E-06	1.01E-03	1.451E-01	7.927E+02	1.605

CCCG = 7, Gamma = 0.078

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9942868	0.9963842	0.9965074	0.9980612	2.660E+03	9.654E+00	--
α_2	7.03E-04	1.81E-03	1.69E-03	3.35E-03	4.851E+00	2.668E+03	1.024
α_3	2.51E-04	9.82E-04	8.68E-04	2.10E-03	2.800E+00	2.849E+03	0.960
α_4	5.41E-05	5.30E-04	4.09E-04	1.42E-03	1.384E+00	2.612E+03	1.047
α_5	7.81E-07	2.21E-04	9.86E-05	8.53E-04	4.902E-01	2.222E+03	1.232
α_6	1.44E-15	6.06E-05	7.67E-07	3.48E-04	1.146E-01	1.892E+03	1.446
α_7	4.57E-93	8.70E-06	9.25E-25	1.03E-05	1.464E-02	1.683E+03	1.626

CCCG = 8, Gamma = 0.079

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9939579	0.9964085	0.9965733	0.9982962	1.983E+03	7.148E+00	--
α_2	4.17E-04	1.54E-03	1.37E-03	3.23E-03	2.980E+00	1.935E+03	1.071
α_3	1.53E-04	8.80E-04	7.36E-04	2.10E-03	1.960E+00	2.225E+03	0.932
α_4	4.13E-05	5.65E-04	4.15E-04	1.60E-03	1.166E+00	2.061E+03	1.006
α_5	1.65E-06	2.90E-04	1.41E-04	1.09E-03	5.375E-01	1.851E+03	1.121
α_6	2.49E-11	1.13E-04	8.74E-06	5.95E-04	1.805E-01	1.603E+03	1.294
α_7	1.55E-35	2.99E-05	2.24E-11	1.46E-04	4.139E-02	1.383E+03	1.500
α_8	1.07E-08	1.75E-04	3.86E-05	8.15E-04	2.827E-01	1.616E+03	1.283

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	5.47E-03	2.38E-03	2.82E-03	2.49E-03	2.28E-03	1.81E-03	1.54E-03
α_3		2.21E-03	6.77E-04	9.75E-04	9.40E-04	9.82E-04	8.80E-04
α_4			9.05E-04	2.90E-04	4.68E-04	5.30E-04	5.65E-04
α_5				5.11E-05	1.34E-04	2.21E-04	2.90E-04
α_6					1.83E-04	6.06E-05	1.13E-04
α_7						8.70E-06	2.99E-05
α_8							1.75E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	5.47E-03	4.59E-03	4.40E-03	3.80E-03	4.00E-03	3.62E-03	3.59E-03
Gamma		4.81E-01	3.59E-01	3.46E-01	4.31E-01	4.98E-01	5.72E-01
Delta			5.72E-01	2.59E-01	4.55E-01	4.55E-01	5.71E-01
Epsilon				1.50E-01	4.04E-01	3.54E-01	5.18E-01
Mu					5.77E-01	2.39E-01	5.22E-01
Omega						1.26E-01	6.45E-01
Sigma							8.54E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.58	2.37	3.16	3.95	4.74	5.53	6.32
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.9.2.2 PWR-MSS-PRV-OO: PWR MSS Power-Operated Relief Valves Fail to Close

Generic CCF Parameters

Plant Type: PWR
System Group: Steam
System: Main Steam
Component Group: Valve
Component Type: Power Operated Relief Valve
Failure Mode: Fail to Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 19.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9563275	0.9888396	0.9951428	0.9999661	1.0000000	4.151E+01	4.685E-01
α_2	3.13E-05	1.12E-02	4.86E-03	4.37E-02	0.00E+00	4.685E-01	4.151E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9588768	0.9855762	0.9894550	0.9990035	1.0000000	7.708E+01	1.128E+00
α_2	3.64E-04	1.09E-02	7.09E-03	3.43E-02	0.00E+00	8.512E-01	7.736E+01
α_3	1.77E-07	3.54E-03	7.58E-04	1.66E-02	0.00E+00	2.768E-01	7.793E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9593807	0.9830427	0.9858348	0.9971619	1.0000000	1.098E+02	1.894E+00
α_2	9.75E-04	1.13E-02	8.53E-03	3.10E-02	0.00E+00	1.260E+00	1.104E+02
α_3	3.92E-06	3.60E-03	1.32E-03	1.49E-02	0.00E+00	4.024E-01	1.113E+02
α_4	1.44E-08	2.07E-03	3.09E-04	1.03E-02	0.00E+00	2.315E-01	1.114E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9676935	0.9839146	0.9853999	0.9950582	1.0000000	2.099E+02	3.432E+00
α_2	1.53E-03	9.02E-03	7.54E-03	2.16E-02	0.00E+00	1.924E+00	2.114E+02
α_3	2.85E-04	4.92E-03	3.48E-03	1.44E-02	0.00E+00	1.049E+00	2.123E+02
α_4	1.36E-06	1.79E-03	6.17E-04	7.56E-03	0.00E+00	3.822E-01	2.130E+02
α_5	3.12E-20	3.60E-04	3.35E-07	2.09E-03	0.00E+00	7.674E-02	2.133E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9698723	0.9845462	0.9858271	0.9948416	1.0000000	2.443E+02	3.835E+00
α_2	9.83E-04	6.85E-03	5.58E-03	1.71E-02	0.00E+00	1.701E+00	2.465E+02
α_3	3.84E-04	4.86E-03	3.62E-03	1.36E-02	0.00E+00	1.207E+00	2.469E+02

α_4	2.20E-05	2.40E-03	1.26E-03	8.65E-03	0.00E+00	5.960E-01	2.476E+02
α_5	3.49E-09	8.91E-04	1.19E-04	4.47E-03	0.00E+00	2.211E-01	2.479E+02
α_6	3.48E-15	4.42E-04	4.48E-06	2.55E-03	0.00E+00	1.098E-01	2.480E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9744669	0.9855101	0.9863164	0.9937983	1.0000000	3.909E+02	5.747E+00
α_2	1.16E-03	5.66E-03	4.85E-03	1.29E-02	0.00E+00	2.243E+00	3.944E+02
α_3	5.51E-04	4.11E-03	3.31E-03	1.04E-02	0.00E+00	1.630E+00	3.950E+02
α_4	1.70E-04	2.73E-03	1.95E-03	7.94E-03	0.00E+00	1.083E+00	3.956E+02
α_5	1.03E-05	1.43E-03	7.19E-04	5.24E-03	0.00E+00	5.654E-01	3.961E+02
α_6	2.65E-10	4.83E-04	4.46E-05	2.52E-03	0.00E+00	1.916E-01	3.965E+02
α_7	6.01E-41	8.77E-05	3.26E-12	3.85E-04	0.00E+00	3.480E-02	3.966E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9756484	0.9861983	0.9869703	0.9941057	1.0000000	4.091E+02	5.726E+00
α_2	8.77E-04	4.86E-03	4.10E-03	1.15E-02	0.00E+00	2.018E+00	4.128E+02
α_3	3.46E-04	3.35E-03	2.60E-03	8.94E-03	0.00E+00	1.391E+00	4.135E+02
α_4	1.52E-04	2.56E-03	1.82E-03	7.50E-03	0.00E+00	1.062E+00	4.138E+02
α_5	2.99E-05	1.69E-03	9.89E-04	5.75E-03	0.00E+00	7.026E-01	4.141E+02
α_6	3.31E-07	8.43E-04	2.59E-04	3.67E-03	0.00E+00	3.497E-01	4.145E+02
α_7	1.27E-15	2.60E-04	2.39E-06	1.50E-03	0.00E+00	1.078E-01	4.147E+02
α_8	2.66E-17	2.28E-04	9.67E-07	1.33E-03	0.00E+00	9.469E-02	4.148E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.86E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
α_2	1.12E-02	1.09E-02	1.13E-02	9.02E-03	6.85E-03	5.66E-03	4.86E-03
α_3		3.54E-03	3.60E-03	4.92E-03	4.86E-03	4.11E-03	3.35E-03
α_4			2.07E-03	1.79E-03	2.40E-03	2.73E-03	2.56E-03
α_5				3.60E-04	8.91E-04	1.43E-03	1.69E-03
α_6					4.42E-04	4.83E-04	8.43E-04
α_7						8.77E-05	2.60E-04
α_8							2.28E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.86E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
Beta	1.12E-02	1.44E-02	1.70E-02	1.61E-02	1.55E-02	1.45E-02	1.38E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	19.10	19.10	19.10	19.10	19.10	19.10	19.10
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 7.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.393

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9678458	0.9917006	0.9962976	0.9999724	5.776E+01	4.834E-01	--
α_2	2.76E-05	8.30E-03	3.70E-03	3.22E-02	4.834E-01	5.776E+01	0.890

CCCG = 3, Gamma = 0.393

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9728703	0.9902297	0.9926834	0.9992014	1.242E+02	1.226E+00	--
α_2	3.73E-04	7.65E-03	5.28E-03	2.30E-02	9.769E-01	1.267E+02	1.084
α_3	3.39E-08	2.12E-03	3.68E-04	1.03E-02	2.487E-01	1.171E+02	1.180

CCCG = 4, Gamma = 0.393

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9705017	0.9873836	0.9893154	0.9976595	1.610E+02	2.057E+00	--
α_2	9.49E-04	8.59E-03	6.73E-03	2.26E-02	1.442E+00	1.664E+02	1.140
α_3	3.32E-06	2.64E-03	9.94E-04	1.09E-02	4.114E-01	1.552E+02	1.230
α_4	1.82E-09	1.38E-03	1.51E-04	7.10E-03	2.036E-01	1.470E+02	1.301

CCCG = 5, Gamma = 0.393

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9754166	0.9875400	0.9886222	0.9959658	2.919E+02	3.683E+00	--
α_2	1.50E-03	7.34E-03	6.30E-03	1.67E-02	2.243E+00	3.034E+02	1.184
α_3	1.77E-04	3.52E-03	2.44E-03	1.06E-02	9.912E-01	2.802E+02	1.286
α_4	9.22E-07	1.35E-03	4.57E-04	5.73E-03	3.765E-01	2.782E+02	1.299
α_5	2.12E-21	2.44E-04	1.39E-07	1.41E-03	7.237E-02	2.959E+02	1.222

CCCG = 6, Gamma = 0.393

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9766728	0.9878063	0.9887510	0.9957125	3.353E+02	4.139E+00	--
α_2	1.11E-03	5.78E-03	4.91E-03	1.34E-02	2.128E+00	3.662E+02	1.118
α_3	2.49E-04	3.61E-03	2.62E-03	1.03E-02	1.134E+00	3.133E+02	1.310
α_4	1.14E-05	1.75E-03	8.66E-04	6.46E-03	5.533E-01	3.165E+02	1.299
α_5	2.65E-09	6.82E-04	9.10E-05	3.42E-03	2.210E-01	3.239E+02	1.271
α_6	4.88E-16	3.83E-04	2.66E-06	2.22E-03	1.027E-01	2.684E+02	1.534

CCCG = 7, Gamma = 0.393

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9805513	0.9886841	0.9892523	0.9948771	5.620E+02	6.432E+00	--
α_2	1.18E-03	4.54E-03	4.02E-03	9.66E-03	2.840E+00	6.232E+02	1.110
α_3	4.88E-04	3.28E-03	2.69E-03	8.13E-03	1.746E+00	5.298E+02	1.308
α_4	1.27E-04	2.04E-03	1.46E-03	5.92E-03	1.084E+00	5.312E+02	1.306
α_5	5.83E-06	1.03E-03	4.97E-04	3.84E-03	5.376E-01	5.238E+02	1.326
α_6	3.36E-10	3.82E-04	3.85E-05	1.97E-03	1.979E-01	5.181E+02	1.341
α_7	1.14E-52	5.09E-05	5.10E-15	1.74E-04	2.656E-02	5.222E+02	1.331

CCCG = 8, Gamma = 0.393

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9814157	0.9893145	0.9898795	0.9952840	5.659E+02	6.112E+00	--
α_2	8.02E-04	3.70E-03	3.20E-03	8.33E-03	2.364E+00	6.359E+02	1.088
α_3	3.27E-04	2.75E-03	2.17E-03	7.12E-03	1.512E+00	5.491E+02	1.262
α_4	1.18E-04	2.01E-03	1.42E-03	5.90E-03	1.056E+00	5.248E+02	1.321
α_5	1.89E-05	1.25E-03	7.11E-04	4.30E-03	6.745E-01	5.398E+02	1.285
α_6	7.99E-08	5.94E-04	1.51E-04	2.70E-03	3.076E-01	5.172E+02	1.342
α_7	1.55E-15	2.21E-04	2.18E-06	1.28E-03	1.093E-01	4.939E+02	1.406
α_8	2.54E-18	1.64E-04	4.56E-07	9.58E-04	8.885E-02	5.407E+02	1.285

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.90E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01
α_2	8.30E-03	7.65E-03	8.59E-03	7.34E-03	5.78E-03	4.54E-03	3.70E-03
α_3		2.12E-03	2.64E-03	3.52E-03	3.61E-03	3.28E-03	2.75E-03
α_4			1.38E-03	1.35E-03	1.75E-03	2.04E-03	2.01E-03
α_5				2.44E-04	6.82E-04	1.03E-03	1.25E-03
α_6					3.83E-04	3.82E-04	5.94E-04
α_7						5.09E-05	2.21E-04
α_8							1.64E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.90E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01
Beta	8.30E-03	9.77E-03	1.26E-02	1.25E-02	1.22E-02	1.13E-02	1.07E-02
Gamma		2.17E-01	3.19E-01	4.11E-01	5.26E-01	5.99E-01	6.53E-01
Delta			3.44E-01	3.12E-01	4.38E-01	5.15E-01	6.07E-01
Epsilon				1.53E-01	3.79E-01	4.17E-01	5.26E-01
Mu					3.59E-01	2.97E-01	4.40E-01
Omega						1.18E-01	3.93E-01
Sigma							4.26E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.50	7.50	7.50	7.50	7.50	7.50	7.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9076294	0.9766094	0.9900449	0.9999471	1.878E+01	4.498E-01	--
α_2	5.29E-05	2.34E-02	9.96E-03	9.24E-02	4.498E-01	1.878E+01	0.890

CCCG = 3, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9066881	0.9664420	0.9748472	0.9974155	3.393E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.480E+01	1.084
α_3	7.73E-08	7.29E-03	1.19E-03	3.58E-02	2.396E-01	3.261E+01	1.180

CCCG = 4, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9040911	0.9594900	0.9658578	0.9930787	4.496E+01	1.898E+00	--
α_2	2.42E-03	2.66E-02	2.03E-02	7.19E-02	1.285E+00	4.711E+01	1.140
α_3	8.13E-06	8.75E-03	3.15E-03	3.65E-02	3.927E-01	4.448E+01	1.230
α_4	2.02E-08	5.20E-03	7.01E-04	2.61E-02	2.207E-01	4.220E+01	1.301

CCCG = 5, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9239440	0.9615970	0.9649255	0.9878667	8.778E+01	3.506E+00	--
α_2	3.77E-03	2.10E-02	1.78E-02	4.95E-02	1.992E+00	9.271E+01	1.184
α_3	7.69E-04	1.24E-02	8.89E-03	3.59E-02	1.078E+00	8.607E+01	1.286
α_4	2.22E-06	4.21E-03	1.37E-03	1.80E-02	3.632E-01	8.595E+01	1.299
α_5	7.32E-21	7.90E-04	4.58E-07	4.58E-03	7.248E-02	9.165E+01	1.222

CCCG = 6, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9303942	0.9631665	0.9658465	0.9867767	1.098E+02	4.199E+00	--
α_2	2.69E-03	1.56E-02	1.31E-02	3.71E-02	1.941E+00	1.226E+02	1.118
α_3	1.21E-03	1.25E-02	9.63E-03	3.38E-02	1.332E+00	1.050E+02	1.310
α_4	6.20E-05	5.77E-03	3.12E-03	2.05E-02	6.181E-01	1.066E+02	1.299
α_5	1.45E-08	2.11E-03	3.14E-04	1.05E-02	2.313E-01	1.094E+02	1.271
α_6	7.74E-20	8.46E-04	7.99E-07	4.93E-03	7.684E-02	9.071E+01	1.534

CCCG = 7, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9398010	0.9649951	0.9667269	0.9842733	1.715E+02	6.223E+00	--
α_2	3.31E-03	1.35E-02	1.19E-02	2.92E-02	2.654E+00	1.936E+02	1.110
α_3	1.35E-03	9.87E-03	7.99E-03	2.48E-02	1.645E+00	1.650E+02	1.308
α_4	4.46E-04	6.68E-03	4.84E-03	1.92E-02	1.115E+00	1.658E+02	1.306
α_5	3.56E-05	3.67E-03	1.95E-03	1.32E-02	6.034E-01	1.638E+02	1.326
α_6	1.95E-10	1.10E-03	8.17E-05	5.81E-03	1.780E-01	1.623E+02	1.341
α_7	9.10E-51	1.67E-04	3.43E-14	5.90E-04	2.734E-02	1.637E+02	1.331

CCCG = 8, Gamma = 0.157

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9422806	0.9664232	0.9680831	0.9848954	1.798E+02	6.246E+00	--
α_2	2.79E-03	1.21E-02	1.06E-02	2.66E-02	2.504E+00	2.046E+02	1.088
α_3	8.53E-04	7.94E-03	6.20E-03	2.10E-02	1.419E+00	1.773E+02	1.262
α_4	3.31E-04	6.02E-03	4.23E-03	1.78E-02	1.027E+00	1.696E+02	1.321
α_5	8.64E-05	4.18E-03	2.51E-03	1.40E-02	7.337E-01	1.747E+02	1.285
α_6	2.36E-06	2.37E-03	8.55E-04	9.85E-03	3.975E-01	1.675E+02	1.342
α_7	4.81E-20	4.80E-04	4.62E-07	2.79E-03	7.703E-02	1.602E+02	1.406
α_8	4.63E-18	4.99E-04	1.25E-06	2.91E-03	8.749E-02	1.754E+02	1.285

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.77E-01	9.66E-01	9.59E-01	9.62E-01	9.63E-01	9.65E-01	9.66E-01
α_2	2.34E-02	2.63E-02	2.66E-02	2.10E-02	1.56E-02	1.35E-02	1.21E-02
α_3		7.29E-03	8.75E-03	1.24E-02	1.25E-02	9.87E-03	7.94E-03
α_4			5.20E-03	4.21E-03	5.77E-03	6.68E-03	6.02E-03
α_5				7.90E-04	2.11E-03	3.67E-03	4.18E-03
α_6					8.46E-04	1.10E-03	2.37E-03
α_7						1.67E-04	4.80E-04
α_8							4.99E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.77E-01	9.66E-01	9.59E-01	9.62E-01	9.63E-01	9.65E-01	9.66E-01
Beta	2.34E-02	3.36E-02	4.05E-02	3.84E-02	3.68E-02	3.50E-02	3.36E-02
Gamma		2.17E-01	3.44E-01	4.52E-01	5.77E-01	6.14E-01	6.40E-01
Delta			3.73E-01	2.88E-01	4.10E-01	5.41E-01	6.30E-01
Epsilon				1.58E-01	3.39E-01	4.25E-01	5.56E-01
Mu					2.86E-01	2.56E-01	4.44E-01
Omega						1.32E-01	2.93E-01
Sigma							5.09E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 4.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.236

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9437901	0.9855917	0.9936779	0.9999584	3.219E+01	4.706E-01	--
α_2	4.16E-05	1.44E-02	6.32E-03	5.62E-02	4.706E-01	3.219E+01	0.890

CCCG = 3, Gamma = 0.236

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9475322	0.9817064	0.9867023	0.9987970	5.916E+01	1.103E+00	--
α_2	3.80E-04	1.31E-02	8.38E-03	4.21E-02	8.104E-01	6.086E+01	1.084
α_3	4.35E-07	5.15E-03	1.21E-03	2.38E-02	2.921E-01	5.639E+01	1.180

CCCG = 4, Gamma = 0.236

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9542378	0.9806878	0.9837599	0.9966280	9.915E+01	1.953E+00	--
α_2	1.18E-03	1.26E-02	9.62E-03	3.40E-02	1.312E+00	1.031E+02	1.140
α_3	7.50E-06	4.45E-03	1.76E-03	1.80E-02	4.307E-01	9.636E+01	1.230
α_4	4.58E-09	2.29E-03	2.71E-04	1.17E-02	2.099E-01	9.129E+01	1.301

CCCG = 5, Gamma = 0.236

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9634480	0.9822884	0.9840880	0.9949772	1.723E+02	3.107E+00	--
α_2	1.31E-03	9.24E-03	7.51E-03	2.31E-02	1.684E+00	1.806E+02	1.184
α_3	2.49E-04	5.62E-03	3.82E-03	1.71E-02	9.426E-01	1.668E+02	1.286
α_4	1.73E-06	2.30E-03	7.91E-04	9.69E-03	3.816E-01	1.658E+02	1.299
α_5	2.23E-16	5.59E-04	3.06E-06	3.25E-03	9.865E-02	1.765E+02	1.222

CCCG = 6, Gamma = 0.236

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9678788	0.9835334	0.9849019	0.9945119	2.283E+02	3.822E+00	--
α_2	9.77E-04	6.74E-03	5.50E-03	1.67E-02	1.714E+00	2.526E+02	1.118
α_3	3.35E-04	5.10E-03	3.69E-03	1.47E-02	1.108E+00	2.160E+02	1.310
α_4	3.93E-05	2.97E-03	1.66E-03	1.04E-02	6.509E-01	2.183E+02	1.299
α_5	2.25E-08	1.13E-03	2.04E-04	5.46E-03	2.536E-01	2.235E+02	1.271
α_6	8.38E-17	5.16E-04	2.35E-06	3.01E-03	9.572E-02	1.853E+02	1.534

CCCG = 7, Gamma = 0.236

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9721766	0.9845839	0.9855324	0.9937514	3.318E+02	5.195E+00	--
α_2	1.07E-03	5.64E-03	4.78E-03	1.31E-02	2.105E+00	3.714E+02	1.110
α_3	3.91E-04	4.16E-03	3.18E-03	1.13E-02	1.320E+00	3.158E+02	1.308
α_4	1.60E-04	3.14E-03	2.18E-03	9.40E-03	9.967E-01	3.166E+02	1.306
α_5	8.49E-06	1.68E-03	7.98E-04	6.33E-03	5.249E-01	3.123E+02	1.326
α_6	4.70E-10	6.32E-04	6.19E-05	3.28E-03	1.956E-01	3.091E+02	1.341
α_7	4.85E-28	1.70E-04	3.85E-09	9.22E-04	5.291E-02	3.115E+02	1.331

CCCG = 8, Gamma = 0.236

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9743580	0.9853994	0.9862020	0.9937002	3.936E+02	5.832E+00	--
α_2	1.01E-03	4.99E-03	4.27E-03	1.14E-02	2.229E+00	4.445E+02	1.088
α_3	2.81E-04	3.27E-03	2.46E-03	9.02E-03	1.260E+00	3.841E+02	1.262
α_4	1.61E-04	2.83E-03	2.00E-03	8.35E-03	1.042E+00	3.670E+02	1.321
α_5	4.73E-05	2.02E-03	1.23E-03	6.65E-03	7.626E-01	3.775E+02	1.285
α_6	2.07E-07	9.03E-04	2.52E-04	4.02E-03	3.271E-01	3.619E+02	1.342
α_7	3.77E-13	3.89E-04	1.04E-05	2.18E-03	1.344E-01	3.456E+02	1.406
α_8	1.83E-20	2.03E-04	1.90E-07	1.18E-03	7.682E-02	3.784E+02	1.285

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.82E-01	9.81E-01	9.82E-01	9.84E-01	9.85E-01	9.85E-01
α_2	1.44E-02	1.31E-02	1.26E-02	9.24E-03	6.74E-03	5.64E-03	4.99E-03
α_3		5.15E-03	4.45E-03	5.62E-03	5.10E-03	4.16E-03	3.27E-03
α_4			2.29E-03	2.30E-03	2.97E-03	3.14E-03	2.83E-03
α_5				5.59E-04	1.13E-03	1.68E-03	2.02E-03
α_6					5.16E-04	6.32E-04	9.03E-04
α_7						1.70E-04	3.89E-04
α_8							2.03E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.82E-01	9.81E-01	9.82E-01	9.84E-01	9.85E-01	9.85E-01
Beta	1.44E-02	1.83E-02	1.93E-02	1.77E-02	1.65E-02	1.54E-02	1.46E-02
Gamma		2.82E-01	3.49E-01	4.78E-01	5.91E-01	6.34E-01	6.58E-01
Delta			3.40E-01	3.37E-01	4.75E-01	5.74E-01	6.60E-01
Epsilon				1.96E-01	3.57E-01	4.41E-01	5.54E-01
Mu					3.13E-01	3.23E-01	4.26E-01
Omega						2.12E-01	3.96E-01
Sigma							3.43E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.50	4.50	4.50	4.50	4.50	4.50	4.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 4.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.215

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9850461	0.9961198	0.9982475	0.9999857	1.266E+02	4.932E-01	--
α_2	1.43E-05	3.88E-03	1.75E-03	1.50E-02	4.932E-01	1.266E+02	0.890

CCCG = 3, Gamma = 0.215

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9862711	0.9953119	0.9966679	0.9997222	2.249E+02	1.059E+00	--
α_2	5.74E-05	3.07E-03	1.81E-03	1.04E-02	7.137E-01	2.318E+02	1.084
α_3	5.82E-07	1.62E-03	4.90E-04	7.06E-03	3.458E-01	2.133E+02	1.180

CCCG = 4, Gamma = 0.215

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9881858	0.9949200	0.9956876	0.9990304	4.141E+02	2.115E+00	--
α_2	4.48E-04	3.61E-03	2.88E-03	9.30E-03	1.549E+00	4.271E+02	1.140
α_3	2.08E-08	6.66E-04	1.30E-04	3.17E-03	2.646E-01	3.972E+02	1.230
α_4	8.85E-08	8.01E-04	1.97E-04	3.66E-03	3.010E-01	3.755E+02	1.301

CCCG = 5, Gamma = 0.215

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9917146	0.9953974	0.9956796	0.9981165	1.152E+03	5.325E+00	--
α_2	9.74E-04	3.05E-03	2.78E-03	6.07E-03	3.632E+00	1.185E+03	1.184
α_3	1.22E-04	1.24E-03	9.50E-04	3.34E-03	1.354E+00	1.093E+03	1.286
α_4	2.59E-08	2.73E-04	6.52E-05	1.26E-03	2.961E-01	1.083E+03	1.299
α_5	1.10E-34	3.68E-05	4.06E-11	1.83E-04	4.243E-02	1.151E+03	1.222

CCCG = 6, Gamma = 0.215

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9914505	0.9953380	0.9956461	0.9981736	1.054E+03	4.936E+00	--
α_2	6.82E-04	2.56E-03	2.28E-03	5.42E-03	2.915E+00	1.134E+03	1.118
α_3	1.10E-04	1.29E-03	9.73E-04	3.58E-03	1.257E+00	9.697E+02	1.310
α_4	2.09E-06	5.14E-04	2.35E-04	1.97E-03	5.031E-01	9.786E+02	1.299
α_5	3.34E-15	1.15E-04	1.52E-06	6.62E-04	1.155E-01	1.001E+03	1.271
α_6	8.19E-13	1.75E-04	6.41E-06	9.70E-04	1.451E-01	8.289E+02	1.534

CCCG = 7, Gamma = 0.215

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9932568	0.9957317	0.9958769	0.9977109	2.252E+03	9.654E+00	--
α_2	7.63E-04	1.97E-03	1.84E-03	3.63E-03	4.851E+00	2.459E+03	1.110
α_3	3.43E-04	1.34E-03	1.18E-03	2.86E-03	2.800E+00	2.089E+03	1.308
α_4	6.75E-05	6.61E-04	5.10E-04	1.77E-03	1.384E+00	2.094E+03	1.306
α_5	8.41E-07	2.38E-04	1.06E-04	9.19E-04	4.902E-01	2.063E+03	1.326
α_6	1.34E-15	5.62E-05	7.12E-07	3.22E-04	1.146E-01	2.040E+03	1.341
α_7	3.75E-93	7.12E-06	7.58E-25	8.46E-06	1.464E-02	2.055E+03	1.331

CCCG = 8, Gamma = 0.215

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9930103	0.9958445	0.9960351	0.9980283	1.713E+03	7.148E+00	--
α_2	4.24E-04	1.57E-03	1.39E-03	3.29E-03	2.980E+00	1.901E+03	1.088
α_3	2.07E-04	1.19E-03	9.98E-04	2.85E-03	1.960E+00	1.641E+03	1.262
α_4	5.44E-05	7.43E-04	5.45E-04	2.11E-03	1.166E+00	1.568E+03	1.321
α_5	1.89E-06	3.33E-04	1.61E-04	1.25E-03	5.375E-01	1.612E+03	1.285
α_6	2.58E-11	1.17E-04	9.07E-06	6.18E-04	1.805E-01	1.543E+03	1.342
α_7	1.45E-35	2.81E-05	2.10E-11	1.37E-04	4.139E-02	1.474E+03	1.406
α_8	1.07E-08	1.75E-04	3.86E-05	8.17E-04	2.827E-01	1.613E+03	1.285

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
α_2	3.88E-03	3.07E-03	3.61E-03	3.05E-03	2.56E-03	1.97E-03	1.57E-03
α_3		1.62E-03	6.66E-04	1.24E-03	1.29E-03	1.34E-03	1.19E-03
α_4			8.01E-04	2.73E-04	5.14E-04	6.61E-04	7.43E-04
α_5				3.68E-05	1.15E-04	2.38E-04	3.33E-04
α_6					1.75E-04	5.62E-05	1.17E-04
α_7						7.12E-06	2.81E-05
α_8							1.75E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
Beta	3.88E-03	4.69E-03	5.08E-03	4.60E-03	4.66E-03	4.27E-03	4.16E-03
Gamma		3.45E-01	2.89E-01	3.36E-01	4.50E-01	5.39E-01	6.23E-01
Delta			5.46E-01	2.00E-01	3.83E-01	4.18E-01	5.39E-01
Epsilon				1.19E-01	3.61E-01	3.13E-01	4.68E-01
Mu					6.03E-01	2.10E-01	4.90E-01
Omega						1.13E-01	6.35E-01
Sigma							8.62E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.10	4.10	4.10	4.10	4.10	4.10	4.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.9.3 PWR Pressurizer Power-Operated Relief Valves

2.9.3.1 PWR-RCS-PORV-CC: PWR Pressurizer Power-Operated Relief Valves Fail to Open

Generic CCF Parameters

Plant Type:	PWR
System:	Reactor Coolant
Component Group:	Valve
Component Type:	Power Operated Relief Valve
Failure Mode:	Fail to Open
Date Range:	2006 through 2020
Prior:	Default 2015

Total Number of Independent Failure Events: 13.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9489457	0.9869423	0.9943066	0.9999604	1.0000000	3.541E+01	4.685E-01
α_2	3.67E-05	1.31E-02	5.70E-03	5.11E-02	0.00E+00	4.685E-01	3.541E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9554249	0.9843560	0.9885545	0.9989185	1.0000000	7.098E+01	1.128E+00
α_2	3.96E-04	1.18E-02	7.70E-03	3.72E-02	0.00E+00	8.512E-01	7.126E+01
α_3	1.92E-07	3.84E-03	8.22E-04	1.80E-02	0.00E+00	2.768E-01	7.183E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9570527	0.9820628	0.9850112	0.9969959	1.0000000	1.037E+02	1.894E+00
α_2	1.03E-03	1.19E-02	9.02E-03	3.28E-02	0.00E+00	1.260E+00	1.043E+02
α_3	4.14E-06	3.81E-03	1.40E-03	1.58E-02	0.00E+00	4.024E-01	1.052E+02
α_4	1.52E-08	2.19E-03	3.27E-04	1.09E-02	0.00E+00	2.315E-01	1.053E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9667484	0.9834412	0.9849688	0.9949115	1.0000000	2.038E+02	3.432E+00
α_2	1.58E-03	9.28E-03	7.76E-03	2.22E-02	0.00E+00	1.924E+00	2.053E+02
α_3	2.93E-04	5.06E-03	3.58E-03	1.49E-02	0.00E+00	1.049E+00	2.062E+02
α_4	1.40E-06	1.84E-03	6.36E-04	7.78E-03	0.00E+00	3.822E-01	2.069E+02
α_5	3.22E-20	3.70E-04	3.45E-07	2.15E-03	0.00E+00	7.674E-02	2.072E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9691173	0.9841568	0.9854689	0.9947104	1.0000000	2.382E+02	3.835E+00

α_2	1.01E-03	7.03E-03	5.72E-03	1.75E-02	0.00E+00	1.701E+00	2.404E+02
α_3	3.93E-04	4.99E-03	3.71E-03	1.40E-02	0.00E+00	1.207E+00	2.408E+02
α_4	2.26E-05	2.46E-03	1.29E-03	8.87E-03	0.00E+00	5.960E-01	2.415E+02
α_5	3.58E-09	9.13E-04	1.22E-04	4.58E-03	0.00E+00	2.211E-01	2.418E+02
α_6	3.57E-15	4.54E-04	4.59E-06	2.62E-03	0.00E+00	1.098E-01	2.419E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9740651	0.9852838	0.9861023	0.9937016	1.0000000	3.848E+02	5.747E+00
α_2	1.17E-03	5.74E-03	4.92E-03	1.31E-02	0.00E+00	2.243E+00	3.883E+02
α_3	5.60E-04	4.17E-03	3.36E-03	1.06E-02	0.00E+00	1.630E+00	3.889E+02
α_4	1.73E-04	2.77E-03	1.98E-03	8.07E-03	0.00E+00	1.083E+00	3.895E+02
α_5	1.05E-05	1.45E-03	7.30E-04	5.32E-03	0.00E+00	5.654E-01	3.900E+02
α_6	2.69E-10	4.91E-04	4.53E-05	2.56E-03	0.00E+00	1.916E-01	3.904E+02
α_7	6.10E-41	8.91E-05	3.31E-12	3.91E-04	0.00E+00	3.480E-02	3.905E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9752863	0.9859924	0.9867755	0.9940179	1.0000000	4.030E+02	5.726E+00
α_2	8.90E-04	4.94E-03	4.16E-03	1.17E-02	0.00E+00	2.018E+00	4.067E+02
α_3	3.51E-04	3.40E-03	2.63E-03	9.08E-03	0.00E+00	1.391E+00	4.074E+02
α_4	1.55E-04	2.60E-03	1.85E-03	7.61E-03	0.00E+00	1.062E+00	4.077E+02
α_5	3.03E-05	1.72E-03	1.00E-03	5.84E-03	0.00E+00	7.026E-01	4.080E+02
α_6	3.36E-07	8.56E-04	2.63E-04	3.72E-03	0.00E+00	3.497E-01	4.084E+02
α_7	1.29E-15	2.64E-04	2.42E-06	1.52E-03	0.00E+00	1.078E-01	4.086E+02
α_8	2.70E-17	2.32E-04	9.81E-07	1.35E-03	0.00E+00	9.469E-02	4.087E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.84E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.31E-02	1.18E-02	1.19E-02	9.28E-03	7.03E-03	5.74E-03	4.94E-03
α_3		3.84E-03	3.81E-03	5.06E-03	4.99E-03	4.17E-03	3.40E-03
α_4			2.19E-03	1.84E-03	2.46E-03	2.77E-03	2.60E-03
α_5				3.70E-04	9.13E-04	1.45E-03	1.72E-03
α_6					4.54E-04	4.91E-04	8.56E-04
α_7						8.91E-05	2.64E-04
α_8							2.32E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.84E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.31E-02	1.56E-02	1.79E-02	1.66E-02	1.58E-02	1.47E-02	1.40E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	13.00	13.00	13.00	13.00	13.00	13.00	13.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 3.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.269

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9719219	0.9927560	0.9967729	0.9999760	6.625E+01	4.834E-01	--
α_2	2.40E-05	7.24E-03	3.23E-03	2.81E-02	4.834E-01	6.625E+01	0.717

CCCG = 3, Gamma = 0.269

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9798111	0.9927383	0.9945693	0.9994078	1.676E+02	1.226E+00	--
α_2	2.91E-04	5.98E-03	4.12E-03	1.80E-02	9.769E-01	1.625E+02	0.822
α_3	2.05E-08	1.29E-03	2.23E-04	6.23E-03	2.487E-01	1.932E+02	0.695

CCCG = 4, Gamma = 0.269

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9783396	0.9907496	0.9921745	0.9982877	2.203E+02	2.057E+00	--
α_2	7.27E-04	6.59E-03	5.16E-03	1.73E-02	1.442E+00	2.174E+02	0.856
α_3	2.22E-06	1.77E-03	6.65E-04	7.28E-03	4.114E-01	2.319E+02	0.807
α_4	1.17E-09	8.92E-04	9.72E-05	4.57E-03	2.036E-01	2.282E+02	0.821

CCCG = 5, Gamma = 0.269

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9819304	0.9908524	0.9916519	0.9970429	3.989E+02	3.683E+00	--
α_2	1.17E-03	5.74E-03	4.92E-03	1.31E-02	2.243E+00	3.888E+02	0.915
α_3	1.19E-04	2.36E-03	1.63E-03	7.08E-03	9.912E-01	4.195E+02	0.851
α_4	5.93E-07	8.71E-04	2.94E-04	3.69E-03	3.765E-01	4.320E+02	0.827
α_5	1.59E-21	1.84E-04	1.05E-07	1.06E-03	7.237E-02	3.942E+02	0.907

CCCG = 6, Gamma = 0.269

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9820478	0.9906250	0.9913553	0.9967078	4.374E+02	4.139E+00	--
α_2	9.81E-04	5.10E-03	4.33E-03	1.18E-02	2.128E+00	4.152E+02	0.977
α_3	1.65E-04	2.39E-03	1.73E-03	6.83E-03	1.134E+00	4.741E+02	0.858
α_4	7.41E-06	1.13E-03	5.62E-04	4.20E-03	5.533E-01	4.874E+02	0.836
α_5	1.79E-09	4.60E-04	6.14E-05	2.31E-03	2.210E-01	4.797E+02	0.850
α_6	3.77E-16	2.96E-04	2.06E-06	1.72E-03	1.027E-01	3.468E+02	1.176

CCCG = 7, Gamma = 0.269

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9849346	0.9912409	0.9916829	0.9960382	7.279E+02	6.432E+00	--
α_2	1.10E-03	4.23E-03	3.75E-03	9.00E-03	2.840E+00	6.685E+02	1.029
α_3	3.29E-04	2.22E-03	1.82E-03	5.50E-03	1.746E+00	7.844E+02	0.879
α_4	8.48E-05	1.36E-03	9.74E-04	3.96E-03	1.084E+00	7.948E+02	0.868
α_5	3.82E-06	6.72E-04	3.25E-04	2.51E-03	5.376E-01	7.994E+02	0.864
α_6	2.09E-10	2.38E-04	2.40E-05	1.23E-03	1.979E-01	8.302E+02	0.832
α_7	7.99E-53	3.57E-05	3.57E-15	1.22E-04	2.656E-02	7.446E+02	0.928

CCCG = 8, Gamma = 0.269

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9852193	0.9915069	0.9919579	0.9962546	7.136E+02	6.112E+00	--
α_2	7.81E-04	3.61E-03	3.12E-03	8.12E-03	2.364E+00	6.526E+02	1.055
α_3	2.36E-04	1.98E-03	1.57E-03	5.15E-03	1.512E+00	7.607E+02	0.906
α_4	7.68E-05	1.31E-03	9.28E-04	3.85E-03	1.056E+00	8.046E+02	0.857
α_5	1.30E-05	8.55E-04	4.87E-04	2.95E-03	6.745E-01	7.881E+02	0.876
α_6	5.25E-08	3.91E-04	9.93E-05	1.77E-03	3.076E-01	7.868E+02	0.878
α_7	8.54E-16	1.22E-04	1.21E-06	7.04E-04	1.093E-01	8.947E+02	0.772
α_8	3.41E-18	2.21E-04	6.14E-07	1.29E-03	8.885E-02	4.017E+02	1.719

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01
α_2	7.24E-03	5.98E-03	6.59E-03	5.74E-03	5.10E-03	4.23E-03	3.61E-03
α_3		1.29E-03	1.77E-03	2.36E-03	2.39E-03	2.22E-03	1.98E-03
α_4			8.92E-04	8.71E-04	1.13E-03	1.36E-03	1.31E-03
α_5				1.84E-04	4.60E-04	6.72E-04	8.55E-04
α_6					2.96E-04	2.38E-04	3.91E-04
α_7						3.57E-05	1.22E-04
α_8							2.21E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01
Beta	7.24E-03	7.26E-03	9.25E-03	9.15E-03	9.37E-03	8.76E-03	8.49E-03
Gamma		1.77E-01	2.88E-01	3.73E-01	4.56E-01	5.17E-01	5.75E-01
Delta			3.35E-01	3.09E-01	4.42E-01	5.10E-01	5.94E-01
Epsilon				1.74E-01	4.00E-01	4.10E-01	5.48E-01
Mu					3.91E-01	2.90E-01	4.62E-01
Omega						1.30E-01	4.68E-01
Sigma							6.44E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.50	3.50	3.50	3.50	3.50	3.50	3.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8469743	0.9633084	0.9866793	0.9999714	9.979E+00	3.801E-01	--
α_2	2.86E-05	3.67E-02	1.33E-02	1.53E-01	3.801E-01	9.979E+00	0.717

CCCG = 3, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8568092	0.9516617	0.9659289	0.9976524	1.890E+01	9.600E-01	--
α_2	5.36E-04	3.53E-02	2.06E-02	1.20E-01	6.673E-01	1.825E+01	0.822
α_3	1.15E-06	1.31E-02	3.14E-03	6.02E-02	2.927E-01	2.210E+01	0.695

CCCG = 4, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8611361	0.9432513	0.9530444	0.9917885	2.774E+01	1.669E+00	--
α_2	2.10E-03	3.60E-02	2.59E-02	1.05E-01	1.039E+00	2.780E+01	0.856
α_3	1.11E-05	1.27E-02	4.55E-03	5.31E-02	3.887E-01	3.022E+01	0.807
α_4	9.29E-08	8.02E-03	1.33E-03	3.93E-02	2.414E-01	2.985E+01	0.821

CCCG = 5, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8990505	0.9488552	0.9531974	0.9838036	6.469E+01	3.487E+00	--
α_2	4.27E-03	2.73E-02	2.26E-02	6.61E-02	1.791E+00	6.391E+01	0.915
α_3	1.36E-03	1.71E-02	1.28E-02	4.75E-02	1.207E+00	6.945E+01	0.851
α_4	1.06E-05	5.97E-03	2.39E-03	2.41E-02	4.340E-01	7.222E+01	0.827
α_5	1.84E-26	8.29E-04	2.95E-08	4.57E-03	5.493E-02	6.620E+01	0.907

CCCG = 6, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9095633	0.9528612	0.9564700	0.9838172	7.893E+01	3.905E+00	--
α_2	1.70E-03	1.75E-02	1.35E-02	4.70E-02	1.335E+00	7.496E+01	0.977
α_3	2.17E-03	1.76E-02	1.41E-02	4.52E-02	1.531E+00	8.535E+01	0.858
α_4	1.56E-04	8.06E-03	4.80E-03	2.71E-02	7.191E-01	8.848E+01	0.836
α_5	4.12E-08	2.81E-03	4.81E-04	1.37E-02	2.467E-01	8.749E+01	0.850
α_6	1.27E-20	1.15E-03	6.92E-07	6.66E-03	7.279E-02	6.334E+01	1.176

CCCG = 7, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9253048	0.9572091	0.9594542	0.9814415	1.291E+02	5.770E+00	--
α_2	1.62E-03	1.29E-02	1.03E-02	3.32E-02	1.549E+00	1.181E+02	1.029
α_3	2.53E-03	1.42E-02	1.20E-02	3.35E-02	1.989E+00	1.381E+02	0.879
α_4	8.16E-04	9.07E-03	6.89E-03	2.48E-02	1.287E+00	1.406E+02	0.868
α_5	8.09E-05	4.85E-03	2.81E-03	1.65E-02	6.913E-01	1.419E+02	0.864
α_6	1.16E-08	1.57E-03	2.37E-04	7.77E-03	2.327E-01	1.478E+02	0.832
α_7	1.08E-64	1.59E-04	2.41E-17	4.01E-04	2.112E-02	1.327E+02	0.928

CCCG = 8, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9342279	0.9606745	0.9623860	0.9812749	1.714E+02	7.016E+00	--
α_2	1.31E-03	1.02E-02	8.17E-03	2.59E-02	1.583E+00	1.539E+02	1.055
α_3	1.95E-03	1.10E-02	9.23E-03	2.60E-02	1.986E+00	1.790E+02	0.906
α_4	1.22E-03	8.74E-03	7.10E-03	2.19E-02	1.672E+00	1.896E+02	0.857
α_5	2.86E-04	5.40E-03	3.77E-03	1.61E-02	1.011E+00	1.863E+02	0.876
α_6	2.31E-05	3.05E-03	1.55E-03	1.12E-02	5.709E-01	1.863E+02	0.878
α_7	1.95E-10	8.51E-04	6.67E-05	4.50E-03	1.809E-01	2.123E+02	0.772
α_8	1.89E-107	1.30E-04	3.96E-27	9.80E-05	1.245E-02	9.540E+01	1.719

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.63E-01	9.52E-01	9.43E-01	9.49E-01	9.53E-01	9.57E-01	9.61E-01
α_2	3.67E-02	3.53E-02	3.60E-02	2.73E-02	1.75E-02	1.29E-02	1.02E-02
α_3		1.31E-02	1.27E-02	1.71E-02	1.76E-02	1.42E-02	1.10E-02
α_4			8.02E-03	5.97E-03	8.06E-03	9.07E-03	8.74E-03
α_5				8.29E-04	2.81E-03	4.85E-03	5.40E-03
α_6					1.15E-03	1.57E-03	3.05E-03
α_7						1.59E-04	8.51E-04
α_8							1.30E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.63E-01	9.52E-01	9.43E-01	9.49E-01	9.53E-01	9.57E-01	9.61E-01
Beta	3.67E-02	4.83E-02	5.67E-02	5.11E-02	4.71E-02	4.28E-02	3.93E-02
Gamma		2.70E-01	3.65E-01	4.67E-01	6.29E-01	6.98E-01	7.41E-01
Delta			3.87E-01	2.85E-01	4.06E-01	5.24E-01	6.24E-01
Epsilon				1.22E-01	3.29E-01	4.20E-01	5.19E-01
Mu					2.90E-01	2.63E-01	4.28E-01
Omega						9.19E-02	2.43E-01
Sigma							1.33E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 6.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.462

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9568832	0.9889642	0.9951799	0.9999683	4.217E+01	4.706E-01	--
α_2	3.17E-05	1.10E-02	4.82E-03	4.31E-02	4.706E-01	4.217E+01	0.717

CCCG = 3, Gamma = 0.462

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9634208	0.9872825	0.9907864	0.9991681	8.559E+01	1.103E+00	--
α_2	2.81E-04	9.75E-03	6.20E-03	3.13E-02	8.104E-01	8.232E+01	0.822
α_3	2.50E-07	2.97E-03	6.97E-04	1.37E-02	2.921E-01	9.808E+01	0.695

CCCG = 4, Gamma = 0.462

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9676131	0.9863672	0.9885579	0.9976288	1.413E+02	1.953E+00	--
α_2	8.70E-04	9.32E-03	7.12E-03	2.53E-02	1.312E+00	1.395E+02	0.856
α_3	4.84E-06	2.88E-03	1.14E-03	1.17E-02	4.307E-01	1.490E+02	0.807
α_4	2.85E-09	1.43E-03	1.69E-04	7.27E-03	2.099E-01	1.466E+02	0.821

CCCG = 5, Gamma = 0.462

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738508	0.9873538	0.9886510	0.9964232	2.426E+02	3.107E+00	--
α_2	1.00E-03	7.09E-03	5.76E-03	1.77E-02	1.684E+00	2.358E+02	0.915
α_3	1.63E-04	3.69E-03	2.50E-03	1.13E-02	9.426E-01	2.544E+02	0.851
α_4	1.09E-06	1.45E-03	4.99E-04	6.13E-03	3.816E-01	2.622E+02	0.827
α_5	1.65E-16	4.12E-04	2.26E-06	2.40E-03	9.865E-02	2.394E+02	0.907

CCCG = 6, Gamma = 0.462

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9760955	0.9877640	0.9887891	0.9959300	3.086E+02	3.822E+00	--
α_2	8.49E-04	5.86E-03	4.78E-03	1.46E-02	1.714E+00	2.908E+02	0.977
α_3	2.18E-04	3.33E-03	2.40E-03	9.60E-03	1.108E+00	3.320E+02	0.858
α_4	2.51E-05	1.90E-03	1.06E-03	6.64E-03	6.509E-01	3.414E+02	0.836
α_5	1.49E-08	7.54E-04	1.36E-04	3.63E-03	2.536E-01	3.362E+02	0.850
α_6	6.38E-17	3.94E-04	1.79E-06	2.29E-03	9.572E-02	2.430E+02	1.176

CCCG = 7, Gamma = 0.462

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9789102	0.9883285	0.9890519	0.9952763	4.399E+02	5.195E+00	--
α_2	9.88E-04	5.21E-03	4.42E-03	1.21E-02	2.105E+00	4.023E+02	1.029
α_3	2.62E-04	2.79E-03	2.13E-03	7.57E-03	1.320E+00	4.722E+02	0.879
α_4	1.06E-04	2.08E-03	1.44E-03	6.23E-03	9.967E-01	4.784E+02	0.868
α_5	5.51E-06	1.09E-03	5.18E-04	4.11E-03	5.249E-01	4.812E+02	0.864
α_6	2.91E-10	3.91E-04	3.82E-05	2.03E-03	1.956E-01	4.999E+02	0.832
α_7	3.37E-28	1.18E-04	2.67E-09	6.40E-04	5.291E-02	4.484E+02	0.928

CCCG = 8, Gamma = 0.462

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9799009	0.9885664	0.9891988	0.9950725	5.042E+02	5.832E+00	--
α_2	9.78E-04	4.82E-03	4.13E-03	1.10E-02	2.229E+00	4.603E+02	1.055
α_3	2.01E-04	2.34E-03	1.76E-03	6.46E-03	1.260E+00	5.369E+02	0.906
α_4	1.04E-04	1.83E-03	1.29E-03	5.40E-03	1.042E+00	5.679E+02	0.857
α_5	3.21E-05	1.37E-03	8.38E-04	4.52E-03	7.626E-01	5.562E+02	0.876
α_6	1.35E-07	5.89E-04	1.64E-04	2.62E-03	3.271E-01	5.554E+02	0.878
α_7	2.06E-13	2.13E-04	5.70E-06	1.19E-03	1.344E-01	6.317E+02	0.772
α_8	2.44E-20	2.71E-04	2.54E-07	1.57E-03	7.682E-02	2.837E+02	1.719

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.87E-01	9.86E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01
α_2	1.10E-02	9.75E-03	9.32E-03	7.09E-03	5.86E-03	5.21E-03	4.82E-03
α_3		2.97E-03	2.88E-03	3.69E-03	3.33E-03	2.79E-03	2.34E-03
α_4			1.43E-03	1.45E-03	1.90E-03	2.08E-03	1.83E-03
α_5				4.12E-04	7.54E-04	1.09E-03	1.37E-03
α_6					3.94E-04	3.91E-04	5.89E-04
α_7						1.18E-04	2.13E-04
α_8							2.71E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.87E-01	9.86E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01
Beta	1.10E-02	1.27E-02	1.36E-02	1.26E-02	1.22E-02	1.17E-02	1.14E-02
Gamma		2.33E-01	3.16E-01	4.39E-01	5.21E-01	5.54E-01	5.78E-01
Delta			3.31E-01	3.36E-01	4.78E-01	5.69E-01	6.46E-01
Epsilon				2.21E-01	3.76E-01	4.35E-01	5.71E-01
Mu					3.43E-01	3.18E-01	4.39E-01
Omega						2.32E-01	4.51E-01
Sigma							5.60E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.00	6.00	6.00	6.00	6.00	6.00	6.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 1.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.115

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9876681	0.9968011	0.9985565	0.9999882	1.537E+02	4.932E-01	--
α_2	1.18E-05	3.20E-03	1.44E-03	1.23E-02	4.932E-01	1.537E+02	0.717

CCCG = 3, Gamma = 0.115

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9902826	0.9966840	0.9976452	0.9998038	3.185E+02	1.059E+00	--
α_2	4.40E-05	2.35E-03	1.39E-03	7.94E-03	7.137E-01	3.026E+02	0.822
α_3	3.46E-07	9.63E-04	2.91E-04	4.21E-03	3.458E-01	3.586E+02	0.695

CCCG = 4, Gamma = 0.115

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9914482	0.9963251	0.9968817	0.9992992	5.733E+02	2.115E+00	--
α_2	3.38E-04	2.73E-03	2.17E-03	7.02E-03	1.549E+00	5.663E+02	0.856
α_3	1.37E-08	4.39E-04	8.59E-05	2.09E-03	2.646E-01	6.024E+02	0.807
α_4	5.61E-08	5.08E-04	1.25E-04	2.32E-03	3.010E-01	5.921E+02	0.821

CCCG = 5, Gamma = 0.115

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9938998	0.9966126	0.9968208	0.9986144	1.567E+03	5.325E+00	--
α_2	7.54E-04	2.37E-03	2.15E-03	4.70E-03	3.632E+00	1.532E+03	0.915
α_3	8.06E-05	8.20E-04	6.30E-04	2.21E-03	1.354E+00	1.650E+03	0.851
α_4	1.65E-08	1.74E-04	4.16E-05	8.01E-04	2.961E-01	1.698E+03	0.827
α_5	8.16E-35	2.74E-05	3.02E-11	1.36E-04	4.243E-02	1.548E+03	0.907

CCCG = 6, Gamma = 0.115

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9933273	0.9963626	0.9966034	0.9985756	1.352E+03	4.936E+00	--
α_2	5.97E-04	2.24E-03	1.99E-03	4.75E-03	2.915E+00	1.296E+03	0.977
α_3	7.25E-05	8.50E-04	6.38E-04	2.35E-03	1.257E+00	1.478E+03	0.858
α_4	1.35E-06	3.31E-04	1.52E-04	1.27E-03	5.031E-01	1.518E+03	0.836
α_5	2.24E-15	7.73E-05	1.02E-06	4.43E-04	1.155E-01	1.493E+03	0.850
α_6	6.29E-13	1.34E-04	4.92E-06	7.45E-04	1.451E-01	1.079E+03	1.176

CCCG = 7, Gamma = 0.115

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9946878	0.9966382	0.9967528	0.9981975	2.862E+03	9.654E+00	--
α_2	7.08E-04	1.83E-03	1.70E-03	3.37E-03	4.851E+00	2.651E+03	1.029
α_3	2.31E-04	9.01E-04	7.96E-04	1.93E-03	2.800E+00	3.107E+03	0.879
α_4	4.49E-05	4.40E-04	3.40E-04	1.18E-03	1.384E+00	3.147E+03	0.868
α_5	5.48E-07	1.55E-04	6.93E-05	5.99E-04	4.902E-01	3.163E+03	0.864
α_6	8.30E-16	3.49E-05	4.42E-07	2.00E-04	1.146E-01	3.284E+03	0.832
α_7	2.61E-93	4.97E-06	5.29E-25	5.91E-06	1.464E-02	2.945E+03	0.928

CCCG = 8, Gamma = 0.115

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9942565	0.9965861	0.9967429	0.9983806	2.087E+03	7.148E+00	--
α_2	4.12E-04	1.52E-03	1.35E-03	3.19E-03	2.980E+00	1.960E+03	1.055
α_3	1.49E-04	8.58E-04	7.18E-04	2.05E-03	1.960E+00	2.282E+03	0.906
α_4	3.53E-05	4.83E-04	3.54E-04	1.37E-03	1.166E+00	2.413E+03	0.857
α_5	1.29E-06	2.27E-04	1.10E-04	8.51E-04	5.375E-01	2.363E+03	0.876
α_6	1.69E-11	7.65E-05	5.94E-06	4.05E-04	1.805E-01	2.358E+03	0.878
α_7	7.98E-36	1.54E-05	1.15E-11	7.55E-05	4.139E-02	2.681E+03	0.772
α_8	1.43E-08	2.35E-04	5.18E-05	1.09E-03	2.827E-01	1.204E+03	1.719

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01
α_2	3.20E-03	2.35E-03	2.73E-03	2.37E-03	2.24E-03	1.83E-03	1.52E-03
α_3		9.63E-04	4.39E-04	8.20E-04	8.50E-04	9.01E-04	8.58E-04
α_4			5.08E-04	1.74E-04	3.31E-04	4.40E-04	4.83E-04
α_5				2.74E-05	7.73E-05	1.55E-04	2.27E-04
α_6					1.34E-04	3.49E-05	7.65E-05
α_7						4.97E-06	1.54E-05
α_8							2.35E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01
Beta	3.20E-03	3.32E-03	3.67E-03	3.39E-03	3.64E-03	3.36E-03	3.41E-03
Gamma		2.91E-01	2.58E-01	3.02E-01	3.83E-01	4.57E-01	5.55E-01
Delta			5.36E-01	1.97E-01	3.90E-01	4.13E-01	5.47E-01
Epsilon				1.36E-01	3.90E-01	3.07E-01	5.34E-01
Mu					6.35E-01	2.05E-01	5.90E-01
Omega						1.25E-01	7.66E-01
Sigma							9.38E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.50	1.50	1.50	1.50	1.50	1.50	1.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.9.3.2 PWR-RCS-PORV-OO: PWR Pressurizer Power-Operated Relief Valves Fail to Close

Generic CCF Parameters

Plant Type: PWR
 System Group: Clean Water
 System: Reactor Coolant
 Component Group: Valve
 Component Type: Power Operated Relief Valve
 Failure Mode: Fail to Close
 Date Range: 2006 through 2020
 Prior: Default 2015

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9293809	0.9818971	0.9920474	0.9999453	1.0000000	2.541E+01	4.685E-01
α_2	5.13E-05	1.81E-02	7.95E-03	7.06E-02	0.00E+00	4.685E-01	2.541E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9483145	0.9818372	0.9866969	0.9987453	1.0000000	6.098E+01	1.128E+00
α_2	4.60E-04	1.37E-02	8.95E-03	4.32E-02	0.00E+00	8.512E-01	6.126E+01
α_3	2.23E-07	4.46E-03	9.56E-04	2.09E-02	0.00E+00	2.768E-01	6.183E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9525994	0.9801860	0.9834318	0.9966772	1.0000000	9.368E+01	1.894E+00
α_2	1.14E-03	1.32E-02	9.97E-03	3.62E-02	0.00E+00	1.260E+00	9.431E+01
α_3	4.58E-06	4.21E-03	1.55E-03	1.74E-02	0.00E+00	4.024E-01	9.517E+01
α_4	1.68E-08	2.42E-03	3.61E-04	1.20E-02	0.00E+00	2.315E-01	9.534E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9650736	0.9826018	0.9842043	0.9946508	1.0000000	1.938E+02	3.432E+00
α_2	1.66E-03	9.75E-03	8.15E-03	2.33E-02	0.00E+00	1.924E+00	1.953E+02
α_3	3.08E-04	5.32E-03	3.77E-03	1.56E-02	0.00E+00	1.049E+00	1.962E+02
α_4	1.47E-06	1.94E-03	6.68E-04	8.17E-03	0.00E+00	3.822E-01	1.969E+02
α_5	3.38E-20	3.89E-04	3.63E-07	2.26E-03	0.00E+00	7.674E-02	1.972E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9677940	0.9834740	0.9848410	0.9944760	1.0000000	2.282E+02	3.835E+00
α_2	1.05E-03	7.33E-03	5.97E-03	1.83E-02	0.00E+00	1.701E+00	2.304E+02

α_3	4.10E-04	5.20E-03	3.87E-03	1.46E-02	0.00E+00	1.207E+00	2.308E+02
α_4	2.35E-05	2.57E-03	1.35E-03	9.25E-03	0.00E+00	5.960E-01	2.315E+02
α_5	3.73E-09	9.53E-04	1.27E-04	4.78E-03	0.00E+00	2.211E-01	2.318E+02
α_6	3.72E-15	4.73E-04	4.79E-06	2.73E-03	0.00E+00	1.098E-01	2.319E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9733872	0.9848971	0.9857364	0.9935299	1.0000000	3.748E+02	5.747E+00
α_2	1.21E-03	5.89E-03	5.05E-03	1.35E-02	0.00E+00	2.243E+00	3.783E+02
α_3	5.75E-04	4.28E-03	3.45E-03	1.08E-02	0.00E+00	1.630E+00	3.789E+02
α_4	1.77E-04	2.85E-03	2.04E-03	8.28E-03	0.00E+00	1.083E+00	3.795E+02
α_5	1.07E-05	1.49E-03	7.49E-04	5.46E-03	0.00E+00	5.654E-01	3.800E+02
α_6	2.76E-10	5.03E-04	4.65E-05	2.62E-03	0.00E+00	1.916E-01	3.804E+02
α_7	6.26E-41	9.14E-05	3.40E-12	4.01E-04	0.00E+00	3.480E-02	3.805E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9746696	0.9856411	0.9864433	0.9938665	1.0000000	3.930E+02	5.726E+00
α_2	9.13E-04	5.06E-03	4.26E-03	1.19E-02	0.00E+00	2.018E+00	3.967E+02
α_3	3.60E-04	3.49E-03	2.70E-03	9.30E-03	0.00E+00	1.391E+00	3.974E+02
α_4	1.58E-04	2.66E-03	1.89E-03	7.80E-03	0.00E+00	1.062E+00	3.977E+02
α_5	3.11E-05	1.76E-03	1.03E-03	5.98E-03	0.00E+00	7.026E-01	3.980E+02
α_6	3.44E-07	8.77E-04	2.69E-04	3.81E-03	0.00E+00	3.497E-01	3.984E+02
α_7	1.32E-15	2.70E-04	2.48E-06	1.56E-03	0.00E+00	1.078E-01	3.986E+02
α_8	2.76E-17	2.37E-04	1.01E-06	1.38E-03	0.00E+00	9.469E-02	3.987E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.81E-02	1.37E-02	1.32E-02	9.75E-03	7.33E-03	5.89E-03	5.06E-03
α_3		4.46E-03	4.21E-03	5.32E-03	5.20E-03	4.28E-03	3.49E-03
α_4			2.42E-03	1.94E-03	2.57E-03	2.85E-03	2.66E-03
α_5				3.89E-04	9.53E-04	1.49E-03	1.76E-03
α_6					4.73E-04	5.03E-04	8.77E-04
α_7						9.14E-05	2.70E-04
α_8							2.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.81E-02	1.82E-02	1.98E-02	1.74E-02	1.65E-02	1.51E-02	1.44E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 2.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.833

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9439694	0.9854979	0.9934769	0.9999514	3.285E+01	4.834E-01	--
α_2	4.86E-05	1.45E-02	6.52E-03	5.60E-02	4.834E-01	3.285E+01	1.405

CCCG = 3, Gamma = 0.833

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9619407	0.9862664	0.9896935	0.9988736	8.802E+01	1.226E+00	--
α_2	5.08E-04	1.04E-02	7.18E-03	3.12E-02	9.769E-01	9.306E+01	1.419
α_3	5.37E-08	3.35E-03	5.83E-04	1.62E-02	2.487E-01	7.410E+01	1.795

CCCG = 4, Gamma = 0.833

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9639818	0.9845761	0.9869259	0.9971333	1.313E+02	2.057E+00	--
α_2	1.15E-03	1.04E-02	8.15E-03	2.73E-02	1.442E+00	1.373E+02	1.344
α_3	4.09E-06	3.26E-03	1.23E-03	1.34E-02	4.114E-01	1.259E+02	1.476
α_4	2.33E-09	1.77E-03	1.94E-04	9.11E-03	2.036E-01	1.145E+02	1.625

CCCG = 5, Gamma = 0.833

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9728003	0.9862074	0.9874022	0.9955315	2.633E+02	3.683E+00	--
α_2	1.62E-03	7.91E-03	6.79E-03	1.80E-02	2.243E+00	2.813E+02	1.258
α_3	2.03E-04	4.04E-03	2.80E-03	1.21E-02	9.912E-01	2.446E+02	1.453
α_4	1.05E-06	1.54E-03	5.20E-04	6.53E-03	3.765E-01	2.443E+02	1.458
α_5	2.65E-21	3.06E-04	1.74E-07	1.77E-03	7.237E-02	2.368E+02	1.506

CCCG = 6, Gamma = 0.833

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9747691	0.9868067	0.9878269	0.9953589	3.096E+02	4.139E+00	--
α_2	1.17E-03	6.06E-03	5.15E-03	1.41E-02	2.128E+00	3.491E+02	1.159
α_3	2.74E-04	3.97E-03	2.89E-03	1.13E-02	1.134E+00	2.848E+02	1.423
α_4	1.31E-05	2.00E-03	9.91E-04	7.39E-03	5.533E-01	2.766E+02	1.468
α_5	2.96E-09	7.60E-04	1.01E-04	3.81E-03	2.210E-01	2.907E+02	1.399
α_6	5.26E-16	4.13E-04	2.88E-06	2.40E-03	1.027E-01	2.486E+02	1.637

CCCG = 7, Gamma = 0.833

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9794145	0.9880204	0.9886211	0.9945753	5.305E+02	6.432E+00	--
α_2	1.23E-03	4.73E-03	4.19E-03	1.01E-02	2.840E+00	5.980E+02	1.149
α_3	5.09E-04	3.43E-03	2.80E-03	8.48E-03	1.746E+00	5.077E+02	1.354
α_4	1.38E-04	2.22E-03	1.59E-03	6.45E-03	1.084E+00	4.879E+02	1.411
α_5	6.40E-06	1.13E-03	5.45E-04	4.21E-03	5.376E-01	4.773E+02	1.444
α_6	3.62E-10	4.12E-04	4.16E-05	2.13E-03	1.979E-01	4.804E+02	1.436
α_7	1.60E-52	7.16E-05	7.17E-15	2.45E-04	2.656E-02	3.711E+02	1.859

CCCG = 8, Gamma = 0.833

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9802996	0.9886706	0.9892689	0.9949987	5.334E+02	6.112E+00	--
α_2	8.53E-04	3.94E-03	3.40E-03	8.86E-03	2.364E+00	5.976E+02	1.150
α_3	3.36E-04	2.82E-03	2.23E-03	7.33E-03	1.512E+00	5.340E+02	1.288
α_4	1.25E-04	2.14E-03	1.51E-03	6.27E-03	1.056E+00	4.933E+02	1.395
α_5	2.07E-05	1.36E-03	7.78E-04	4.70E-03	6.745E-01	4.936E+02	1.396
α_6	8.59E-08	6.39E-04	1.62E-04	2.90E-03	3.076E-01	4.813E+02	1.432
α_7	1.68E-15	2.40E-04	2.37E-06	1.38E-03	1.093E-01	4.559E+02	1.512
α_8	2.88E-18	1.86E-04	5.17E-07	1.09E-03	8.885E-02	4.770E+02	1.446

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.86E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01
α_2	1.45E-02	1.04E-02	1.04E-02	7.91E-03	6.06E-03	4.73E-03	3.94E-03
α_3		3.35E-03	3.26E-03	4.04E-03	3.97E-03	3.43E-03	2.82E-03
α_4			1.77E-03	1.54E-03	2.00E-03	2.22E-03	2.14E-03
α_5				3.06E-04	7.60E-04	1.13E-03	1.36E-03
α_6					4.13E-04	4.12E-04	6.39E-04
α_7						7.16E-05	2.40E-04
α_8							1.86E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.86E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01
Beta	1.45E-02	1.37E-02	1.54E-02	1.38E-02	1.32E-02	1.20E-02	1.13E-02
Gamma		2.44E-01	3.26E-01	4.26E-01	5.41E-01	6.05E-01	6.52E-01
Delta			3.53E-01	3.14E-01	4.44E-01	5.27E-01	6.18E-01
Epsilon				1.66E-01	3.70E-01	4.20E-01	5.32E-01
Mu					3.52E-01	3.01E-01	4.38E-01
Omega						1.48E-01	4.00E-01
Sigma							4.37E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.50	2.50	2.50	2.50	2.50	2.50	2.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.4

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.133

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8297539	0.9564543	0.9809135	0.9998982	9.880E+00	4.498E-01	--
α_2	1.02E-04	4.35E-02	1.91E-02	1.70E-01	4.498E-01	9.880E+00	1.405

CCCG = 3, Gamma = 0.133

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8655664	0.9512597	0.9631518	0.9961933	2.300E+01	1.178E+00	--
α_2	1.67E-03	3.68E-02	2.55E-02	1.11E-01	9.387E-01	2.454E+01	1.419
α_3	1.28E-07	1.19E-02	1.96E-03	5.84E-02	2.396E-01	1.990E+01	1.795

CCCG = 4, Gamma = 0.133

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8805898	0.9493211	0.9571340	0.9912789	3.556E+01	1.898E+00	--
α_2	3.00E-03	3.28E-02	2.52E-02	8.87E-02	1.285E+00	3.785E+01	1.344
α_3	1.03E-05	1.10E-02	3.98E-03	4.59E-02	3.927E-01	3.523E+01	1.476
α_4	2.65E-08	6.82E-03	9.23E-04	3.43E-02	2.207E-01	3.213E+01	1.625

CCCG = 5, Gamma = 0.133

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9149293	0.9569704	0.9606652	0.9863734	7.797E+01	3.506E+00	--
α_2	4.11E-03	2.29E-02	1.93E-02	5.38E-02	1.992E+00	8.502E+01	1.258
α_3	8.90E-04	1.43E-02	1.03E-02	4.14E-02	1.078E+00	7.429E+01	1.453
α_4	2.55E-06	4.84E-03	1.57E-03	2.07E-02	3.632E-01	7.473E+01	1.458
α_5	9.24E-21	9.97E-04	5.79E-07	5.78E-03	7.248E-02	7.263E+01	1.506

CCCG = 6, Gamma = 0.133

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9240407	0.9597564	0.9626644	0.9855302	1.001E+02	4.199E+00	--
α_2	2.84E-03	1.64E-02	1.38E-02	3.91E-02	1.941E+00	1.161E+02	1.159
α_3	1.34E-03	1.39E-02	1.07E-02	3.74E-02	1.332E+00	9.471E+01	1.423
α_4	7.15E-05	6.64E-03	3.59E-03	2.36E-02	6.181E-01	9.249E+01	1.468
α_5	1.63E-08	2.37E-03	3.52E-04	1.17E-02	2.313E-01	9.751E+01	1.399
α_6	8.42E-20	9.20E-04	8.69E-07	5.36E-03	7.684E-02	8.345E+01	1.637

CCCG = 7, Gamma = 0.133

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9359295	0.9627188	0.9645545	0.9832366	1.607E+02	6.223E+00	--
α_2	3.47E-03	1.42E-02	1.25E-02	3.06E-02	2.654E+00	1.848E+02	1.149
α_3	1.41E-03	1.03E-02	8.38E-03	2.60E-02	1.645E+00	1.573E+02	1.354
α_4	4.88E-04	7.31E-03	5.30E-03	2.10E-02	1.115E+00	1.515E+02	1.411
α_5	3.92E-05	4.05E-03	2.15E-03	1.45E-02	6.034E-01	1.485E+02	1.444
α_6	2.11E-10	1.19E-03	8.86E-05	6.30E-03	1.780E-01	1.498E+02	1.436
α_7	1.29E-50	2.36E-04	4.86E-14	8.36E-04	2.734E-02	1.158E+02	1.859

CCCG = 8, Gamma = 0.133

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9385189	0.9642115	0.9659727	0.9838874	1.683E+02	6.246E+00	--
α_2	2.99E-03	1.29E-02	1.13E-02	2.84E-02	2.504E+00	1.913E+02	1.150
α_3	8.81E-04	8.20E-03	6.40E-03	2.17E-02	1.419E+00	1.716E+02	1.288
α_4	3.54E-04	6.43E-03	4.52E-03	1.90E-02	1.027E+00	1.587E+02	1.395
α_5	9.49E-05	4.59E-03	2.76E-03	1.53E-02	7.337E-01	1.590E+02	1.396
α_6	2.55E-06	2.55E-03	9.24E-04	1.06E-02	3.975E-01	1.552E+02	1.432
α_7	5.24E-20	5.23E-04	5.03E-07	3.04E-03	7.703E-02	1.473E+02	1.512
α_8	5.28E-18	5.68E-04	1.42E-06	3.31E-03	8.749E-02	1.541E+02	1.446

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.56E-01	9.51E-01	9.49E-01	9.57E-01	9.60E-01	9.63E-01	9.64E-01
α_2	4.35E-02	3.68E-02	3.28E-02	2.29E-02	1.64E-02	1.42E-02	1.29E-02
α_3		1.19E-02	1.10E-02	1.43E-02	1.39E-02	1.03E-02	8.20E-03
α_4			6.82E-03	4.84E-03	6.64E-03	7.31E-03	6.43E-03
α_5				9.97E-04	2.37E-03	4.05E-03	4.59E-03
α_6					9.20E-04	1.19E-03	2.55E-03
α_7						2.36E-04	5.23E-04
α_8							5.68E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.56E-01	9.51E-01	9.49E-01	9.57E-01	9.60E-01	9.63E-01	9.64E-01
Beta	4.35E-02	4.87E-02	5.07E-02	4.30E-02	4.02E-02	3.73E-02	3.58E-02
Gamma		2.44E-01	3.52E-01	4.68E-01	5.91E-01	6.20E-01	6.39E-01
Delta			3.82E-01	2.90E-01	4.17E-01	5.53E-01	6.41E-01
Epsilon				1.71E-01	3.31E-01	4.28E-01	5.62E-01
Mu					2.80E-01	2.60E-01	4.42E-01
Omega						1.66E-01	2.99E-01
Sigma							5.21E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.40	0.40	0.40	0.40	0.40	0.40	0.40
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9254105	0.9808392	0.9915376	0.9999442	2.409E+01	4.706E-01	--
α_2	5.58E-05	1.92E-02	8.46E-03	7.46E-02	4.706E-01	2.409E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9492792	0.9823211	0.9871539	0.9988381	6.126E+01	1.103E+00	--
α_2	3.76E-04	1.30E-02	8.28E-03	4.17E-02	8.104E-01	6.155E+01	--
α_3	3.95E-07	4.68E-03	1.10E-03	2.16E-02	2.921E-01	6.207E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9595678	0.9829546	0.9856771	0.9970284	1.126E+02	1.953E+00	--
α_2	1.07E-03	1.15E-02	8.76E-03	3.10E-02	1.312E+00	1.132E+02	--
α_3	6.33E-06	3.76E-03	1.49E-03	1.52E-02	4.307E-01	1.141E+02	--
α_4	3.65E-09	1.83E-03	2.17E-04	9.33E-03	2.099E-01	1.143E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9696218	0.9852970	0.9867994	0.9958370	2.082E+02	3.107E+00	--
α_2	1.13E-03	7.97E-03	6.48E-03	1.99E-02	1.684E+00	2.096E+02	--
α_3	1.97E-04	4.46E-03	3.03E-03	1.36E-02	9.426E-01	2.104E+02	--
α_4	1.36E-06	1.81E-03	6.21E-04	7.62E-03	3.816E-01	2.109E+02	--
α_5	1.87E-16	4.67E-04	2.56E-06	2.72E-03	9.865E-02	2.112E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9733376	0.9863454	0.9874863	0.9954551	2.761E+02	3.822E+00	--
α_2	8.87E-04	6.12E-03	4.99E-03	1.52E-02	1.714E+00	2.782E+02	--
α_3	2.60E-04	3.96E-03	2.86E-03	1.14E-02	1.108E+00	2.788E+02	--
α_4	3.07E-05	2.33E-03	1.30E-03	8.12E-03	6.509E-01	2.793E+02	--
α_5	1.79E-08	9.06E-04	1.63E-04	4.37E-03	2.536E-01	2.797E+02	--
α_6	5.54E-17	3.42E-04	1.55E-06	1.99E-03	9.572E-02	2.798E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9771222	0.9873350	0.9881185	0.9948722	4.050E+02	5.195E+00	--
α_2	9.74E-04	5.13E-03	4.35E-03	1.20E-02	2.105E+00	4.081E+02	--
α_3	3.02E-04	3.22E-03	2.46E-03	8.74E-03	1.320E+00	4.089E+02	--
α_4	1.24E-04	2.43E-03	1.68E-03	7.28E-03	9.967E-01	4.092E+02	--
α_5	6.47E-06	1.28E-03	6.08E-04	4.83E-03	5.249E-01	4.097E+02	--
α_6	3.54E-10	4.77E-04	4.66E-05	2.47E-03	1.956E-01	4.100E+02	--
α_7	3.68E-28	1.29E-04	2.92E-09	7.00E-04	5.291E-02	4.101E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787229	0.9878938	0.9885625	0.9947813	4.759E+02	5.832E+00	--
α_2	9.39E-04	4.63E-03	3.96E-03	1.06E-02	2.229E+00	4.795E+02	--
α_3	2.24E-04	2.62E-03	1.97E-03	7.22E-03	1.260E+00	4.805E+02	--
α_4	1.23E-04	2.16E-03	1.53E-03	6.38E-03	1.042E+00	4.807E+02	--
α_5	3.72E-05	1.58E-03	9.69E-04	5.22E-03	7.626E-01	4.810E+02	--
α_6	1.55E-07	6.79E-04	1.90E-04	3.02E-03	3.271E-01	4.814E+02	--
α_7	2.70E-13	2.79E-04	7.48E-06	1.57E-03	1.344E-01	4.816E+02	--
α_8	1.44E-20	1.59E-04	1.50E-07	9.26E-04	7.682E-02	4.817E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.92E-02	1.30E-02	1.15E-02	7.97E-03	6.12E-03	5.13E-03	4.63E-03
α_3		4.68E-03	3.76E-03	4.46E-03	3.96E-03	3.22E-03	2.62E-03
α_4			1.83E-03	1.81E-03	2.33E-03	2.43E-03	2.16E-03
α_5				4.67E-04	9.06E-04	1.28E-03	1.58E-03
α_6					3.42E-04	4.77E-04	6.79E-04
α_7						1.29E-04	2.79E-04
α_8							1.59E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.92E-02	1.77E-02	1.70E-02	1.47E-02	1.37E-02	1.27E-02	1.21E-02
Gamma		2.65E-01	3.28E-01	4.58E-01	5.52E-01	5.95E-01	6.18E-01
Delta			3.28E-01	3.38E-01	4.74E-01	5.73E-01	6.50E-01
Epsilon				2.05E-01	3.49E-01	4.37E-01	5.55E-01
Mu					2.74E-01	3.21E-01	4.14E-01
Omega						2.13E-01	3.92E-01
Sigma							3.64E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9755515	0.9936494	0.9971225	0.9999766	7.717E+01	4.932E-01	--
α_2	2.34E-05	6.35E-03	2.88E-03	2.44E-02	4.932E-01	7.717E+01	1.405

CCCG = 3, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9807372	0.9934160	0.9953149	0.9996091	1.599E+02	1.059E+00	--
α_2	7.65E-05	4.08E-03	2.41E-03	1.38E-02	7.137E-01	1.741E+02	1.419
α_3	9.02E-07	2.50E-03	7.58E-04	1.09E-02	3.458E-01	1.379E+02	1.795

CCCG = 4, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9858040	0.9938932	0.9948143	0.9988336	3.442E+02	2.115E+00	--
α_2	5.32E-04	4.29E-03	3.42E-03	1.10E-02	1.549E+00	3.593E+02	1.344
α_3	2.52E-08	8.06E-04	1.58E-04	3.83E-03	2.646E-01	3.282E+02	1.476
α_4	1.12E-07	1.01E-03	2.48E-04	4.61E-03	3.010E-01	2.980E+02	1.625

CCCG = 5, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9909790	0.9949881	0.9952952	0.9979487	1.057E+03	5.325E+00	--
α_2	1.04E-03	3.26E-03	2.97E-03	6.47E-03	3.632E+00	1.112E+03	1.258
α_3	1.38E-04	1.40E-03	1.08E-03	3.78E-03	1.354E+00	9.646E+02	1.453
α_4	2.92E-08	3.08E-04	7.35E-05	1.41E-03	2.961E-01	9.620E+02	1.458
α_5	1.36E-34	4.55E-05	5.02E-11	2.26E-04	4.243E-02	9.318E+02	1.506

CCCG = 6, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9908841	0.9950287	0.9953570	0.9980521	9.879E+02	4.936E+00	--
α_2	7.09E-04	2.66E-03	2.37E-03	5.63E-03	2.915E+00	1.092E+03	1.159
α_3	1.20E-04	1.41E-03	1.06E-03	3.90E-03	1.257E+00	8.897E+02	1.423
α_4	2.37E-06	5.83E-04	2.67E-04	2.23E-03	5.031E-01	8.631E+02	1.468
α_5	3.69E-15	1.27E-04	1.68E-06	7.30E-04	1.155E-01	9.065E+02	1.399
α_6	8.76E-13	1.87E-04	6.86E-06	1.04E-03	1.451E-01	7.747E+02	1.637

CCCG = 7, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9929352	0.9955279	0.9956800	0.9976014	2.149E+03	9.654E+00	--
α_2	7.90E-04	2.04E-03	1.90E-03	3.76E-03	4.851E+00	2.374E+03	1.149
α_3	3.56E-04	1.39E-03	1.23E-03	2.97E-03	2.800E+00	2.014E+03	1.354
α_4	7.31E-05	7.15E-04	5.52E-04	1.91E-03	1.384E+00	1.934E+03	1.411
α_5	9.17E-07	2.59E-04	1.16E-04	1.00E-03	4.902E-01	1.891E+03	1.444
α_6	1.43E-15	6.02E-05	7.63E-07	3.46E-04	1.146E-01	1.902E+03	1.436
α_7	5.24E-93	9.96E-06	1.06E-24	1.18E-05	1.464E-02	1.469E+03	1.859

CCCG = 8, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9926346	0.9956209	0.9958217	0.9979220	1.625E+03	7.148E+00	--
α_2	4.49E-04	1.66E-03	1.48E-03	3.48E-03	2.980E+00	1.796E+03	1.150
α_3	2.12E-04	1.22E-03	1.02E-03	2.91E-03	1.960E+00	1.604E+03	1.288
α_4	5.75E-05	7.87E-04	5.77E-04	2.23E-03	1.166E+00	1.481E+03	1.395
α_5	2.06E-06	3.63E-04	1.76E-04	1.36E-03	5.375E-01	1.482E+03	1.396
α_6	2.76E-11	1.25E-04	9.70E-06	6.61E-04	1.805E-01	1.444E+03	1.432
α_7	1.57E-35	3.03E-05	2.26E-11	1.48E-04	4.139E-02	1.367E+03	1.512
α_8	1.21E-08	1.98E-04	4.36E-05	9.21E-04	2.827E-01	1.430E+03	1.446

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.93E-01	9.94E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
α_2	6.35E-03	4.08E-03	4.29E-03	3.26E-03	2.66E-03	2.04E-03	1.66E-03
α_3		2.50E-03	8.06E-04	1.40E-03	1.41E-03	1.39E-03	1.22E-03
α_4			1.01E-03	3.08E-04	5.83E-04	7.15E-04	7.87E-04
α_5				4.55E-05	1.27E-04	2.59E-04	3.63E-04
α_6					1.87E-04	6.02E-05	1.25E-04
α_7						9.96E-06	3.03E-05
α_8							1.98E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.93E-01	9.94E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01
Beta	6.35E-03	6.58E-03	6.11E-03	5.01E-03	4.97E-03	4.47E-03	4.38E-03
Gamma		3.80E-01	2.97E-01	3.50E-01	4.64E-01	5.44E-01	6.22E-01
Delta			5.56E-01	2.01E-01	3.89E-01	4.29E-01	5.52E-01
Epsilon				1.29E-01	3.51E-01	3.15E-01	4.76E-01
Mu					5.95E-01	2.13E-01	4.93E-01
Omega						1.42E-01	6.46E-01
Sigma							8.67E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.10	0.10	0.10	0.10	0.10	0.10	0.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.10 Main Steam Isolation Valves

2.10.1 PWR Main Steam Isolation Valves

2.10.1.1 PWR-MSS-MSV-CC: PWR Main Steam Isolation Valves Fail to Open

Generic CCF Parameters

Plant Type: PWR
System Group: Steam
System: Main Steam
Component Group: Valve
Component Type: Main Steam Stop Valve
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 11.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9243133	0.9782949	0.9878504	0.9997357	0.9738903	2.863E+01	6.352E-01
α_2	2.67E-04	2.17E-02	1.21E-02	7.57E-02	2.61E-02	6.352E-01	2.863E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9403631	0.9762094	0.9806803	0.9967681	0.9463807	6.680E+01	1.628E+00
α_2	1.96E-03	1.97E-02	1.53E-02	5.28E-02	5.36E-02	1.351E+00	6.708E+01
α_3	2.02E-07	4.05E-03	8.67E-04	1.90E-02	0.00E+00	2.768E-01	6.816E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9420081	0.9723547	0.9753119	0.9925952	0.9173554	1.018E+02	2.894E+00
α_2	4.50E-03	2.16E-02	1.86E-02	4.88E-02	8.26E-02	2.260E+00	1.024E+02
α_3	4.18E-06	3.84E-03	1.41E-03	1.59E-02	0.00E+00	4.024E-01	1.043E+02
α_4	1.54E-08	2.21E-03	3.30E-04	1.10E-02	0.00E+00	2.315E-01	1.044E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9602905	0.9788083	0.9803147	0.9921773	0.9327731	2.047E+02	4.432E+00
α_2	2.96E-03	1.24E-02	1.09E-02	2.70E-02	4.48E-02	2.591E+00	2.066E+02
α_3	6.77E-04	6.61E-03	5.12E-03	1.76E-02	2.24E-02	1.382E+00	2.078E+02
α_4	1.39E-06	1.83E-03	6.30E-04	7.71E-03	0.00E+00	3.822E-01	2.088E+02
α_5	3.19E-20	3.67E-04	3.42E-07	2.13E-03	0.00E+00	7.674E-02	2.091E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
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α_1	0.9640505	0.9804020	0.9816840	0.9923709	0.9433428	2.419E+02	4.835E+00
α_2	1.69E-03	8.70E-03	7.41E-03	2.01E-02	2.52E-02	2.146E+00	2.446E+02
α_3	9.18E-04	6.69E-03	5.42E-03	1.68E-02	2.52E-02	1.651E+00	2.451E+02
α_4	5.18E-05	2.87E-03	1.68E-03	9.71E-03	6.30E-03	7.071E-01	2.460E+02
α_5	3.51E-09	8.96E-04	1.20E-04	4.50E-03	0.00E+00	2.211E-01	2.465E+02
α_6	3.50E-15	4.45E-04	4.50E-06	2.57E-03	0.00E+00	1.098E-01	2.466E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9712158	0.9830457	0.9838461	0.9921291	0.9510404	3.912E+02	6.747E+00
α_2	1.49E-03	6.38E-03	5.58E-03	1.40E-02	1.45E-02	2.539E+00	3.954E+02
α_3	9.72E-04	5.21E-03	4.41E-03	1.22E-02	2.18E-02	2.074E+00	3.959E+02
α_4	3.01E-04	3.28E-03	2.49E-03	8.94E-03	1.09E-02	1.305E+00	3.967E+02
α_5	1.45E-05	1.51E-03	8.00E-04	5.44E-03	1.81E-03	6.024E-01	3.974E+02
α_6	2.64E-10	4.81E-04	4.45E-05	2.51E-03	0.00E+00	1.916E-01	3.978E+02
α_7	5.99E-41	8.74E-05	3.25E-12	3.84E-04	0.00E+00	3.480E-02	3.979E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9727177	0.9839465	0.9847081	0.9925629	0.9568966	4.122E+02	6.726E+00
α_2	1.07E-03	5.29E-03	4.52E-03	1.21E-02	8.51E-03	2.216E+00	4.167E+02
α_3	6.53E-04	4.26E-03	3.50E-03	1.05E-02	1.70E-02	1.786E+00	4.172E+02
α_4	3.21E-04	3.24E-03	2.49E-03	8.72E-03	1.28E-02	1.358E+00	4.176E+02
α_5	5.27E-05	1.91E-03	1.20E-03	6.20E-03	4.26E-03	8.014E-01	4.181E+02
α_6	4.42E-07	8.64E-04	2.78E-04	3.71E-03	5.32E-04	3.621E-01	4.186E+02
α_7	1.26E-15	2.57E-04	2.36E-06	1.49E-03	0.00E+00	1.078E-01	4.188E+02
α_8	2.63E-17	2.26E-04	9.57E-07	1.32E-03	0.00E+00	9.469E-02	4.189E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.78E-01	9.76E-01	9.72E-01	9.79E-01	9.80E-01	9.83E-01	9.84E-01
α_2	2.17E-02	1.97E-02	2.16E-02	1.24E-02	8.70E-03	6.38E-03	5.29E-03
α_3		4.05E-03	3.84E-03	6.61E-03	6.69E-03	5.21E-03	4.26E-03
α_4			2.21E-03	1.83E-03	2.87E-03	3.28E-03	3.24E-03
α_5				3.67E-04	8.96E-04	1.51E-03	1.91E-03
α_6					4.45E-04	4.81E-04	8.64E-04
α_7						8.74E-05	2.57E-04
α_8							2.26E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.78E-01	9.76E-01	9.72E-01	9.79E-01	9.80E-01	9.83E-01	9.84E-01
Beta	2.17E-02	2.38E-02	2.76E-02	2.12E-02	1.96E-02	1.70E-02	1.61E-02
Gamma		1.70E-01	2.19E-01	4.15E-01	5.56E-01	6.24E-01	6.71E-01
Delta			3.65E-01	2.49E-01	3.86E-01	5.07E-01	6.04E-01
Epsilon				1.67E-01	3.19E-01	3.88E-01	5.01E-01
Mu					3.32E-01	2.73E-01	4.13E-01

Omega						1.54E-01	3.59E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.55	8.33	11.10	13.88	16.65	19.43	22.20
N₁	0.6667	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.1667	0.5000	1.0000	0.6667	0.4444	0.2963	0.1975
N₃		0.0000	0.0000	0.3333	0.4444	0.4444	0.3951
N₄			0.0000	0.0000	0.1111	0.2222	0.2963
N₅				0.0000	0.0000	0.0370	0.0988
N₆					0.0000	0.0000	0.0123
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 3.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.274

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9677619	0.9916788	0.9962878	0.9999724	5.761E+01	4.834E-01	--
α_2	2.76E-05	8.32E-03	3.71E-03	3.22E-02	4.834E-01	5.761E+01	0.793

CCCG = 3, Gamma = 0.282

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9774601	0.9918893	0.9939316	0.9993380	1.499E+02	1.226E+00	--
α_2	3.32E-04	6.82E-03	4.71E-03	2.05E-02	9.769E-01	1.422E+02	0.933
α_3	2.06E-08	1.29E-03	2.24E-04	6.25E-03	2.487E-01	1.927E+02	0.692

CCCG = 4, Gamma = 0.289

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740180	0.9888949	0.9905999	0.9979419	1.832E+02	2.057E+00	--
α_2	9.51E-04	8.61E-03	6.75E-03	2.26E-02	1.442E+00	1.661E+02	1.119
α_3	2.06E-06	1.65E-03	6.18E-04	6.77E-03	4.114E-01	2.496E+02	0.750
α_4	1.12E-09	8.53E-04	9.29E-05	4.37E-03	2.036E-01	2.386E+02	0.785

CCCG = 5, Gamma = 0.294

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9799465	0.9898444	0.9907303	0.9967155	3.590E+02	3.683E+00	--
α_2	1.31E-03	6.41E-03	5.50E-03	1.46E-02	2.243E+00	3.476E+02	1.025
α_3	1.38E-04	2.75E-03	1.90E-03	8.24E-03	9.912E-01	3.599E+02	0.994
α_4	5.70E-07	8.37E-04	2.83E-04	3.55E-03	3.765E-01	4.497E+02	0.797
α_5	1.40E-21	1.61E-04	9.18E-08	9.31E-04	7.237E-02	4.490E+02	0.799

CCCG = 6, Gamma = 0.297

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9806791	0.9899078	0.9906928	0.9964548	4.060E+02	4.139E+00	--
α_2	9.91E-04	5.15E-03	4.38E-03	1.20E-02	2.128E+00	4.108E+02	0.992
α_3	2.04E-04	2.96E-03	2.15E-03	8.46E-03	1.134E+00	3.824E+02	1.068
α_4	8.30E-06	1.27E-03	6.30E-04	4.70E-03	5.533E-01	4.351E+02	0.940
α_5	1.69E-09	4.34E-04	5.79E-05	2.18E-03	2.210E-01	5.095E+02	0.804
α_6	3.55E-16	2.79E-04	1.94E-06	1.62E-03	1.027E-01	3.684E+02	1.112

CCCG = 7, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9847156	0.9911133	0.9915616	0.9959803	7.173E+02	6.432E+00	--
α_2	9.63E-04	3.71E-03	3.28E-03	7.89E-03	2.840E+00	7.635E+02	0.905
α_3	3.98E-04	2.68E-03	2.19E-03	6.63E-03	1.746E+00	6.497E+02	1.065
α_4	9.63E-05	1.55E-03	1.11E-03	4.50E-03	1.084E+00	7.000E+02	0.989
α_5	3.87E-06	6.81E-04	3.30E-04	2.55E-03	5.376E-01	7.892E+02	0.878
α_6	2.11E-10	2.41E-04	2.43E-05	1.24E-03	1.979E-01	8.224E+02	0.843
α_7	7.37E-53	3.29E-05	3.30E-15	1.12E-04	2.656E-02	8.069E+02	0.860

CCCG = 8, Gamma = 0.302

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9851367	0.9914593	0.9919128	0.9962336	7.095E+02	6.112E+00	--
α_2	6.35E-04	2.94E-03	2.54E-03	6.60E-03	2.364E+00	8.028E+02	0.862
α_3	2.83E-04	2.37E-03	1.88E-03	6.16E-03	1.512E+00	6.355E+02	1.090
α_4	9.69E-05	1.65E-03	1.17E-03	4.85E-03	1.056E+00	6.378E+02	1.087
α_5	1.38E-05	9.14E-04	5.21E-04	3.15E-03	6.745E-01	7.372E+02	0.941
α_6	5.13E-08	3.82E-04	9.71E-05	1.73E-03	3.076E-01	8.046E+02	0.862
α_7	9.74E-16	1.39E-04	1.37E-06	8.03E-04	1.093E-01	7.850E+02	0.884
α_8	2.20E-18	1.42E-04	3.96E-07	8.31E-04	8.885E-02	6.234E+02	1.113

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.92E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	8.32E-03	6.82E-03	8.61E-03	6.41E-03	5.15E-03	3.71E-03	2.94E-03
α_3		1.29E-03	1.65E-03	2.75E-03	2.96E-03	2.68E-03	2.37E-03
α_4			8.53E-04	8.37E-04	1.27E-03	1.55E-03	1.65E-03
α_5				1.61E-04	4.34E-04	6.81E-04	9.14E-04
α_6					2.79E-04	2.41E-04	3.82E-04
α_7						3.29E-05	1.39E-04
α_8							1.42E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.92E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	8.32E-03	8.11E-03	1.11E-02	1.02E-02	1.01E-02	8.89E-03	8.54E-03
Gamma		1.59E-01	2.25E-01	3.69E-01	4.89E-01	5.83E-01	6.56E-01
Delta			3.41E-01	2.66E-01	4.01E-01	4.83E-01	5.76E-01
Epsilon				1.62E-01	3.59E-01	3.82E-01	4.88E-01
Mu					3.91E-01	2.87E-01	4.21E-01
Omega						1.20E-01	4.24E-01
Sigma							5.06E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.75	2.63	3.50	4.38	5.25	6.13	7.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.235

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9097285	0.9771467	0.9902811	0.9999484	1.923E+01	4.498E-01	--
α_2	5.16E-05	2.29E-02	9.72E-03	9.03E-02	4.498E-01	1.923E+01	0.793

CCCG = 3, Gamma = 0.241

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9235575	0.9725970	0.9795318	0.9979013	4.182E+01	1.178E+00	--
α_2	1.03E-03	2.30E-02	1.58E-02	6.97E-02	9.387E-01	3.981E+01	0.933
α_3	4.59E-08	4.36E-03	7.05E-04	2.14E-02	2.396E-01	5.465E+01	0.692

CCCG = 4, Gamma = 0.248

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9180291	0.9654736	0.9709620	0.9941257	5.309E+01	1.898E+00	--
α_2	2.37E-03	2.61E-02	2.00E-02	7.06E-02	1.285E+00	4.804E+01	1.119
α_3	4.93E-06	5.33E-03	1.91E-03	2.23E-02	3.927E-01	7.322E+01	0.750
α_4	1.21E-08	3.14E-03	4.21E-04	1.58E-02	2.207E-01	7.008E+01	0.785

CCCG = 5, Gamma = 0.252

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9390913	0.9693342	0.9720333	0.9903486	1.108E+02	3.506E+00	--
α_2	3.24E-03	1.81E-02	1.53E-02	4.26E-02	1.992E+00	1.081E+02	1.025
α_3	5.88E-04	9.49E-03	6.81E-03	2.76E-02	1.078E+00	1.125E+02	0.994
α_4	1.35E-06	2.56E-03	8.30E-04	1.10E-02	3.632E-01	1.412E+02	0.797
α_5	4.74E-21	5.13E-04	2.97E-07	2.97E-03	7.248E-02	1.412E+02	0.799

CCCG = 6, Gamma = 0.255

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9434772	0.9701623	0.9723641	0.9893221	1.365E+02	4.199E+00	--
α_2	2.36E-03	1.37E-02	1.15E-02	3.26E-02	1.941E+00	1.400E+02	0.992
α_3	9.71E-04	1.01E-02	7.76E-03	2.73E-02	1.332E+00	1.305E+02	1.068
α_4	4.43E-05	4.13E-03	2.23E-03	1.47E-02	6.181E-01	1.491E+02	0.940
α_5	9.06E-09	1.32E-03	1.96E-04	6.54E-03	2.313E-01	1.749E+02	0.804
α_6	5.54E-20	6.07E-04	5.72E-07	3.53E-03	7.684E-02	1.266E+02	1.112

CCCG = 7, Gamma = 0.257

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9533321	0.9729267	0.9742880	0.9878719	2.236E+02	6.223E+00	--
α_2	2.67E-03	1.09E-02	9.60E-03	2.36E-02	2.654E+00	2.406E+02	0.905
α_3	1.09E-03	7.96E-03	6.43E-03	2.00E-02	1.645E+00	2.051E+02	1.065
α_4	3.34E-04	5.01E-03	3.63E-03	1.44E-02	1.115E+00	2.214E+02	0.989
α_5	2.33E-05	2.41E-03	1.27E-03	8.63E-03	6.034E-01	2.501E+02	0.878
α_6	1.21E-10	6.82E-04	5.08E-05	3.62E-03	1.780E-01	2.609E+02	0.843
α_7	5.81E-51	1.07E-04	2.19E-14	3.77E-04	2.734E-02	2.561E+02	0.860

CCCG = 8, Gamma = 0.259

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9546031	0.9736476	0.9749697	0.9881765	2.308E+02	6.246E+00	--
α_2	2.18E-03	9.45E-03	8.25E-03	2.08E-02	2.504E+00	2.624E+02	0.862
α_3	7.26E-04	6.77E-03	5.28E-03	1.79E-02	1.419E+00	2.082E+02	1.090
α_4	2.69E-04	4.89E-03	3.43E-03	1.45E-02	1.027E+00	2.092E+02	1.087
α_5	6.23E-05	3.02E-03	1.81E-03	1.01E-02	7.337E-01	2.421E+02	0.941
α_6	1.50E-06	1.50E-03	5.42E-04	6.25E-03	3.975E-01	2.645E+02	0.862
α_7	2.98E-20	2.98E-04	2.86E-07	1.73E-03	7.703E-02	2.583E+02	0.884
α_8	3.96E-18	4.26E-04	1.07E-06	2.49E-03	8.749E-02	2.051E+02	1.113

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.77E-01	9.73E-01	9.65E-01	9.69E-01	9.70E-01	9.73E-01	9.74E-01
α_2	2.29E-02	2.30E-02	2.61E-02	1.81E-02	1.37E-02	1.09E-02	9.45E-03
α_3		4.36E-03	5.33E-03	9.49E-03	1.01E-02	7.96E-03	6.77E-03
α_4			3.14E-03	2.56E-03	4.13E-03	5.01E-03	4.89E-03
α_5				5.13E-04	1.32E-03	2.41E-03	3.02E-03
α_6					6.07E-04	6.82E-04	1.50E-03
α_7						1.07E-04	2.98E-04
α_8							4.26E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.77E-01	9.73E-01	9.65E-01	9.69E-01	9.70E-01	9.73E-01	9.74E-01
Beta	2.29E-02	2.74E-02	3.45E-02	3.07E-02	2.98E-02	2.71E-02	2.64E-02
Gamma		1.59E-01	2.45E-01	4.10E-01	5.42E-01	5.97E-01	6.41E-01
Delta			3.70E-01	2.45E-01	3.75E-01	5.08E-01	5.99E-01
Epsilon				1.67E-01	3.18E-01	3.89E-01	5.18E-01
Mu					3.15E-01	2.47E-01	4.24E-01
Omega						1.35E-01	3.26E-01
Sigma							5.88E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.50	2.25	3.00	3.75	4.50	5.25	6.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.131

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7516553	0.9307000	0.9630409	0.9995268	7.343E+00	5.468E-01	--
α_2	4.73E-04	6.93E-02	3.70E-02	2.48E-01	5.468E-01	7.343E+00	0.793

CCCG = 3, Gamma = 0.107

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7771940	0.9113179	0.9276608	0.9893119	1.500E+01	1.460E+00	--
α_2	5.87E-03	7.48E-02	5.72E-02	2.04E-01	1.167E+00	1.445E+01	0.933
α_3	1.22E-06	1.39E-02	3.35E-03	6.40E-02	2.927E-01	2.074E+01	0.692

CCCG = 4, Gamma = 0.083

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7591633	0.8834399	0.8945880	0.9694605	2.023E+01	2.669E+00	--
α_2	1.87E-02	9.63E-02	8.37E-02	2.17E-01	2.039E+00	1.914E+01	1.119
α_3	1.07E-05	1.23E-02	4.40E-03	5.14E-02	3.887E-01	3.122E+01	0.750
α_4	9.26E-08	8.00E-03	1.33E-03	3.91E-02	2.414E-01	2.995E+01	0.785

CCCG = 5, Gamma = 0.067

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8622674	0.9248937	0.9296117	0.9713780	5.525E+01	4.487E+00	--
α_2	9.84E-03	4.26E-02	3.74E-02	9.32E-02	2.458E+00	5.520E+01	1.025
α_3	3.23E-03	2.59E-02	2.08E-02	6.60E-02	1.540E+00	5.795E+01	0.994
α_4	1.04E-05	5.85E-03	2.34E-03	2.36E-02	4.340E-01	7.374E+01	0.797
α_5	1.65E-26	7.42E-04	2.64E-08	4.09E-03	5.493E-02	7.396E+01	0.799

CCCG = 6, Gamma = 0.057

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8792801	0.9329181	0.9368445	0.9731281	6.821E+01	4.905E+00	--
α_2	3.71E-03	2.40E-02	1.99E-02	5.84E-02	1.779E+00	7.238E+01	0.992
α_3	5.11E-03	2.87E-02	2.42E-02	6.74E-02	1.975E+00	6.690E+01	1.068
α_4	3.30E-04	1.06E-02	6.83E-03	3.38E-02	8.302E-01	7.740E+01	0.940
α_5	3.94E-08	2.70E-03	4.61E-04	1.31E-02	2.467E-01	9.129E+01	0.804
α_6	1.21E-20	1.10E-03	6.63E-07	6.39E-03	7.279E-02	6.610E+01	1.112

CCCG = 7, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9092049	0.9459047	0.9482687	0.9745267	1.184E+02	6.770E+00	--
α_2	2.21E-03	1.37E-02	1.14E-02	3.31E-02	1.845E+00	1.331E+02	0.905
α_3	4.78E-03	2.12E-02	1.85E-02	4.69E-02	2.433E+00	1.123E+02	1.065
α_4	1.46E-03	1.22E-02	9.71E-03	3.16E-02	1.509E+00	1.220E+02	0.989
α_5	1.06E-04	5.24E-03	3.13E-03	1.75E-02	7.283E-01	1.384E+02	0.878
α_6	1.19E-08	1.61E-03	2.42E-04	7.94E-03	2.327E-01	1.447E+02	0.843
α_7	1.01E-64	1.49E-04	2.25E-17	3.74E-04	2.112E-02	1.421E+02	0.860

CCCG = 8, Gamma = 0.043

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9205147	0.9509871	0.9528175	0.9752072	1.555E+02	8.016E+00	--
α_2	1.44E-03	9.42E-03	7.75E-03	2.31E-02	1.781E+00	1.873E+02	0.862
α_3	3.50E-03	1.59E-02	1.38E-02	3.55E-02	2.381E+00	1.472E+02	1.090
α_4	2.30E-03	1.31E-02	1.10E-02	3.11E-02	1.968E+00	1.480E+02	1.087
α_5	4.23E-04	6.40E-03	4.63E-03	1.84E-02	1.110E+00	1.722E+02	0.941
α_6	2.57E-05	3.09E-03	1.60E-03	1.12E-02	5.832E-01	1.884E+02	0.862
α_7	2.25E-10	9.81E-04	7.69E-05	5.19E-03	1.809E-01	1.842E+02	0.884
α_8	1.23E-107	8.50E-05	2.57E-27	6.37E-05	1.245E-02	1.464E+02	1.113

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.31E-01	9.11E-01	8.83E-01	9.25E-01	9.33E-01	9.46E-01	9.51E-01
α_2	6.93E-02	7.48E-02	9.63E-02	4.26E-02	2.40E-02	1.37E-02	9.42E-03
α_3		1.39E-02	1.23E-02	2.59E-02	2.87E-02	2.12E-02	1.59E-02
α_4			8.00E-03	5.85E-03	1.06E-02	1.22E-02	1.31E-02
α_5				7.42E-04	2.70E-03	5.24E-03	6.40E-03
α_6					1.10E-03	1.61E-03	3.09E-03
α_7						1.49E-04	9.81E-04
α_8							8.50E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.31E-01	9.11E-01	8.83E-01	9.25E-01	9.33E-01	9.46E-01	9.51E-01
Beta	6.93E-02	8.87E-02	1.17E-01	7.51E-02	6.71E-02	5.41E-02	4.90E-02
Gamma		1.57E-01	1.74E-01	4.33E-01	6.42E-01	7.47E-01	8.08E-01
Delta			3.94E-01	2.03E-01	3.34E-01	4.75E-01	5.98E-01
Epsilon				1.13E-01	2.63E-01	3.64E-01	4.46E-01
Mu					2.90E-01	2.51E-01	3.93E-01
Omega						8.47E-02	2.57E-01
Sigma							7.97E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.6667	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.1667	0.5000	1.0000	0.6667	0.4444	0.2963	0.1975
N ₃		0.0000	0.0000	0.3333	0.4444	0.4444	0.3951

N₄			0.0000	0.0000	0.1111	0.2222	0.2963
N₅				0.0000	0.0000	0.0370	0.0988
N₆					0.0000	0.0000	0.0123
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 4.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.360

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9457796	0.9861048	0.9939073	0.9999599	3.340E+01	4.706E-01	--
α_2	4.01E-05	1.39E-02	6.09E-03	5.42E-02	4.706E-01	3.340E+01	0.793

CCCG = 3, Gamma = 0.370

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9581722	0.9854441	0.9894429	0.9990462	7.464E+01	1.103E+00	--
α_2	3.32E-04	1.15E-02	7.31E-03	3.69E-02	8.104E-01	6.976E+01	0.933
α_3	2.58E-07	3.07E-03	7.21E-04	1.42E-02	2.921E-01	9.478E+01	0.692

CCCG = 4, Gamma = 0.380

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9610565	0.9835868	0.9862113	0.9971398	1.170E+02	1.953E+00	--
α_2	1.15E-03	1.23E-02	9.43E-03	3.34E-02	1.312E+00	1.052E+02	1.119
α_3	4.55E-06	2.71E-03	1.07E-03	1.10E-02	4.307E-01	1.585E+02	0.750
α_4	2.75E-09	1.38E-03	1.63E-04	7.04E-03	2.099E-01	1.516E+02	0.785

CCCG = 5, Gamma = 0.387

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9709977	0.9859665	0.9874023	0.9960279	2.183E+02	3.107E+00	--
α_2	1.12E-03	7.95E-03	6.47E-03	1.99E-02	1.684E+00	2.100E+02	1.025
α_3	1.91E-04	4.32E-03	2.93E-03	1.32E-02	9.426E-01	2.175E+02	0.994
α_4	1.05E-06	1.40E-03	4.82E-04	5.91E-03	3.816E-01	2.720E+02	0.797
α_5	1.45E-16	3.63E-04	1.99E-06	2.11E-03	9.865E-02	2.717E+02	0.799

CCCG = 6, Gamma = 0.391

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740831	0.9867290	0.9878387	0.9955836	2.842E+02	3.822E+00	--
α_2	8.59E-04	5.93E-03	4.83E-03	1.47E-02	1.714E+00	2.874E+02	0.992
α_3	2.71E-04	4.13E-03	2.98E-03	1.19E-02	1.108E+00	2.674E+02	1.068
α_4	2.82E-05	2.13E-03	1.19E-03	7.45E-03	6.509E-01	3.043E+02	0.940
α_5	1.41E-08	7.11E-04	1.28E-04	3.43E-03	2.536E-01	3.566E+02	0.804
α_6	6.02E-17	3.71E-04	1.69E-06	2.16E-03	9.572E-02	2.579E+02	1.112

CCCG = 7, Gamma = 0.394

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9785355	0.9881203	0.9888563	0.9951916	4.321E+02	5.195E+00	--
α_2	8.65E-04	4.56E-03	3.86E-03	1.06E-02	2.105E+00	4.599E+02	0.905
α_3	3.16E-04	3.36E-03	2.56E-03	9.13E-03	1.320E+00	3.915E+02	1.065
α_4	1.20E-04	2.36E-03	1.63E-03	7.06E-03	9.967E-01	4.217E+02	0.989
α_5	5.57E-06	1.10E-03	5.24E-04	4.16E-03	5.249E-01	4.757E+02	0.878
α_6	2.93E-10	3.94E-04	3.86E-05	2.04E-03	1.956E-01	4.958E+02	0.843
α_7	3.10E-28	1.09E-04	2.46E-09	5.90E-04	5.291E-02	4.865E+02	0.860

CCCG = 8, Gamma = 0.397

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9798360	0.9885293	0.9891637	0.9950564	5.026E+02	5.832E+00	--
α_2	7.94E-04	3.91E-03	3.35E-03	8.96E-03	2.229E+00	5.671E+02	0.862
α_3	2.40E-04	2.80E-03	2.10E-03	7.72E-03	1.260E+00	4.492E+02	1.090
α_4	1.31E-04	2.31E-03	1.63E-03	6.80E-03	1.042E+00	4.507E+02	1.087
α_5	3.43E-05	1.46E-03	8.94E-04	4.82E-03	7.626E-01	5.211E+02	0.941
α_6	1.31E-07	5.75E-04	1.60E-04	2.56E-03	3.271E-01	5.689E+02	0.862
α_7	2.35E-13	2.42E-04	6.49E-06	1.36E-03	1.344E-01	5.551E+02	0.884
α_8	1.57E-20	1.74E-04	1.63E-07	1.01E-03	7.682E-02	4.409E+02	1.113

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.85E-01	9.84E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01
α_2	1.39E-02	1.15E-02	1.23E-02	7.95E-03	5.93E-03	4.56E-03	3.91E-03
α_3		3.07E-03	2.71E-03	4.32E-03	4.13E-03	3.36E-03	2.80E-03
α_4			1.38E-03	1.40E-03	2.13E-03	2.36E-03	2.31E-03
α_5				3.63E-04	7.11E-04	1.10E-03	1.46E-03
α_6					3.71E-04	3.94E-04	5.75E-04
α_7						1.09E-04	2.42E-04
α_8							1.74E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.85E-01	9.84E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01
Beta	1.39E-02	1.46E-02	1.64E-02	1.40E-02	1.33E-02	1.19E-02	1.15E-02
Gamma		2.11E-01	2.49E-01	4.33E-01	5.53E-01	6.16E-01	6.59E-01
Delta			3.38E-01	2.90E-01	4.38E-01	5.41E-01	6.30E-01
Epsilon				2.06E-01	3.36E-01	4.05E-01	5.15E-01
Mu					3.43E-01	3.13E-01	4.04E-01
Omega						2.16E-01	4.20E-01
Sigma							4.18E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.30	3.45	4.60	5.75	6.90	8.05	9.20
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.10.1.2 PWR-MSS-MSV-OO: PWR Main Steam Isolation Valves Fail to Close

Generic CCF Parameters

Plant Type: PWR
System Group: Steam
System: Main Steam
Component Group: Valve
Component Type: Main Steam Stop Valve
Failure Mode: Fail to Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 20.7

Total Number of Common-Cause Failure Events: 5

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9143454	0.9702493	0.9784363	0.9981472	0.9541075	3.496E+01	1.072E+00
α_2	1.86E-03	2.98E-02	2.16E-02	8.57E-02	4.59E-02	1.072E+00	3.496E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9238196	0.9638194	0.9677157	0.9904799	0.9102791	7.516E+01	2.821E+00
α_2	7.40E-03	3.19E-02	2.80E-02	6.98E-02	8.66E-02	2.486E+00	7.549E+01
α_3	1.21E-06	4.30E-03	1.25E-03	1.89E-02	3.09E-03	3.352E-01	7.765E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9339268	0.9653881	0.9680116	0.9878825	0.9117838	1.130E+02	4.050E+00
α_2	5.73E-03	2.30E-02	2.03E-02	4.93E-02	5.84E-02	2.687E+00	1.143E+02
α_3	6.67E-04	9.66E-03	7.05E-03	2.76E-02	2.98E-02	1.131E+00	1.159E+02
α_4	1.48E-08	1.99E-03	3.01E-04	9.84E-03	5.68E-05	2.329E-01	1.168E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9535819	0.9733153	0.9747136	0.9882844	0.9147609	2.182E+02	5.982E+00
α_2	4.05E-03	1.41E-02	1.27E-02	2.90E-02	4.13E-02	3.159E+00	2.210E+02
α_3	1.79E-03	9.40E-03	7.99E-03	2.18E-02	3.54E-02	2.108E+00	2.221E+02
α_4	3.48E-05	2.85E-03	1.57E-03	1.00E-02	8.55E-03	6.381E-01	2.236E+02
α_5	3.34E-20	3.43E-04	3.28E-07	2.00E-03	7.74E-06	7.697E-02	2.241E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9574978	0.9750283	0.9762197	0.9884987	0.9217051	2.578E+02	6.603E+00
α_2	2.14E-03	9.38E-03	8.17E-03	2.07E-02	2.20E-02	2.479E+00	2.619E+02
α_3	2.51E-03	1.01E-02	8.93E-03	2.19E-02	4.17E-02	2.681E+00	2.617E+02

α_4	1.85E-04	3.73E-03	2.57E-03	1.12E-02	1.10E-02	9.855E-01	2.634E+02
α_5	4.88E-07	1.31E-03	4.00E-04	5.72E-03	3.57E-03	3.472E-01	2.641E+02
α_6	3.27E-15	4.15E-04	4.20E-06	2.39E-03	0.00E+00	1.098E-01	2.643E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9665853	0.9791987	0.9799562	0.9892245	0.9275142	4.096E+02	8.701E+00
α_2	2.03E-03	7.31E-03	6.54E-03	1.52E-02	2.00E-02	3.057E+00	4.152E+02
α_3	1.54E-03	6.33E-03	5.57E-03	1.37E-02	2.50E-02	2.650E+00	4.156E+02
α_4	7.45E-04	4.51E-03	3.75E-03	1.09E-02	1.97E-02	1.886E+00	4.164E+02
α_5	5.77E-05	1.96E-03	1.24E-03	6.29E-03	6.22E-03	8.188E-01	4.175E+02
α_6	1.24E-08	6.08E-04	1.10E-04	2.93E-03	1.54E-03	2.543E-01	4.180E+02
α_7	5.70E-41	8.32E-05	3.09E-12	3.65E-04	0.00E+00	3.480E-02	4.183E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9678796	0.9799349	0.9806528	0.9895326	0.9319073	4.330E+02	8.866E+00
α_2	1.73E-03	6.53E-03	5.81E-03	1.38E-02	1.88E-02	2.887E+00	4.390E+02
α_3	9.48E-04	4.87E-03	4.15E-03	1.13E-02	1.65E-02	2.151E+00	4.397E+02
α_4	7.21E-04	4.31E-03	3.59E-03	1.04E-02	1.83E-02	1.904E+00	4.400E+02
α_5	2.02E-04	2.68E-03	1.97E-03	7.55E-03	1.04E-02	1.183E+00	4.407E+02
α_6	4.85E-06	1.15E-03	5.29E-04	4.38E-03	3.40E-03	5.067E-01	4.414E+02
α_7	6.31E-13	3.15E-04	9.75E-06	1.76E-03	6.78E-04	1.391E-01	4.417E+02
α_8	2.49E-17	2.14E-04	9.08E-07	1.25E-03	0.00E+00	9.469E-02	4.418E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.70E-01	9.64E-01	9.65E-01	9.73E-01	9.75E-01	9.79E-01	9.80E-01
α_2	2.98E-02	3.19E-02	2.30E-02	1.41E-02	9.38E-03	7.31E-03	6.53E-03
α_3		4.30E-03	9.66E-03	9.40E-03	1.01E-02	6.33E-03	4.87E-03
α_4			1.99E-03	2.85E-03	3.73E-03	4.51E-03	4.31E-03
α_5				3.43E-04	1.31E-03	1.96E-03	2.68E-03
α_6					4.15E-04	6.08E-04	1.15E-03
α_7						8.32E-05	3.15E-04
α_8							2.14E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.70E-01	9.64E-01	9.65E-01	9.73E-01	9.75E-01	9.79E-01	9.80E-01
Beta	2.98E-02	3.62E-02	3.46E-02	2.67E-02	2.50E-02	2.08E-02	2.01E-02
Gamma		1.19E-01	3.37E-01	4.72E-01	6.25E-01	6.49E-01	6.74E-01
Delta			1.71E-01	2.53E-01	3.50E-01	5.30E-01	6.40E-01
Epsilon				1.08E-01	3.17E-01	3.70E-01	5.02E-01
Mu					2.40E-01	2.61E-01	3.85E-01
Omega						1.20E-01	3.16E-01
Sigma							4.05E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	10.35	15.53	20.70	25.88	31.05	36.23	41.40
N₁	2.1933	1.6550	1.5891	1.4941	1.5320	1.5704	1.5812
N₂	0.6033	1.6350	1.4268	1.2350	0.7778	0.8139	0.8689
N₃		0.0583	0.7283	1.0593	1.4742	1.0204	0.7610
N₄			0.0014	0.2558	0.3896	0.8034	0.8423
N₅				0.0002	0.1262	0.2534	0.4800
N₆					0.0000	0.0627	0.1570
N₇						0.0000	0.0313
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 9.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.388

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9452551	0.9853172	0.9928151	0.9999180	3.579E+01	5.334E-01	--
α_2	8.20E-05	1.47E-02	7.18E-03	5.47E-02	5.334E-01	3.579E+01	1.360

CCCG = 3, Gamma = 0.402

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9587998	0.9845869	0.9880707	0.9984576	8.681E+01	1.359E+00	--
α_2	8.66E-04	1.33E-02	9.60E-03	3.81E-02	1.102E+00	8.204E+01	1.666
α_3	4.97E-08	2.16E-03	4.01E-04	1.04E-02	2.570E-01	1.188E+02	1.164

CCCG = 4, Gamma = 0.410

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9592535	0.9819325	0.9843973	0.9961813	1.247E+02	2.295E+00	--
α_2	1.77E-03	1.28E-02	1.04E-02	3.22E-02	1.650E+00	1.271E+02	1.507
α_3	7.72E-06	4.07E-03	1.64E-03	1.63E-02	4.392E-01	1.075E+02	1.797
α_4	1.70E-09	1.18E-03	1.31E-04	6.03E-03	2.050E-01	1.740E+02	1.113

CCCG = 5, Gamma = 0.416

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9697684	0.9842815	0.9855214	0.9945583	2.528E+02	4.036E+00	--
α_2	2.21E-03	9.46E-03	8.27E-03	2.08E-02	2.532E+00	2.651E+02	1.370
α_3	2.62E-04	4.52E-03	3.20E-03	1.33E-02	1.049E+00	2.309E+02	1.581
α_4	1.17E-06	1.54E-03	5.29E-04	6.48E-03	3.823E-01	2.486E+02	1.473
α_5	1.95E-21	1.98E-04	1.16E-07	1.14E-03	7.260E-02	3.667E+02	1.000

CCCG = 6, Gamma = 0.420

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9713046	0.9845611	0.9856293	0.9941684	2.942E+02	4.613E+00	--
α_2	1.69E-03	7.40E-03	6.44E-03	1.63E-02	2.490E+00	3.342E+02	1.245
α_3	4.06E-04	4.95E-03	3.70E-03	1.38E-02	1.230E+00	2.474E+02	1.686
α_4	1.49E-05	2.03E-03	1.03E-03	7.43E-03	5.678E-01	2.797E+02	1.496
α_5	3.11E-09	7.47E-04	1.01E-04	3.74E-03	2.222E-01	2.972E+02	1.410
α_6	4.11E-16	3.23E-04	2.24E-06	1.87E-03	1.027E-01	3.183E+02	1.317

CCCG = 7, Gamma = 0.423

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9775755	0.9866852	0.9872952	0.9937120	5.207E+02	7.026E+00	--
α_2	1.61E-03	5.49E-03	4.94E-03	1.12E-02	3.262E+00	5.913E+02	1.185
α_3	6.54E-04	3.96E-03	3.29E-03	9.54E-03	1.887E+00	4.749E+02	1.478
α_4	1.58E-04	2.39E-03	1.72E-03	6.88E-03	1.112E+00	4.649E+02	1.512
α_5	6.28E-06	1.07E-03	5.21E-04	4.00E-03	5.410E-01	5.048E+02	1.395
α_6	3.34E-10	3.74E-04	3.79E-05	1.93E-03	1.981E-01	5.292E+02	1.331
α_7	9.13E-53	4.07E-05	4.08E-15	1.39E-04	2.656E-02	6.519E+02	1.081

CCCG = 8, Gamma = 0.425

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9779524	0.9869945	0.9876082	0.9939408	5.179E+02	6.824E+00	--
α_2	1.24E-03	4.78E-03	4.24E-03	1.02E-02	2.833E+00	5.899E+02	1.193
α_3	4.84E-04	3.39E-03	2.76E-03	8.46E-03	1.700E+00	4.998E+02	1.409
α_4	1.58E-04	2.43E-03	1.75E-03	7.03E-03	1.103E+00	4.524E+02	1.558
α_5	2.26E-05	1.43E-03	8.19E-04	4.90E-03	6.820E-01	4.772E+02	1.479
α_6	8.50E-08	6.19E-04	1.58E-04	2.81E-03	3.084E-01	4.979E+02	1.419
α_7	1.49E-15	2.12E-04	2.10E-06	1.23E-03	1.093E-01	5.144E+02	1.374
α_8	2.26E-18	1.47E-04	4.07E-07	8.55E-04	8.885E-02	6.059E+02	1.166

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.85E-01	9.82E-01	9.84E-01	9.85E-01	9.87E-01	9.87E-01
α_2	1.47E-02	1.33E-02	1.28E-02	9.46E-03	7.40E-03	5.49E-03	4.78E-03
α_3		2.16E-03	4.07E-03	4.52E-03	4.95E-03	3.96E-03	3.39E-03
α_4			1.18E-03	1.54E-03	2.03E-03	2.39E-03	2.43E-03
α_5				1.98E-04	7.47E-04	1.07E-03	1.43E-03
α_6					3.23E-04	3.74E-04	6.19E-04
α_7						4.07E-05	2.12E-04
α_8							1.47E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.85E-01	9.82E-01	9.84E-01	9.85E-01	9.87E-01	9.87E-01
Beta	1.47E-02	1.54E-02	1.81E-02	1.57E-02	1.54E-02	1.33E-02	1.30E-02
Gamma		1.40E-01	2.90E-01	3.98E-01	5.21E-01	5.88E-01	6.32E-01
Delta			2.24E-01	2.77E-01	3.85E-01	4.95E-01	5.88E-01
Epsilon				1.14E-01	3.46E-01	3.84E-01	4.97E-01
Mu					3.02E-01	2.79E-01	4.07E-01
Omega						9.82E-02	3.67E-01
Sigma							4.08E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.55	6.83	9.10	11.38	13.65	15.93	18.20
N_1	0.5000	0.6250	0.6944	0.7234	0.7234	0.7033	0.6698
N_2	0.0500	0.1250	0.2083	0.2894	0.3617	0.4220	0.4689
N_3		0.0083	0.0278	0.0579	0.0965	0.1407	0.1875

N₄			0.0014	0.0058	0.0145	0.0281	0.0469
N₅				0.0002	0.0012	0.0034	0.0075
N₆					0.0000	0.0002	0.0008
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 3.7

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.211

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215056	0.9473904	0.9690750	0.9992476	1.176E+01	6.531E-01	--
α_2	7.52E-04	5.26E-02	3.09E-02	1.78E-01	6.531E-01	1.176E+01	1.360

CCCG = 3, Gamma = 0.207

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8369114	0.9327538	0.9439972	0.9900262	2.342E+01	1.688E+00	--
α_2	6.42E-03	5.87E-02	4.68E-02	1.52E-01	1.399E+00	2.241E+01	1.666
α_3	6.67E-07	8.50E-03	1.99E-03	3.93E-02	2.896E-01	3.379E+01	1.164

CCCG = 4, Gamma = 0.202

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8466564	0.9268272	0.9344126	0.9810071	3.442E+01	2.717E+00	--
α_2	8.67E-03	5.02E-02	4.25E-02	1.18E-01	1.904E+00	3.600E+01	1.507
α_3	1.71E-04	1.87E-02	9.94E-03	6.68E-02	5.932E-01	3.120E+01	1.797
α_4	1.66E-08	4.30E-03	5.78E-04	2.16E-02	2.207E-01	5.109E+01	1.113

CCCG = 5, Gamma = 0.198

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8950533	0.9429781	0.9466641	0.9782976	7.501E+01	4.536E+00	--
α_2	7.06E-03	3.00E-02	2.64E-02	6.55E-02	2.521E+00	8.143E+01	1.370
α_3	2.81E-03	2.17E-02	1.75E-02	5.50E-02	1.579E+00	7.116E+01	1.581
α_4	2.45E-06	4.65E-03	1.51E-03	1.99E-02	3.632E-01	7.774E+01	1.473
α_5	5.83E-21	6.30E-04	3.65E-07	3.65E-03	7.248E-02	1.150E+02	1.000

CCCG = 6, Gamma = 0.195

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9036435	0.9458286	0.9488800	0.9775823	9.155E+01	5.243E+00	--
α_2	3.06E-03	1.72E-02	1.45E-02	4.07E-02	1.982E+00	1.130E+02	1.245
α_3	5.96E-03	2.75E-02	2.39E-02	6.14E-02	2.335E+00	8.259E+01	1.686
α_4	6.96E-05	6.46E-03	3.49E-03	2.29E-02	6.182E-01	9.510E+01	1.496
α_5	1.57E-08	2.28E-03	3.39E-04	1.13E-02	2.313E-01	1.013E+02	1.410
α_6	6.45E-20	7.07E-04	6.67E-07	4.11E-03	7.684E-02	1.087E+02	1.317

CCCG = 7, Gamma = 0.193

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9261246	0.9554087	0.9572584	0.9783746	1.560E+02	7.282E+00	--
α_2	3.60E-03	1.44E-02	1.27E-02	3.10E-02	2.708E+00	1.853E+02	1.185
α_3	3.08E-03	1.49E-02	1.28E-02	3.39E-02	2.250E+00	1.485E+02	1.478
α_4	1.24E-03	1.03E-02	8.17E-03	2.66E-02	1.515E+00	1.458E+02	1.512
α_5	3.66E-05	3.78E-03	2.00E-03	1.35E-02	6.034E-01	1.592E+02	1.395
α_6	1.89E-10	1.06E-03	7.93E-05	5.65E-03	1.780E-01	1.672E+02	1.331
α_7	7.23E-51	1.33E-04	2.72E-14	4.69E-04	2.734E-02	2.061E+02	1.081

CCCG = 8, Gamma = 0.192

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9282273	0.9566421	0.9584354	0.9789309	1.616E+02	7.322E+00	--
α_2	3.15E-03	1.33E-02	1.16E-02	2.90E-02	2.573E+00	1.914E+02	1.193
α_3	1.68E-03	1.09E-02	8.97E-03	2.66E-02	1.786E+00	1.623E+02	1.409
α_4	1.21E-03	1.02E-02	8.06E-03	2.63E-02	1.507E+00	1.469E+02	1.558
α_5	2.19E-04	5.71E-03	3.79E-03	1.78E-02	8.937E-01	1.555E+02	1.479
α_6	2.43E-06	2.44E-03	8.81E-04	1.01E-02	3.975E-01	1.626E+02	1.419
α_7	4.58E-20	4.57E-04	4.40E-07	2.66E-03	7.703E-02	1.683E+02	1.374
α_8	4.10E-18	4.41E-04	1.10E-06	2.57E-03	8.749E-02	1.982E+02	1.166

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.47E-01	9.33E-01	9.27E-01	9.43E-01	9.46E-01	9.55E-01	9.57E-01
α_2	5.26E-02	5.87E-02	5.02E-02	3.00E-02	1.72E-02	1.44E-02	1.33E-02
α_3		8.50E-03	1.87E-02	2.17E-02	2.75E-02	1.49E-02	1.09E-02
α_4			4.30E-03	4.65E-03	6.46E-03	1.03E-02	1.02E-02
α_5				6.30E-04	2.28E-03	3.78E-03	5.71E-03
α_6					7.07E-04	1.06E-03	2.44E-03
α_7						1.33E-04	4.57E-04
α_8							4.41E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.47E-01	9.33E-01	9.27E-01	9.43E-01	9.46E-01	9.55E-01	9.57E-01
Beta	5.26E-02	6.72E-02	7.32E-02	5.70E-02	5.42E-02	4.46E-02	4.34E-02
Gamma		1.26E-01	3.14E-01	4.73E-01	6.82E-01	6.77E-01	6.94E-01
Delta			1.87E-01	1.96E-01	2.56E-01	5.06E-01	6.38E-01
Epsilon				1.19E-01	3.16E-01	3.26E-01	4.71E-01
Mu					2.37E-01	2.41E-01	3.69E-01
Omega						1.11E-01	2.69E-01
Sigma							4.91E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.85	2.77	3.70	4.62	5.55	6.47	7.40
N_1	0.7267	0.6300	0.4280	0.2708	0.3087	0.3421	0.3714
N_2	0.2033	0.4600	0.6185	0.5290	0.0411	0.0544	0.0688
N_3		0.0500	0.2005	0.5014	1.0028	0.6047	0.3672

N₄			0.0000	0.0000	0.0001	0.4002	0.4805
N₅				0.0000	0.0000	0.0000	0.1600
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 5.8

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.321

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8778319	0.9612056	0.9745960	0.9987995	2.033E+01	8.206E-01	--
α_2	1.20E-03	3.88E-02	2.54E-02	1.22E-01	8.206E-01	2.033E+01	1.360

CCCG = 3, Gamma = 0.307

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8856199	0.9495429	0.9564305	0.9898710	4.051E+01	2.153E+00	--
α_2	7.59E-03	4.55E-02	3.82E-02	1.08E-01	1.860E+00	3.905E+01	1.666
α_3	4.21E-07	4.99E-03	1.18E-03	2.30E-02	2.921E-01	5.827E+01	1.164

CCCG = 4, Gamma = 0.301

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9192331	0.9607278	0.9646213	0.9889022	7.468E+01	3.053E+00	--
α_2	4.03E-03	2.36E-02	1.98E-02	5.63E-02	1.912E+00	7.898E+01	1.507
α_3	5.92E-04	1.37E-02	9.32E-03	4.19E-02	9.307E-01	6.691E+01	1.797
α_4	3.82E-09	1.92E-03	2.27E-04	9.76E-03	2.099E-01	1.093E+02	1.113

CCCG = 5, Gamma = 0.298

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9469738	0.9718988	0.9739439	0.9898344	1.478E+02	4.274E+00	--
α_2	2.49E-03	1.31E-02	1.11E-02	3.04E-02	2.101E+00	1.586E+02	1.370
α_3	1.15E-03	1.04E-02	8.13E-03	2.72E-02	1.443E+00	1.378E+02	1.581
α_4	4.96E-05	4.22E-03	2.31E-03	1.49E-02	6.316E-01	1.489E+02	1.473
α_5	1.79E-16	4.48E-04	2.45E-06	2.61E-03	9.865E-02	2.201E+02	1.000

CCCG = 6, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9545214	0.9748705	0.9764236	0.9899133	1.968E+02	5.072E+00	--
α_2	1.69E-03	8.96E-03	7.60E-03	2.09E-02	2.089E+00	2.311E+02	1.245
α_3	9.98E-04	8.61E-03	6.80E-03	2.24E-02	1.483E+00	1.707E+02	1.686
α_4	2.90E-04	5.29E-03	3.71E-03	1.57E-02	1.026E+00	1.931E+02	1.496
α_5	1.31E-06	1.84E-03	6.26E-04	7.78E-03	3.786E-01	2.056E+02	1.410
α_6	7.04E-17	4.34E-04	1.97E-06	2.53E-03	9.572E-02	2.204E+02	1.317

CCCG = 7, Gamma = 0.294

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9643167	0.9791354	0.9801535	0.9904774	3.048E+02	6.495E+00	--
α_2	1.54E-03	6.86E-03	5.96E-03	1.52E-02	2.443E+00	3.537E+02	1.185
α_3	7.26E-04	5.58E-03	4.48E-03	1.42E-02	1.595E+00	2.840E+02	1.478
α_4	4.96E-04	4.91E-03	3.79E-03	1.32E-02	1.372E+00	2.778E+02	1.512
α_5	6.34E-05	2.56E-03	1.58E-03	8.39E-03	7.749E-01	3.019E+02	1.395
α_6	1.95E-08	8.14E-04	1.52E-04	3.90E-03	2.581E-01	3.169E+02	1.331
α_7	3.87E-28	1.35E-04	3.07E-09	7.35E-04	5.291E-02	3.905E+02	1.081

CCCG = 8, Gamma = 0.293

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9668008	0.9801557	0.9810336	0.9905130	3.549E+02	7.184E+00	--
α_2	1.45E-03	6.17E-03	5.39E-03	1.35E-02	2.560E+00	4.127E+02	1.193
α_3	4.73E-04	4.17E-03	3.28E-03	1.09E-02	1.466E+00	3.499E+02	1.409
α_4	4.22E-04	4.27E-03	3.29E-03	1.15E-02	1.357E+00	3.164E+02	1.558
α_5	1.97E-04	3.21E-03	2.29E-03	9.36E-03	1.075E+00	3.338E+02	1.479
α_6	4.55E-06	1.38E-03	6.12E-04	5.38E-03	4.834E-01	3.486E+02	1.419
α_7	2.48E-11	4.59E-04	2.72E-05	2.48E-03	1.657E-01	3.603E+02	1.374
α_8	1.63E-20	1.81E-04	1.70E-07	1.05E-03	7.682E-02	4.245E+02	1.166

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.61E-01	9.50E-01	9.61E-01	9.72E-01	9.75E-01	9.79E-01	9.80E-01
α_2	3.88E-02	4.55E-02	2.36E-02	1.31E-02	8.96E-03	6.86E-03	6.17E-03
α_3		4.99E-03	1.37E-02	1.04E-02	8.61E-03	5.58E-03	4.17E-03
α_4			1.92E-03	4.22E-03	5.29E-03	4.91E-03	4.27E-03
α_5				4.48E-04	1.84E-03	2.56E-03	3.21E-03
α_6					4.34E-04	8.14E-04	1.38E-03
α_7						1.35E-04	4.59E-04
α_8							1.81E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.61E-01	9.50E-01	9.61E-01	9.72E-01	9.75E-01	9.79E-01	9.80E-01
Beta	3.88E-02	5.05E-02	3.93E-02	2.81E-02	2.51E-02	2.09E-02	1.98E-02
Gamma		9.88E-02	3.98E-01	5.35E-01	6.43E-01	6.71E-01	6.89E-01
Delta			1.23E-01	3.11E-01	4.67E-01	6.01E-01	6.95E-01
Epsilon				9.59E-02	3.01E-01	4.17E-01	5.51E-01
Mu					1.91E-01	2.71E-01	3.87E-01
Omega						1.43E-01	3.16E-01
Sigma							2.83E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.90	4.35	5.80	7.25	8.70	10.15	11.60
N_1	0.9667	0.4000	0.4667	0.5000	0.5000	0.5250	0.5400
N_2	0.3500	1.0500	0.6000	0.4167	0.3750	0.3375	0.3313
N_3		0.0000	0.5000	0.5000	0.3750	0.2750	0.2063

N₄			0.0000	0.2500	0.3750	0.3750	0.3150
N₅				0.0000	0.1250	0.2500	0.3125
N₆					0.0000	0.0625	0.1563
N₇						0.0000	0.0313
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 2.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.080

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9765234	0.9939026	0.9972381	0.9999775	8.039E+01	4.932E-01	--
α_2	2.25E-05	6.10E-03	2.76E-03	2.35E-02	4.932E-01	8.039E+01	1.360

CCCG = 3, Gamma = 0.083

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9813390	0.9936223	0.9954623	0.9996215	1.651E+02	1.059E+00	--
α_2	8.93E-05	4.76E-03	2.82E-03	1.61E-02	7.137E-01	1.491E+02	1.666
α_3	5.80E-07	1.61E-03	4.88E-04	7.04E-03	3.458E-01	2.141E+02	1.164

CCCG = 4, Gamma = 0.086

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9849858	0.9935402	0.9945140	0.9987660	3.252E+02	2.115E+00	--
α_2	5.95E-04	4.79E-03	3.82E-03	1.23E-02	1.549E+00	3.215E+02	1.507
α_3	3.05E-08	9.77E-04	1.91E-04	4.65E-03	2.646E-01	2.707E+02	1.797
α_4	7.61E-08	6.88E-04	1.69E-04	3.15E-03	3.010E-01	4.370E+02	1.113

CCCG = 5, Gamma = 0.088

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9902761	0.9945970	0.9949278	0.9977882	9.801E+02	5.325E+00	--
α_2	1.13E-03	3.54E-03	3.22E-03	7.03E-03	3.632E+00	1.022E+03	1.370
α_3	1.50E-04	1.52E-03	1.17E-03	4.10E-03	1.354E+00	8.877E+02	1.581
α_4	2.94E-08	3.10E-04	7.40E-05	1.42E-03	2.961E-01	9.543E+02	1.473
α_5	8.98E-35	3.02E-05	3.32E-11	1.50E-04	4.243E-02	1.406E+03	1.000

CCCG = 6, Gamma = 0.089

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9901100	0.9946058	0.9949617	0.9978861	9.101E+02	4.936E+00	--
α_2	7.60E-04	2.86E-03	2.54E-03	6.04E-03	2.915E+00	1.018E+03	1.245
α_3	1.42E-04	1.67E-03	1.25E-03	4.61E-03	1.257E+00	7.526E+02	1.686
α_4	2.41E-06	5.92E-04	2.71E-04	2.27E-03	5.031E-01	8.491E+02	1.496
α_5	3.71E-15	1.28E-04	1.69E-06	7.35E-04	1.155E-01	9.014E+02	1.410
α_6	7.03E-13	1.50E-04	5.51E-06	8.33E-04	1.451E-01	9.650E+02	1.317

CCCG = 7, Gamma = 0.090

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9925887	0.9953083	0.9954678	0.9974835	2.048E+03	9.654E+00	--
α_2	8.14E-04	2.10E-03	1.96E-03	3.87E-03	4.851E+00	2.303E+03	1.185
α_3	3.88E-04	1.51E-03	1.34E-03	3.24E-03	2.800E+00	1.848E+03	1.478
α_4	7.82E-05	7.65E-04	5.91E-04	2.05E-03	1.384E+00	1.807E+03	1.512
α_5	8.85E-07	2.50E-04	1.12E-04	9.67E-04	4.902E-01	1.961E+03	1.395
α_6	1.33E-15	5.58E-05	7.07E-07	3.20E-04	1.146E-01	2.055E+03	1.331
α_7	3.04E-93	5.79E-06	6.16E-25	6.87E-06	1.464E-02	2.530E+03	1.081

CCCG = 8, Gamma = 0.091

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9922326	0.9953816	0.9955932	0.9978083	1.541E+03	7.148E+00	--
α_2	4.65E-04	1.71E-03	1.53E-03	3.60E-03	2.980E+00	1.735E+03	1.193
α_3	2.31E-04	1.33E-03	1.11E-03	3.18E-03	1.960E+00	1.468E+03	1.409
α_4	6.41E-05	8.77E-04	6.43E-04	2.49E-03	1.166E+00	1.329E+03	1.558
α_5	2.18E-06	3.84E-04	1.86E-04	1.44E-03	5.375E-01	1.401E+03	1.479
α_6	2.73E-11	1.24E-04	9.59E-06	6.53E-04	1.805E-01	1.461E+03	1.419
α_7	1.42E-35	2.74E-05	2.05E-11	1.34E-04	4.139E-02	1.509E+03	1.374
α_8	9.70E-09	1.59E-04	3.51E-05	7.42E-04	2.827E-01	1.777E+03	1.166

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.94E-01	9.94E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01
α_2	6.10E-03	4.76E-03	4.79E-03	3.54E-03	2.86E-03	2.10E-03	1.71E-03
α_3		1.61E-03	9.77E-04	1.52E-03	1.67E-03	1.51E-03	1.33E-03
α_4			6.88E-04	3.10E-04	5.92E-04	7.65E-04	8.77E-04
α_5				3.02E-05	1.28E-04	2.50E-04	3.84E-04
α_6					1.50E-04	5.58E-05	1.24E-04
α_7						5.79E-06	2.74E-05
α_8							1.59E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.94E-01	9.94E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01
Beta	6.10E-03	6.38E-03	6.46E-03	5.40E-03	5.39E-03	4.69E-03	4.62E-03
Gamma		2.53E-01	2.58E-01	3.45E-01	4.71E-01	5.52E-01	6.29E-01
Delta			4.13E-01	1.83E-01	3.43E-01	4.16E-01	5.41E-01
Epsilon				8.87E-02	3.20E-01	2.89E-01	4.42E-01
Mu					5.40E-01	1.98E-01	4.47E-01
Omega						9.40E-02	6.02E-01
Sigma							8.53E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.05	1.57	2.10	2.62	3.15	3.67	4.20
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.10.2 BWR Main Steam Isolation Valves

2.10.2.1 BWR-MSS-MSV-CC: BWR Main Steam Isolation Valves Fail to Open

Generic CCF Parameters

Plant Type: BWR
System Group: Steam
System: Main Steam
Component Group: Valve
Component Type: Main Steam Stop Valve
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 2.8

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9288356	0.9817561	0.9919839	0.9999449	1.0000000	2.521E+01	4.685E-01
α_2	5.17E-05	1.82E-02	8.01E-03	7.12E-02	0.00E+00	4.685E-01	2.521E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9481491	0.9817785	0.9866535	0.9987411	1.0000000	6.078E+01	1.128E+00
α_2	4.62E-04	1.37E-02	8.98E-03	4.33E-02	0.00E+00	8.512E-01	6.106E+01
α_3	2.24E-07	4.47E-03	9.59E-04	2.10E-02	0.00E+00	2.768E-01	6.163E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9525009	0.9801444	0.9833968	0.9966701	1.0000000	9.348E+01	1.894E+00
α_2	1.14E-03	1.32E-02	9.99E-03	3.63E-02	0.00E+00	1.260E+00	9.411E+01
α_3	4.59E-06	4.22E-03	1.55E-03	1.75E-02	0.00E+00	4.024E-01	9.497E+01
α_4	1.69E-08	2.43E-03	3.62E-04	1.20E-02	0.00E+00	2.315E-01	9.514E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9650383	0.9825841	0.9841882	0.9946453	1.0000000	1.936E+02	3.432E+00
α_2	1.66E-03	9.76E-03	8.16E-03	2.33E-02	0.00E+00	1.924E+00	1.951E+02
α_3	3.08E-04	5.32E-03	3.77E-03	1.56E-02	0.00E+00	1.049E+00	1.960E+02
α_4	1.48E-06	1.94E-03	6.69E-04	8.18E-03	0.00E+00	3.822E-01	1.967E+02
α_5	3.38E-20	3.89E-04	3.63E-07	2.26E-03	0.00E+00	7.674E-02	1.970E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9677664	0.9834598	0.9848279	0.9944712	1.0000000	2.280E+02	3.835E+00

α_2	1.05E-03	7.34E-03	5.98E-03	1.83E-02	0.00E+00	1.701E+00	2.302E+02
α_3	4.11E-04	5.21E-03	3.87E-03	1.46E-02	0.00E+00	1.207E+00	2.306E+02
α_4	2.36E-05	2.57E-03	1.35E-03	9.26E-03	0.00E+00	5.960E-01	2.313E+02
α_5	3.73E-09	9.54E-04	1.28E-04	4.78E-03	0.00E+00	2.211E-01	2.316E+02
α_6	3.73E-15	4.73E-04	4.79E-06	2.73E-03	0.00E+00	1.098E-01	2.317E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9733732	0.9848892	0.9857289	0.9935264	1.0000000	3.746E+02	5.747E+00
α_2	1.21E-03	5.90E-03	5.06E-03	1.35E-02	0.00E+00	2.243E+00	3.781E+02
α_3	5.75E-04	4.28E-03	3.45E-03	1.08E-02	0.00E+00	1.630E+00	3.787E+02
α_4	1.77E-04	2.85E-03	2.04E-03	8.28E-03	0.00E+00	1.083E+00	3.793E+02
α_5	1.07E-05	1.49E-03	7.50E-04	5.46E-03	0.00E+00	5.654E-01	3.798E+02
α_6	2.77E-10	5.04E-04	4.65E-05	2.62E-03	0.00E+00	1.916E-01	3.802E+02
α_7	6.27E-41	9.15E-05	3.40E-12	4.01E-04	0.00E+00	3.480E-02	3.803E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9746570	0.9856339	0.9864365	0.9938634	1.0000000	3.928E+02	5.726E+00
α_2	9.13E-04	5.06E-03	4.26E-03	1.20E-02	0.00E+00	2.018E+00	3.965E+02
α_3	3.60E-04	3.49E-03	2.70E-03	9.31E-03	0.00E+00	1.391E+00	3.972E+02
α_4	1.59E-04	2.66E-03	1.89E-03	7.81E-03	0.00E+00	1.062E+00	3.975E+02
α_5	3.11E-05	1.76E-03	1.03E-03	5.99E-03	0.00E+00	7.026E-01	3.978E+02
α_6	3.45E-07	8.78E-04	2.69E-04	3.82E-03	0.00E+00	3.497E-01	3.982E+02
α_7	1.32E-15	2.71E-04	2.48E-06	1.56E-03	0.00E+00	1.078E-01	3.984E+02
α_8	2.77E-17	2.38E-04	1.01E-06	1.38E-03	0.00E+00	9.469E-02	3.985E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.82E-02	1.37E-02	1.32E-02	9.76E-03	7.34E-03	5.90E-03	5.06E-03
α_3		4.47E-03	4.22E-03	5.32E-03	5.21E-03	4.28E-03	3.49E-03
α_4			2.43E-03	1.94E-03	2.57E-03	2.85E-03	2.66E-03
α_5				3.89E-04	9.54E-04	1.49E-03	1.76E-03
α_6					4.73E-04	5.04E-04	8.78E-04
α_7						9.15E-05	2.71E-04
α_8							2.38E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.82E-01	9.80E-01	9.83E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.82E-02	1.82E-02	1.99E-02	1.74E-02	1.65E-02	1.51E-02	1.44E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.80	2.80	2.80	2.80	2.80	2.80	2.80
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.357

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9011203	0.9749418	0.9893094	0.9999432	1.750E+01	4.498E-01	--
α_2	5.68E-05	2.51E-02	1.07E-02	9.89E-02	4.498E-01	1.750E+01	0.842

CCCG = 3, Gamma = 0.357

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9262068	0.9735599	0.9802618	0.9979768	4.339E+01	1.178E+00	--
α_2	9.25E-04	2.08E-02	1.42E-02	6.30E-02	9.387E-01	4.424E+01	0.813
α_3	5.98E-08	5.66E-03	9.19E-04	2.78E-02	2.396E-01	4.206E+01	0.869

CCCG = 4, Gamma = 0.357

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9270146	0.9693129	0.9742258	0.9947929	5.996E+01	1.898E+00	--
α_2	1.85E-03	2.05E-02	1.56E-02	5.56E-02	1.285E+00	6.151E+01	0.847
α_3	5.87E-06	6.35E-03	2.28E-03	2.65E-02	3.927E-01	6.144E+01	0.860
α_4	1.50E-08	3.87E-03	5.20E-04	1.95E-02	2.207E-01	5.676E+01	0.933

CCCG = 5, Gamma = 0.357

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9458074	0.9727502	0.9751648	0.9914382	1.251E+02	3.506E+00	--
α_2	2.78E-03	1.56E-02	1.31E-02	3.67E-02	1.992E+00	1.260E+02	0.860
α_3	5.19E-04	8.38E-03	6.01E-03	2.44E-02	1.078E+00	1.275E+02	0.856
α_4	1.48E-06	2.81E-03	9.11E-04	1.21E-02	3.632E-01	1.287E+02	0.853
α_5	4.58E-21	4.95E-04	2.87E-07	2.87E-03	7.248E-02	1.462E+02	0.753

CCCG = 6, Gamma = 0.357

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9503179	0.9738066	0.9757534	0.9906416	1.561E+02	4.199E+00	--
α_2	2.03E-03	1.18E-02	9.85E-03	2.80E-02	1.941E+00	1.632E+02	0.831
α_3	8.23E-04	8.58E-03	6.58E-03	2.32E-02	1.332E+00	1.540E+02	0.884
α_4	4.10E-05	3.83E-03	2.06E-03	1.36E-02	6.181E-01	1.610E+02	0.850
α_5	9.57E-09	1.39E-03	2.07E-04	6.91E-03	2.313E-01	1.656E+02	0.828
α_6	5.90E-20	6.46E-04	6.09E-07	3.76E-03	7.684E-02	1.189E+02	1.154

CCCG = 7, Gamma = 0.357

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9584422	0.9759124	0.9771309	0.9892212	2.521E+02	6.223E+00	--
α_2	2.35E-03	9.59E-03	8.44E-03	2.08E-02	2.654E+00	2.740E+02	0.781
α_3	9.47E-04	6.94E-03	5.61E-03	1.75E-02	1.645E+00	2.354E+02	0.911
α_4	2.94E-04	4.41E-03	3.19E-03	1.27E-02	1.115E+00	2.515E+02	0.855
α_5	2.26E-05	2.34E-03	1.24E-03	8.38E-03	6.034E-01	2.577E+02	0.836
α_6	1.26E-10	7.11E-04	5.30E-05	3.77E-03	1.780E-01	2.503E+02	0.862
α_7	5.11E-51	9.39E-05	1.93E-14	3.31E-04	2.734E-02	2.912E+02	0.741

CCCG = 8, Gamma = 0.357

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9603298	0.9769945	0.9781565	0.9896906	2.652E+02	6.246E+00	--
α_2	1.91E-03	8.28E-03	7.22E-03	1.83E-02	2.504E+00	2.999E+02	0.739
α_3	6.12E-04	5.70E-03	4.45E-03	1.51E-02	1.419E+00	2.473E+02	0.898
α_4	2.27E-04	4.12E-03	2.90E-03	1.22E-02	1.027E+00	2.480E+02	0.897
α_5	5.58E-05	2.71E-03	1.62E-03	9.04E-03	7.337E-01	2.705E+02	0.824
α_6	1.48E-06	1.49E-03	5.37E-04	6.19E-03	3.975E-01	2.668E+02	0.836
α_7	3.19E-20	3.19E-04	3.06E-07	1.85E-03	7.703E-02	2.416E+02	0.925
α_8	3.58E-18	3.86E-04	9.64E-07	2.25E-03	8.749E-02	2.268E+02	0.985

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.75E-01	9.74E-01	9.69E-01	9.73E-01	9.74E-01	9.76E-01	9.77E-01
α_2	2.51E-02	2.08E-02	2.05E-02	1.56E-02	1.18E-02	9.59E-03	8.28E-03
α_3		5.66E-03	6.35E-03	8.38E-03	8.58E-03	6.94E-03	5.70E-03
α_4			3.87E-03	2.81E-03	3.83E-03	4.41E-03	4.12E-03
α_5				4.95E-04	1.39E-03	2.34E-03	2.71E-03
α_6					6.46E-04	7.11E-04	1.49E-03
α_7						9.39E-05	3.19E-04
α_8							3.86E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.75E-01	9.74E-01	9.69E-01	9.73E-01	9.74E-01	9.76E-01	9.77E-01
Beta	2.51E-02	2.64E-02	3.07E-02	2.72E-02	2.62E-02	2.41E-02	2.30E-02
Gamma		2.14E-01	3.33E-01	4.29E-01	5.51E-01	6.02E-01	6.40E-01
Delta			3.79E-01	2.83E-01	4.06E-01	5.21E-01	6.13E-01
Epsilon				1.50E-01	3.48E-01	4.16E-01	5.43E-01
Mu					3.16E-01	2.56E-01	4.48E-01
Omega						1.17E-01	3.21E-01
Sigma							5.47E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 1.7

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.607

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9411691	0.9849153	0.9933749	0.9999564	3.073E+01	4.706E-01	--
α_2	4.36E-05	1.51E-02	6.63E-03	5.88E-02	4.706E-01	3.073E+01	0.842

CCCG = 3, Gamma = 0.607

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9590448	0.9857500	0.9896667	0.9990665	7.627E+01	1.103E+00	--
α_2	2.97E-04	1.03E-02	6.54E-03	3.30E-02	8.104E-01	7.796E+01	0.813
α_3	3.34E-07	3.96E-03	9.32E-04	1.83E-02	2.921E-01	7.344E+01	0.869

CCCG = 4, Gamma = 0.607

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9657286	0.9855687	0.9878845	0.9974886	1.334E+02	1.953E+00	--
α_2	8.92E-04	9.56E-03	7.30E-03	2.59E-02	1.312E+00	1.359E+02	0.847
α_3	5.36E-06	3.19E-03	1.26E-03	1.29E-02	4.307E-01	1.347E+02	0.860
α_4	3.36E-09	1.69E-03	1.99E-04	8.58E-03	2.099E-01	1.243E+02	0.933

CCCG = 5, Gamma = 0.607

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9742253	0.9875358	0.9888148	0.9964750	2.462E+02	3.107E+00	--
α_2	9.60E-04	6.80E-03	5.53E-03	1.70E-02	1.684E+00	2.460E+02	0.860
α_3	1.68E-04	3.79E-03	2.57E-03	1.16E-02	9.426E-01	2.479E+02	0.856
α_4	1.15E-06	1.53E-03	5.25E-04	6.45E-03	3.816E-01	2.493E+02	0.853
α_5	1.39E-16	3.49E-04	1.91E-06	2.03E-03	9.865E-02	2.829E+02	0.753

CCCG = 6, Gamma = 0.607

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9772574	0.9883612	0.9893374	0.9961297	3.246E+02	3.822E+00	--
α_2	7.32E-04	5.06E-03	4.12E-03	1.26E-02	1.714E+00	3.371E+02	0.831
α_3	2.28E-04	3.48E-03	2.51E-03	1.00E-02	1.108E+00	3.175E+02	0.884
α_4	2.59E-05	1.96E-03	1.09E-03	6.86E-03	6.509E-01	3.308E+02	0.850
α_5	1.48E-08	7.46E-04	1.34E-04	3.59E-03	2.536E-01	3.399E+02	0.828
α_6	6.36E-17	3.92E-04	1.78E-06	2.28E-03	9.572E-02	2.440E+02	1.154

CCCG = 7, Gamma = 0.607

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9809369	0.9894539	0.9901089	0.9957336	4.874E+02	5.195E+00	--
α_2	7.57E-04	3.99E-03	3.38E-03	9.29E-03	2.105E+00	5.256E+02	0.781
α_3	2.74E-04	2.92E-03	2.23E-03	7.93E-03	1.320E+00	4.509E+02	0.911
α_4	1.05E-04	2.07E-03	1.43E-03	6.20E-03	9.967E-01	4.810E+02	0.855
α_5	5.39E-06	1.07E-03	5.06E-04	4.02E-03	5.249E-01	4.922E+02	0.836
α_6	3.04E-10	4.09E-04	4.00E-05	2.12E-03	1.956E-01	4.775E+02	0.862
α_7	2.72E-28	9.52E-05	2.16E-09	5.17E-04	5.291E-02	5.555E+02	0.741

CCCG = 8, Gamma = 0.607

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9824821	0.9900391	0.9905916	0.9957095	5.797E+02	5.832E+00	--
α_2	6.91E-04	3.41E-03	2.92E-03	7.80E-03	2.229E+00	6.520E+02	0.739
α_3	2.01E-04	2.34E-03	1.76E-03	6.46E-03	1.260E+00	5.370E+02	0.898
α_4	1.10E-04	1.93E-03	1.36E-03	5.70E-03	1.042E+00	5.378E+02	0.897
α_5	3.05E-05	1.30E-03	7.95E-04	4.29E-03	7.626E-01	5.860E+02	0.824
α_6	1.29E-07	5.66E-04	1.58E-04	2.52E-03	3.271E-01	5.777E+02	0.836
α_7	2.49E-13	2.57E-04	6.89E-06	1.44E-03	1.344E-01	5.227E+02	0.925
α_8	1.41E-20	1.57E-04	1.47E-07	9.09E-04	7.682E-02	4.907E+02	0.985

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.86E-01	9.86E-01	9.88E-01	9.88E-01	9.89E-01	9.90E-01
α_2	1.51E-02	1.03E-02	9.56E-03	6.80E-03	5.06E-03	3.99E-03	3.41E-03
α_3		3.96E-03	3.19E-03	3.79E-03	3.48E-03	2.92E-03	2.34E-03
α_4			1.69E-03	1.53E-03	1.96E-03	2.07E-03	1.93E-03
α_5				3.49E-04	7.46E-04	1.07E-03	1.30E-03
α_6					3.92E-04	4.09E-04	5.66E-04
α_7						9.52E-05	2.57E-04
α_8							1.57E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.86E-01	9.86E-01	9.88E-01	9.88E-01	9.89E-01	9.90E-01
Beta	1.51E-02	1.43E-02	1.44E-02	1.25E-02	1.16E-02	1.05E-02	9.96E-03
Gamma		2.78E-01	3.38E-01	4.55E-01	5.65E-01	6.22E-01	6.58E-01
Delta			3.46E-01	3.31E-01	4.71E-01	5.55E-01	6.43E-01
Epsilon				1.86E-01	3.67E-01	4.32E-01	5.41E-01
Mu					3.45E-01	3.21E-01	4.30E-01
Omega						1.89E-01	4.22E-01
Sigma							3.78E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.70	1.70	1.70	1.70	1.70	1.70	1.70
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.036

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9853333	0.9961945	0.9982814	0.9999860	1.291E+02	4.932E-01	--
α_2	1.40E-05	3.81E-03	1.72E-03	1.47E-02	4.932E-01	1.291E+02	0.842

CCCG = 3, Gamma = 0.036

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9895946	0.9964488	0.9974778	0.9997898	2.973E+02	1.059E+00	--
α_2	4.37E-05	2.34E-03	1.38E-03	7.90E-03	7.137E-01	3.043E+02	0.813
α_3	4.35E-07	1.21E-03	3.66E-04	5.29E-03	3.458E-01	2.852E+02	0.869

CCCG = 4, Gamma = 0.036

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9912636	0.9962456	0.9968142	0.9992840	5.611E+02	2.115E+00	--
α_2	3.35E-04	2.71E-03	2.15E-03	6.96E-03	1.549E+00	5.710E+02	0.847
α_3	1.47E-08	4.69E-04	9.18E-05	2.23E-03	2.646E-01	5.635E+02	0.860
α_4	6.40E-08	5.79E-04	1.42E-04	2.65E-03	3.010E-01	5.192E+02	0.933

CCCG = 5, Gamma = 0.036

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941394	0.9967457	0.9969458	0.9986690	1.631E+03	5.325E+00	--
α_2	7.10E-04	2.23E-03	2.03E-03	4.42E-03	3.632E+00	1.628E+03	0.860
α_3	8.11E-05	8.26E-04	6.34E-04	2.23E-03	1.354E+00	1.638E+03	0.856
α_4	1.71E-08	1.80E-04	4.30E-05	8.27E-04	2.961E-01	1.645E+03	0.853
α_5	6.77E-35	2.28E-05	2.51E-11	1.13E-04	4.243E-02	1.865E+03	0.753

CCCG = 6, Gamma = 0.036

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9938873	0.9966682	0.9968889	0.9986954	1.476E+03	4.936E+00	--
α_2	5.08E-04	1.91E-03	1.70E-03	4.04E-03	2.915E+00	1.523E+03	0.831
α_3	7.48E-05	8.76E-04	6.58E-04	2.42E-03	1.257E+00	1.433E+03	0.884
α_4	1.37E-06	3.37E-04	1.54E-04	1.29E-03	5.031E-01	1.492E+03	0.850
α_5	2.18E-15	7.54E-05	9.95E-07	4.32E-04	1.155E-01	1.531E+03	0.828
α_6	6.18E-13	1.32E-04	4.84E-06	7.31E-04	1.451E-01	1.099E+03	1.154

CCCG = 7, Gamma = 0.036

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9953493	0.9970571	0.9971575	0.9984223	3.271E+03	9.654E+00	--
α_2	5.37E-04	1.39E-03	1.29E-03	2.56E-03	4.851E+00	3.495E+03	0.781
α_3	2.39E-04	9.34E-04	8.25E-04	2.00E-03	2.800E+00	2.996E+03	0.911
α_4	4.42E-05	4.33E-04	3.34E-04	1.16E-03	1.384E+00	3.195E+03	0.855
α_5	5.31E-07	1.50E-04	6.71E-05	5.80E-04	4.902E-01	3.267E+03	0.836
α_6	8.60E-16	3.62E-05	4.58E-07	2.08E-04	1.146E-01	3.168E+03	0.862
α_7	2.09E-93	3.97E-06	4.23E-25	4.72E-06	1.464E-02	3.684E+03	0.741

CCCG = 8, Gamma = 0.036

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9951845	0.9971381	0.9972697	0.9986427	2.491E+03	7.148E+00	--
α_2	2.89E-04	1.06E-03	9.48E-04	2.24E-03	2.980E+00	2.796E+03	0.739
α_3	1.47E-04	8.51E-04	7.12E-04	2.03E-03	1.960E+00	2.301E+03	0.898
α_4	3.70E-05	5.06E-04	3.71E-04	1.44E-03	1.166E+00	2.304E+03	0.897
α_5	1.22E-06	2.14E-04	1.04E-04	8.01E-04	5.375E-01	2.510E+03	0.824
α_6	1.61E-11	7.30E-05	5.66E-06	3.86E-04	1.805E-01	2.473E+03	0.836
α_7	9.57E-36	1.85E-05	1.38E-11	9.05E-05	4.139E-02	2.237E+03	0.925
α_8	8.21E-09	1.35E-04	2.97E-05	6.28E-04	2.827E-01	2.099E+03	0.985

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	3.81E-03	2.34E-03	2.71E-03	2.23E-03	1.91E-03	1.39E-03	1.06E-03
α_3		1.21E-03	4.69E-04	8.26E-04	8.76E-04	9.34E-04	8.51E-04
α_4			5.79E-04	1.80E-04	3.37E-04	4.33E-04	5.06E-04
α_5				2.28E-05	7.54E-05	1.50E-04	2.14E-04
α_6					1.32E-04	3.62E-05	7.30E-05
α_7						3.97E-06	1.85E-05
α_8							1.35E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	3.81E-03	3.55E-03	3.75E-03	3.25E-03	3.33E-03	2.94E-03	2.86E-03
Gamma		3.41E-01	2.79E-01	3.16E-01	4.26E-01	5.29E-01	6.28E-01
Delta			5.52E-01	1.97E-01	3.83E-01	4.00E-01	5.26E-01
Epsilon				1.12E-01	3.81E-01	3.05E-01	4.65E-01
Mu					6.36E-01	2.11E-01	5.14E-01
Omega						9.90E-02	6.77E-01
Sigma							8.79E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.10	0.10	0.10	0.10	0.10	0.10	0.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.10.2.2 BWR-MSS-MSV-OO: BWR Main Steam Isolation Valves Fail to Close

Generic CCF Parameters

Plant Type: BWR
System Group: Steam
System: Main Steam
Component Group: Valve
Component Type: Main Steam Stop Valve
Failure Mode: Fail to Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 9.2

Total Number of Common-Cause Failure Events: 3

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9274723	0.9812541	0.9915898	0.9999365	0.9961131	2.507E+01	4.789E-01
α_2	6.01E-05	1.87E-02	8.41E-03	7.25E-02	3.89E-03	4.789E-01	2.507E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9482193	0.9816281	0.9864210	0.9986564	0.9922094	6.193E+01	1.159E+00
α_2	5.21E-04	1.40E-02	9.28E-03	4.35E-02	7.79E-03	8.822E-01	6.221E+01
α_3	2.20E-07	4.39E-03	9.41E-04	2.06E-02	0.00E+00	2.768E-01	6.281E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9526804	0.9800156	0.9831887	0.9965053	0.9882752	9.590E+01	1.956E+00
α_2	1.28E-03	1.35E-02	1.04E-02	3.65E-02	1.17E-02	1.322E+00	9.654E+01
α_3	4.48E-06	4.11E-03	1.51E-03	1.70E-02	1.35E-05	4.025E-01	9.746E+01
α_4	1.64E-08	2.37E-03	3.53E-04	1.17E-02	0.00E+00	2.315E-01	9.763E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9649526	0.9823984	0.9839725	0.9944575	0.9843237	1.973E+02	3.535E+00
α_2	1.84E-03	1.01E-02	8.52E-03	2.37E-02	1.56E-02	2.027E+00	1.988E+02
α_3	3.03E-04	5.22E-03	3.70E-03	1.53E-02	2.71E-05	1.049E+00	1.998E+02
α_4	1.45E-06	1.90E-03	6.56E-04	8.03E-03	0.00E+00	3.822E-01	2.005E+02
α_5	3.32E-20	3.82E-04	3.56E-07	2.22E-03	0.00E+00	7.674E-02	2.008E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9675286	0.9831610	0.9844998	0.9942165	0.9803503	2.329E+02	3.990E+00
α_2	1.27E-03	7.83E-03	6.50E-03	1.90E-02	1.96E-02	1.855E+00	2.351E+02
α_3	4.02E-04	5.10E-03	3.79E-03	1.43E-02	4.54E-05	1.207E+00	2.357E+02

α_4	2.31E-05	2.52E-03	1.32E-03	9.06E-03	0.00E+00	5.960E-01	2.363E+02
α_5	3.65E-09	9.33E-04	1.25E-04	4.68E-03	0.00E+00	2.211E-01	2.367E+02
α_6	3.65E-15	4.63E-04	4.69E-06	2.67E-03	0.00E+00	1.098E-01	2.368E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9730599	0.9845779	0.9854036	0.9932643	0.9763548	3.807E+02	5.964E+00
α_2	1.44E-03	6.36E-03	5.53E-03	1.41E-02	2.36E-02	2.459E+00	3.842E+02
α_3	5.66E-04	4.22E-03	3.40E-03	1.07E-02	6.83E-05	1.630E+00	3.851E+02
α_4	1.74E-04	2.80E-03	2.00E-03	8.15E-03	0.00E+00	1.083E+00	3.856E+02
α_5	1.06E-05	1.46E-03	7.37E-04	5.37E-03	0.00E+00	5.654E-01	3.861E+02
α_6	2.72E-10	4.95E-04	4.58E-05	2.58E-03	0.00E+00	1.916E-01	3.865E+02
α_7	6.16E-41	9.00E-05	3.35E-12	3.95E-04	0.00E+00	3.480E-02	3.867E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9741868	0.9851940	0.9859811	0.9935074	0.9723370	4.001E+02	6.014E+00
α_2	1.20E-03	5.68E-03	4.89E-03	1.28E-02	2.76E-02	2.305E+00	4.039E+02
α_3	3.54E-04	3.43E-03	2.65E-03	9.14E-03	9.61E-05	1.392E+00	4.048E+02
α_4	1.56E-04	2.62E-03	1.86E-03	7.66E-03	0.00E+00	1.062E+00	4.051E+02
α_5	3.05E-05	1.73E-03	1.01E-03	5.88E-03	0.00E+00	7.026E-01	4.055E+02
α_6	3.38E-07	8.61E-04	2.64E-04	3.74E-03	0.00E+00	3.497E-01	4.058E+02
α_7	1.30E-15	2.66E-04	2.44E-06	1.53E-03	0.00E+00	1.078E-01	4.060E+02
α_8	2.71E-17	2.33E-04	9.88E-07	1.36E-03	0.00E+00	9.469E-02	4.061E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.82E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.85E-01
α_2	1.87E-02	1.40E-02	1.35E-02	1.01E-02	7.83E-03	6.36E-03	5.68E-03
α_3		4.39E-03	4.11E-03	5.22E-03	5.10E-03	4.22E-03	3.43E-03
α_4			2.37E-03	1.90E-03	2.52E-03	2.80E-03	2.62E-03
α_5				3.82E-04	9.33E-04	1.46E-03	1.73E-03
α_6					4.63E-04	4.95E-04	8.61E-04
α_7						9.00E-05	2.66E-04
α_8							2.33E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.82E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.85E-01
Beta	1.87E-02	1.84E-02	2.00E-02	1.76E-02	1.68E-02	1.54E-02	1.48E-02
Gamma		2.39E-01	3.24E-01	4.27E-01	5.35E-01	5.88E-01	6.17E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.30	3.45	4.60	5.75	6.90	8.05	9.20
N₁	0.3543	0.5004	0.6259	0.7309	0.8154	0.8794	0.9230
N₂	0.0104	0.0310	0.0619	0.1030	0.1543	0.2156	0.2870
N₃		0.0000	0.0001	0.0002	0.0004	0.0006	0.0010
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 3.5

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.347

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9532171	0.9879013	0.9945717	0.9999594	3.950E+01	4.838E-01	--
α_2	4.06E-05	1.21E-02	5.43E-03	4.68E-02	4.838E-01	3.950E+01	1.132

CCCG = 3, Gamma = 0.348

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9714527	0.9897134	0.9922925	0.9991574	1.180E+02	1.227E+00	--
α_2	3.88E-04	7.93E-03	5.48E-03	2.39E-02	9.780E-01	1.223E+02	1.073
α_3	3.77E-08	2.35E-03	4.09E-04	1.14E-02	2.487E-01	1.054E+02	1.252

CCCG = 4, Gamma = 0.349

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9718052	0.9879402	0.9897868	0.9977607	1.687E+02	2.059E+00	--
α_2	9.16E-04	8.27E-03	6.49E-03	2.17E-02	1.444E+00	1.731E+02	1.064
α_3	3.16E-06	2.52E-03	9.46E-04	1.03E-02	4.114E-01	1.631E+02	1.137
α_4	1.67E-09	1.27E-03	1.39E-04	6.52E-03	2.036E-01	1.600E+02	1.159

CCCG = 5, Gamma = 0.351

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9781483	0.9889272	0.9898905	0.9964147	3.293E+02	3.687E+00	--
α_2	1.34E-03	6.56E-03	5.63E-03	1.50E-02	2.247E+00	3.401E+02	1.042
α_3	1.53E-04	3.05E-03	2.11E-03	9.15E-03	9.912E-01	3.242E+02	1.097
α_4	8.36E-07	1.23E-03	4.14E-04	5.20E-03	3.765E-01	3.066E+02	1.161
α_5	2.05E-21	2.36E-04	1.35E-07	1.36E-03	7.237E-02	3.064E+02	1.163

CCCG = 6, Gamma = 0.352

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9793841	0.9892252	0.9900612	0.9962105	3.805E+02	4.144E+00	--
α_2	1.01E-03	5.23E-03	4.45E-03	1.21E-02	2.133E+00	4.055E+02	0.999
α_3	2.09E-04	3.03E-03	2.20E-03	8.66E-03	1.134E+00	3.735E+02	1.087
α_4	1.01E-05	1.54E-03	7.65E-04	5.71E-03	5.533E-01	3.581E+02	1.135
α_5	2.38E-09	6.11E-04	8.15E-05	3.06E-03	2.210E-01	3.616E+02	1.125
α_6	4.59E-16	3.60E-04	2.51E-06	2.09E-03	1.027E-01	2.849E+02	1.429

CCCG = 7, Gamma = 0.353

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9832795	0.9902733	0.9907626	0.9955965	6.556E+02	6.440E+00	--
α_2	1.04E-03	3.98E-03	3.53E-03	8.46E-03	2.848E+00	7.129E+02	0.965
α_3	4.09E-04	2.76E-03	2.26E-03	6.83E-03	1.746E+00	6.312E+02	1.091
α_4	1.08E-04	1.73E-03	1.24E-03	5.04E-03	1.084E+00	6.246E+02	1.104
α_5	4.90E-06	8.61E-04	4.17E-04	3.22E-03	5.376E-01	6.239E+02	1.106
α_6	3.01E-10	3.43E-04	3.46E-05	1.77E-03	1.979E-01	5.769E+02	1.197
α_7	1.19E-52	5.32E-05	5.33E-15	1.82E-04	2.656E-02	4.994E+02	1.383

CCCG = 8, Gamma = 0.354

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9839774	0.9907878	0.9912755	0.9959331	6.585E+02	6.122E+00	--
α_2	7.14E-04	3.29E-03	2.84E-03	7.38E-03	2.374E+00	7.200E+02	0.956
α_3	2.74E-04	2.30E-03	1.82E-03	5.98E-03	1.512E+00	6.546E+02	1.053
α_4	1.01E-04	1.72E-03	1.22E-03	5.05E-03	1.056E+00	6.123E+02	1.126
α_5	1.61E-05	1.07E-03	6.07E-04	3.67E-03	6.745E-01	6.322E+02	1.092
α_6	6.41E-08	4.77E-04	1.21E-04	2.17E-03	3.076E-01	6.443E+02	1.072
α_7	1.53E-15	2.19E-04	2.16E-06	1.26E-03	1.093E-01	4.991E+02	1.384
α_8	2.13E-18	1.38E-04	3.82E-07	8.03E-04	8.885E-02	6.450E+02	1.071

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.90E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01	9.91E-01
α_2	1.21E-02	7.93E-03	8.27E-03	6.56E-03	5.23E-03	3.98E-03	3.29E-03
α_3		2.35E-03	2.52E-03	3.05E-03	3.03E-03	2.76E-03	2.30E-03
α_4			1.27E-03	1.23E-03	1.54E-03	1.73E-03	1.72E-03
α_5				2.36E-04	6.11E-04	8.61E-04	1.07E-03
α_6					3.60E-04	3.43E-04	4.77E-04
α_7						5.32E-05	2.19E-04
α_8							1.38E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.90E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01	9.91E-01
Beta	1.21E-02	1.03E-02	1.21E-02	1.11E-02	1.08E-02	9.73E-03	9.21E-03
Gamma		2.29E-01	3.14E-01	4.07E-01	5.14E-01	5.91E-01	6.43E-01
Delta			3.35E-01	3.24E-01	4.54E-01	5.20E-01	6.11E-01
Epsilon				1.61E-01	3.86E-01	4.20E-01	5.25E-01
Mu					3.71E-01	3.15E-01	4.39E-01
Omega						1.34E-01	4.28E-01
Sigma							3.86E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.88	1.31	1.75	2.19	2.63	3.06	3.50
N_1	0.0493	0.0729	0.0957	0.1179	0.1393	0.1600	0.1800
N_2	0.0004	0.0011	0.0021	0.0036	0.0054	0.0075	0.0100
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 2.4

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.343

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8650612	0.9653685	0.9847034	0.9999093	1.282E+01	4.598E-01	--
α_2	9.07E-05	3.46E-02	1.53E-02	1.35E-01	4.598E-01	1.282E+01	1.132

CCCG = 3, Gamma = 0.341

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9006054	0.9638969	0.9726924	0.9970652	3.226E+01	1.208E+00	--
α_2	1.36E-03	2.80E-02	1.95E-02	8.37E-02	9.686E-01	3.361E+01	1.073
α_3	8.58E-08	8.09E-03	1.32E-03	3.97E-02	2.396E-01	2.939E+01	1.252

CCCG = 4, Gamma = 0.339

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9072793	0.9604718	0.9665127	0.9929762	4.758E+01	1.958E+00	--
α_2	2.63E-03	2.65E-02	2.06E-02	7.07E-02	1.345E+00	4.937E+01	1.064
α_3	7.69E-06	8.27E-03	2.98E-03	3.45E-02	3.928E-01	4.710E+01	1.137
α_4	1.83E-08	4.74E-03	6.38E-04	2.38E-02	2.207E-01	4.633E+01	1.159

CCCG = 5, Gamma = 0.336

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9316257	0.9652620	0.9682124	0.9888099	1.002E+02	3.605E+00	--
α_2	3.72E-03	1.96E-02	1.67E-02	4.54E-02	2.091E+00	1.048E+02	1.042
α_3	6.59E-04	1.06E-02	7.62E-03	3.08E-02	1.078E+00	1.004E+02	1.097
α_4	2.00E-06	3.79E-03	1.23E-03	1.63E-02	3.632E-01	9.548E+01	1.161
α_5	7.01E-21	7.58E-04	4.39E-07	4.39E-03	7.248E-02	9.560E+01	1.163

CCCG = 6, Gamma = 0.334

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9377957	0.9668306	0.9691796	0.9878371	1.268E+02	4.349E+00	--
α_2	2.85E-03	1.50E-02	1.28E-02	3.49E-02	2.090E+00	1.370E+02	0.999
α_3	1.00E-03	1.04E-02	8.00E-03	2.81E-02	1.332E+00	1.265E+02	1.087
α_4	5.43E-05	5.05E-03	2.73E-03	1.79E-02	6.181E-01	1.217E+02	1.135
α_5	1.29E-08	1.87E-03	2.79E-04	9.28E-03	2.313E-01	1.232E+02	1.125
α_6	7.22E-20	7.90E-04	7.46E-07	4.60E-03	7.684E-02	9.717E+01	1.429

CCCG = 7, Gamma = 0.331

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9474005	0.9692240	0.9707104	0.9859707	2.025E+02	6.431E+00	--
α_2	3.33E-03	1.27E-02	1.13E-02	2.68E-02	2.862E+00	2.230E+02	0.965
α_3	1.13E-03	8.24E-03	6.67E-03	2.07E-02	1.646E+00	1.981E+02	1.091
α_4	3.76E-04	5.65E-03	4.09E-03	1.62E-02	1.115E+00	1.963E+02	1.104
α_5	2.96E-05	3.06E-03	1.62E-03	1.10E-02	6.034E-01	1.964E+02	1.106
α_6	1.74E-10	9.78E-04	7.29E-05	5.19E-03	1.780E-01	1.819E+02	1.197
α_7	9.46E-51	1.73E-04	3.57E-14	6.13E-04	2.734E-02	1.576E+02	1.383

CCCG = 8, Gamma = 0.329

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9491529	0.9701625	0.9715860	0.9863099	2.121E+02	6.524E+00	--
α_2	3.02E-03	1.18E-02	1.04E-02	2.51E-02	2.781E+00	2.334E+02	0.956
α_3	7.11E-04	6.62E-03	5.16E-03	1.75E-02	1.420E+00	2.131E+02	1.053
α_4	2.82E-04	5.12E-03	3.60E-03	1.52E-02	1.027E+00	1.995E+02	1.126
α_5	7.32E-05	3.55E-03	2.13E-03	1.18E-02	7.337E-01	2.062E+02	1.092
α_6	1.88E-06	1.89E-03	6.81E-04	7.85E-03	3.975E-01	2.103E+02	1.072
α_7	4.73E-20	4.72E-04	4.54E-07	2.74E-03	7.703E-02	1.631E+02	1.384
α_8	3.85E-18	4.15E-04	1.04E-06	2.42E-03	8.749E-02	2.108E+02	1.071

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.65E-01	9.64E-01	9.60E-01	9.65E-01	9.67E-01	9.69E-01	9.70E-01
α_2	3.46E-02	2.80E-02	2.65E-02	1.96E-02	1.50E-02	1.27E-02	1.18E-02
α_3		8.09E-03	8.27E-03	1.06E-02	1.04E-02	8.24E-03	6.62E-03
α_4			4.74E-03	3.79E-03	5.05E-03	5.65E-03	5.12E-03
α_5				7.58E-04	1.87E-03	3.06E-03	3.55E-03
α_6					7.90E-04	9.78E-04	1.89E-03
α_7						1.73E-04	4.72E-04
α_8							4.15E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.65E-01	9.64E-01	9.60E-01	9.65E-01	9.67E-01	9.69E-01	9.70E-01
Beta	3.46E-02	3.61E-02	3.95E-02	3.47E-02	3.32E-02	3.08E-02	2.98E-02
Gamma		2.24E-01	3.29E-01	4.37E-01	5.47E-01	5.88E-01	6.05E-01
Delta			3.64E-01	3.00E-01	4.25E-01	5.45E-01	6.33E-01
Epsilon				1.67E-01	3.45E-01	4.27E-01	5.52E-01
Mu					2.97E-01	2.73E-01	4.39E-01
Omega						1.51E-01	3.20E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.60	0.90	1.20	1.50	1.80	2.10	2.40
N_1	0.3050	0.4276	0.5302	0.6130	0.6761	0.7194	0.7430
N_2	0.0100	0.0299	0.0598	0.0995	0.1489	0.2081	0.2770
N_3		0.0000	0.0001	0.0002	0.0004	0.0006	0.0010

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 0.7

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9162805	0.9784702	0.9904602	0.9999371	2.139E+01	4.706E-01	--
α_2	6.29E-05	2.15E-02	9.54E-03	8.37E-02	4.706E-01	2.139E+01	1.132

CCCG = 3, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9434566	0.9802708	0.9856464	0.9987009	5.478E+01	1.103E+00	--
α_2	4.02E-04	1.39E-02	8.86E-03	4.45E-02	8.104E-01	5.754E+01	1.073
α_3	4.94E-07	5.84E-03	1.38E-03	2.69E-02	2.921E-01	4.972E+01	1.252

CCCG = 4, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9560714	0.9814681	0.9844202	0.9967660	1.034E+02	1.953E+00	--
α_2	1.14E-03	1.22E-02	9.30E-03	3.29E-02	1.312E+00	1.066E+02	1.064
α_3	7.17E-06	4.26E-03	1.69E-03	1.72E-02	4.307E-01	1.007E+02	1.137
α_4	4.22E-09	2.12E-03	2.50E-04	1.08E-02	2.099E-01	9.889E+01	1.159

CCCG = 5, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9673677	0.9841993	0.9858106	0.9955236	1.935E+02	3.107E+00	--
α_2	1.17E-03	8.28E-03	6.74E-03	2.07E-02	1.684E+00	2.016E+02	1.042
α_3	2.16E-04	4.88E-03	3.31E-03	1.49E-02	9.426E-01	1.921E+02	1.097
α_4	1.57E-06	2.09E-03	7.20E-04	8.83E-03	3.816E-01	1.819E+02	1.161
α_5	2.17E-16	5.42E-04	2.97E-06	3.15E-03	9.865E-02	1.819E+02	1.163

CCCG = 6, Gamma = 0.067

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9716162	0.9854593	0.9866722	0.9951581	2.590E+02	3.822E+00	--
α_2	8.84E-04	6.11E-03	4.98E-03	1.52E-02	1.714E+00	2.790E+02	0.999
α_3	2.82E-04	4.29E-03	3.10E-03	1.24E-02	1.108E+00	2.569E+02	1.087
α_4	3.48E-05	2.64E-03	1.47E-03	9.20E-03	6.509E-01	2.463E+02	1.135
α_5	2.02E-08	1.02E-03	1.83E-04	4.90E-03	2.536E-01	2.490E+02	1.125
α_6	7.91E-17	4.88E-04	2.22E-06	2.84E-03	9.572E-02	1.962E+02	1.429

CCCG = 7, Gamma = 0.067

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9759938	0.9867078	0.9875290	0.9946169	3.856E+02	5.195E+00	--
α_2	9.39E-04	4.95E-03	4.19E-03	1.15E-02	2.105E+00	4.236E+02	0.965
α_3	3.29E-04	3.51E-03	2.68E-03	9.52E-03	1.320E+00	3.751E+02	1.091
α_4	1.37E-04	2.68E-03	1.86E-03	8.02E-03	9.967E-01	3.711E+02	1.104
α_5	7.15E-06	1.41E-03	6.72E-04	5.33E-03	5.249E-01	3.708E+02	1.106
α_6	4.24E-10	5.70E-04	5.58E-05	2.95E-03	1.956E-01	3.430E+02	1.197
α_7	5.08E-28	1.78E-04	4.04E-09	9.67E-04	5.291E-02	2.970E+02	1.383

CCCG = 8, Gamma = 0.067

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9778395	0.9873893	0.9880852	0.9945628	4.566E+02	5.832E+00	--
α_2	8.97E-04	4.42E-03	3.78E-03	1.01E-02	2.229E+00	5.022E+02	0.956
α_3	2.36E-04	2.75E-03	2.07E-03	7.59E-03	1.260E+00	4.569E+02	1.053
α_4	1.38E-04	2.43E-03	1.72E-03	7.17E-03	1.042E+00	4.273E+02	1.126
α_5	4.05E-05	1.73E-03	1.06E-03	5.69E-03	7.626E-01	4.411E+02	1.092
α_6	1.66E-07	7.27E-04	2.03E-04	3.23E-03	3.271E-01	4.498E+02	1.072
α_7	3.74E-13	3.86E-04	1.03E-05	2.17E-03	1.344E-01	3.485E+02	1.384
α_8	1.54E-20	1.71E-04	1.60E-07	9.90E-04	7.682E-02	4.503E+02	1.071

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.78E-01	9.80E-01	9.81E-01	9.84E-01	9.85E-01	9.87E-01	9.87E-01
α_2	2.15E-02	1.39E-02	1.22E-02	8.28E-03	6.11E-03	4.95E-03	4.42E-03
α_3		5.84E-03	4.26E-03	4.88E-03	4.29E-03	3.51E-03	2.75E-03
α_4			2.12E-03	2.09E-03	2.64E-03	2.68E-03	2.43E-03
α_5				5.42E-04	1.02E-03	1.41E-03	1.73E-03
α_6					4.88E-04	5.70E-04	7.27E-04
α_7						1.78E-04	3.86E-04
α_8							1.71E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.78E-01	9.80E-01	9.81E-01	9.84E-01	9.85E-01	9.87E-01	9.87E-01
Beta	2.15E-02	1.97E-02	1.85E-02	1.58E-02	1.45E-02	1.33E-02	1.26E-02
Gamma		2.96E-01	3.44E-01	4.76E-01	5.80E-01	6.28E-01	6.50E-01
Delta			3.32E-01	3.51E-01	4.91E-01	5.80E-01	6.64E-01
Epsilon				2.06E-01	3.64E-01	4.47E-01	5.53E-01
Mu					3.24E-01	3.46E-01	4.26E-01
Omega						2.38E-01	4.34E-01
Sigma							3.07E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.18	0.26	0.35	0.44	0.53	0.61	0.70
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 2.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.244

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9803922	0.9949096	0.9976973	0.9999812	9.640E+01	4.932E-01	--
α_2	1.88E-05	5.09E-03	2.30E-03	1.96E-02	4.932E-01	9.640E+01	1.132

CCCG = 3, Gamma = 0.245

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9858958	0.9951834	0.9965763	0.9997145	2.189E+02	1.059E+00	--
α_2	5.76E-05	3.08E-03	1.82E-03	1.04E-02	7.137E-01	2.312E+02	1.073
α_3	6.26E-07	1.74E-03	5.27E-04	7.59E-03	3.458E-01	1.984E+02	1.252

CCCG = 4, Gamma = 0.246

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9890022	0.9952718	0.9959867	0.9990977	4.451E+02	2.115E+00	--
α_2	4.20E-04	3.39E-03	2.70E-03	8.73E-03	1.549E+00	4.552E+02	1.064
α_3	1.93E-08	6.19E-04	1.21E-04	2.94E-03	2.646E-01	4.274E+02	1.137
α_4	7.93E-08	7.18E-04	1.76E-04	3.28E-03	3.010E-01	4.190E+02	1.159

CCCG = 5, Gamma = 0.247

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9927451	0.9959706	0.9962179	0.9983514	1.316E+03	5.325E+00	--
α_2	8.59E-04	2.69E-03	2.45E-03	5.35E-03	3.632E+00	1.345E+03	1.042
α_3	1.04E-04	1.06E-03	8.11E-04	2.85E-03	1.354E+00	1.280E+03	1.097
α_4	2.32E-08	2.45E-04	5.84E-05	1.12E-03	2.961E-01	1.209E+03	1.161
α_5	1.05E-34	3.51E-05	3.87E-11	1.74E-04	4.243E-02	1.208E+03	1.163

CCCG = 6, Gamma = 0.248

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9925079	0.9959153	0.9961855	0.9984001	1.203E+03	4.936E+00	--
α_2	6.10E-04	2.29E-03	2.04E-03	4.85E-03	2.915E+00	1.268E+03	0.999
α_3	9.18E-05	1.08E-03	8.08E-04	2.97E-03	1.257E+00	1.167E+03	1.087
α_4	1.83E-06	4.50E-04	2.06E-04	1.72E-03	5.031E-01	1.118E+03	1.135
α_5	2.96E-15	1.02E-04	1.35E-06	5.87E-04	1.155E-01	1.128E+03	1.125
α_6	7.63E-13	1.63E-04	5.98E-06	9.04E-04	1.451E-01	8.888E+02	1.429

CCCG = 7, Gamma = 0.249

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9942406	0.9963550	0.9964791	0.9980455	2.639E+03	9.654E+00	--
α_2	6.63E-04	1.71E-03	1.60E-03	3.16E-03	4.851E+00	2.828E+03	0.965
α_3	2.86E-04	1.12E-03	9.88E-04	2.39E-03	2.800E+00	2.502E+03	1.091
α_4	5.71E-05	5.59E-04	4.32E-04	1.50E-03	1.384E+00	2.475E+03	1.104
α_5	7.02E-07	1.98E-04	8.87E-05	7.67E-04	4.902E-01	2.471E+03	1.106
α_6	1.19E-15	5.02E-05	6.36E-07	2.88E-04	1.146E-01	2.284E+03	1.197
α_7	3.89E-93	7.41E-06	7.88E-25	8.80E-06	1.464E-02	1.977E+03	1.383

CCCG = 8, Gamma = 0.250

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940142	0.9964419	0.9966053	0.9983121	2.002E+03	7.148E+00	--
α_2	3.73E-04	1.38E-03	1.23E-03	2.89E-03	2.980E+00	2.162E+03	0.956
α_3	1.73E-04	9.97E-04	8.34E-04	2.38E-03	1.960E+00	1.965E+03	1.053
α_4	4.64E-05	6.34E-04	4.65E-04	1.80E-03	1.166E+00	1.837E+03	1.126
α_5	1.61E-06	2.83E-04	1.37E-04	1.06E-03	5.375E-01	1.896E+03	1.092
α_6	2.06E-11	9.34E-05	7.25E-06	4.94E-04	1.805E-01	1.932E+03	1.072
α_7	1.43E-35	2.77E-05	2.07E-11	1.35E-04	4.139E-02	1.496E+03	1.384
α_8	8.92E-09	1.46E-04	3.22E-05	6.82E-04	2.827E-01	1.933E+03	1.071

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	5.09E-03	3.08E-03	3.39E-03	2.69E-03	2.29E-03	1.71E-03	1.38E-03
α_3		1.74E-03	6.19E-04	1.06E-03	1.08E-03	1.12E-03	9.97E-04
α_4			7.18E-04	2.45E-04	4.50E-04	5.59E-04	6.34E-04
α_5				3.51E-05	1.02E-04	1.98E-04	2.83E-04
α_6					1.63E-04	5.02E-05	9.34E-05
α_7						7.41E-06	2.77E-05
α_8							1.46E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.95E-01	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	5.09E-03	4.82E-03	4.73E-03	4.03E-03	4.08E-03	3.65E-03	3.56E-03
Gamma		3.61E-01	2.83E-01	3.32E-01	4.39E-01	5.30E-01	6.13E-01
Delta			5.37E-01	2.09E-01	3.99E-01	4.22E-01	5.43E-01
Epsilon				1.26E-01	3.71E-01	3.14E-01	4.65E-01
Mu					6.15E-01	2.25E-01	4.85E-01
Omega						1.29E-01	6.51E-01
Sigma							8.41E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.65	0.97	1.30	1.62	1.95	2.27	2.60
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.11 Generators

2.11.1 Emergency Diesel Generators

2.11.1.1 EPS-EDG-FS: Emergency Diesel Generators Fail to Start

Generic CCF Parameters

System Group: Electrical
System: Emergency Power Supply
Component Group: Emergency Power
Component Type: Generator
Component Subtype: Emergency Diesel Generator
Failure Mode: Fail to Start
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 153.4

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9783559	0.9917164	0.9934749	0.9990540	0.9935233	1.758E+02	1.469E+00
α_2	9.44E-04	8.28E-03	6.52E-03	2.16E-02	6.48E-03	1.469E+00	1.758E+02

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9829993	0.9926672	0.9937659	0.9985853	0.9956729	2.881E+02	2.128E+00
α_2	4.57E-04	4.66E-03	3.58E-03	1.25E-02	2.16E-03	1.351E+00	2.889E+02
α_3	6.69E-05	2.68E-03	1.66E-03	8.76E-03	2.16E-03	7.768E-01	2.894E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9847153	0.9927726	0.9935785	0.9980879	0.9967511	3.975E+02	2.894E+00
α_2	4.48E-04	3.77E-03	2.98E-03	9.78E-03	8.12E-04	1.510E+00	3.989E+02
α_3	8.84E-05	2.25E-03	1.50E-03	7.00E-03	1.62E-03	9.024E-01	3.995E+02
α_4	3.87E-06	1.20E-03	5.30E-04	4.68E-03	8.12E-04	4.815E-01	3.999E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9855869	0.9923421	0.9928990	0.9971860	0.9973992	5.743E+02	4.432E+00
α_2	6.50E-04	3.54E-03	2.99E-03	8.32E-03	3.25E-04	2.049E+00	5.767E+02
α_3	2.65E-04	2.46E-03	1.92E-03	6.51E-03	9.75E-04	1.424E+00	5.773E+02
α_4	3.00E-05	1.31E-03	7.97E-04	4.33E-03	9.75E-04	7.572E-01	5.780E+02
α_5	4.02E-10	3.49E-04	3.70E-05	1.79E-03	3.25E-04	2.017E-01	5.786E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
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α_1	0.9870951	0.9929954	0.9934630	0.9972884	0.9978317	6.854E+02	4.835E+00
α_2	3.85E-04	2.55E-03	2.09E-03	6.30E-03	1.36E-04	1.764E+00	6.885E+02
α_3	2.36E-04	2.11E-03	1.65E-03	5.55E-03	5.42E-04	1.457E+00	6.888E+02
α_4	6.71E-05	1.41E-03	9.64E-04	4.26E-03	8.13E-04	9.710E-01	6.893E+02
α_5	1.94E-06	6.82E-04	2.94E-04	2.68E-03	5.42E-04	4.711E-01	6.898E+02
α_6	2.60E-11	2.50E-04	1.68E-05	1.33E-03	1.36E-04	1.723E-01	6.901E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9874557	0.9926294	0.9929868	0.9965935	0.9981409	9.087E+02	6.747E+00
α_2	5.15E-04	2.48E-03	2.13E-03	5.66E-03	5.81E-05	2.274E+00	9.132E+02
α_3	2.99E-04	1.95E-03	1.60E-03	4.79E-03	2.90E-04	1.786E+00	9.137E+02
α_4	1.58E-04	1.52E-03	1.18E-03	4.07E-03	5.81E-04	1.395E+00	9.141E+02
α_5	3.48E-05	9.59E-04	6.29E-04	3.01E-03	5.81E-04	8.779E-01	9.146E+02
α_6	1.43E-07	3.80E-04	1.16E-04	1.66E-03	2.90E-04	3.478E-01	9.151E+02
α_7	1.30E-23	7.22E-05	1.79E-08	4.12E-04	5.81E-05	6.605E-02	9.154E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9886568	0.9933433	0.9936628	0.9969288	0.9983729	1.004E+03	6.726E+00
α_2	3.66E-04	2.01E-03	1.70E-03	4.75E-03	2.54E-05	2.034E+00	1.008E+03
α_3	1.69E-04	1.47E-03	1.16E-03	3.84E-03	1.53E-04	1.484E+00	1.009E+03
α_4	1.16E-04	1.28E-03	9.73E-04	3.51E-03	3.81E-04	1.296E+00	1.009E+03
α_5	5.35E-05	1.00E-03	7.01E-04	2.99E-03	5.08E-04	1.015E+00	1.009E+03
α_6	4.84E-06	5.78E-04	2.99E-04	2.10E-03	3.81E-04	5.841E-01	1.010E+03
α_7	2.28E-10	2.00E-04	2.11E-05	1.03E-03	1.53E-04	2.016E-01	1.010E+03
α_8	9.74E-16	1.09E-04	1.13E-06	6.29E-04	2.54E-05	1.103E-01	1.010E+03

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.93E-01	9.93E-01	9.92E-01	9.93E-01	9.93E-01	9.93E-01
α_2	8.28E-03	4.66E-03	3.77E-03	3.54E-03	2.55E-03	2.48E-03	2.01E-03
α_3		2.68E-03	2.25E-03	2.46E-03	2.11E-03	1.95E-03	1.47E-03
α_4			1.20E-03	1.31E-03	1.41E-03	1.52E-03	1.28E-03
α_5				3.49E-04	6.82E-04	9.59E-04	1.00E-03
α_6					2.50E-04	3.80E-04	5.78E-04
α_7						7.22E-05	2.00E-04
α_8							1.09E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.93E-01	9.93E-01	9.92E-01	9.93E-01	9.93E-01	9.93E-01
Beta	8.28E-03	7.33E-03	7.23E-03	7.66E-03	7.00E-03	7.37E-03	6.66E-03
Gamma		3.65E-01	4.78E-01	5.38E-01	6.35E-01	6.63E-01	6.98E-01
Delta			3.48E-01	4.02E-01	5.26E-01	6.01E-01	6.84E-01
Epsilon				2.10E-01	3.99E-01	4.81E-01	5.96E-01
Mu					2.68E-01	3.20E-01	4.69E-01

Omega						1.60E-01	3.48E-01
Sigma							3.54E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	153.40	230.10	306.80	383.50	460.20	536.90	613.60
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313	0.0156
N₃		0.5000	0.5000	0.3750	0.2500	0.1563	0.0938
N₄			0.2500	0.3750	0.3750	0.3125	0.2344
N₅				0.1250	0.2500	0.3125	0.3125
N₆					0.0625	0.1563	0.2344
N₇						0.0313	0.0938
N₈							0.0156

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 72.8

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.472

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9877076	0.9968341	0.9985972	0.9999896	1.522E+02	4.834E-01	--
α_2	1.04E-05	3.17E-03	1.40E-03	1.23E-02	4.834E-01	1.522E+02	0.767

CCCG = 3, Gamma = 0.473

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9906194	0.9966324	0.9974868	0.9997263	3.627E+02	1.226E+00	--
α_2	1.19E-04	2.47E-03	1.70E-03	7.44E-03	9.769E-01	3.953E+02	0.606
α_3	1.44E-08	9.02E-04	1.56E-04	4.37E-03	2.487E-01	2.754E+02	0.871

CCCG = 4, Gamma = 0.473

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9909423	0.9961408	0.9967409	0.9992882	5.310E+02	2.057E+00	--
α_2	2.55E-04	2.32E-03	1.82E-03	6.13E-03	1.442E+00	6.192E+02	0.531
α_3	1.28E-06	1.02E-03	3.84E-04	4.21E-03	4.114E-01	4.017E+02	0.820
α_4	6.72E-10	5.13E-04	5.58E-05	2.63E-03	2.036E-01	3.971E+02	0.830

CCCG = 5, Gamma = 0.473

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9910889	0.9954963	0.9958933	0.9985474	8.141E+02	3.683E+00	--
α_2	4.92E-04	2.41E-03	2.07E-03	5.52E-03	2.243E+00	9.274E+02	0.577
α_3	6.65E-05	1.32E-03	9.15E-04	3.97E-03	9.912E-01	7.481E+02	0.716
α_4	4.29E-07	6.30E-04	2.13E-04	2.67E-03	3.765E-01	5.971E+02	0.898
α_5	1.19E-21	1.38E-04	7.84E-08	7.95E-04	7.237E-02	5.260E+02	1.019

CCCG = 6, Gamma = 0.474

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9919522	0.9958047	0.9961347	0.9985302	9.824E+02	4.139E+00	--
α_2	3.48E-04	1.82E-03	1.54E-03	4.22E-03	2.128E+00	1.170E+03	0.531
α_3	8.23E-05	1.19E-03	8.68E-04	3.42E-03	1.134E+00	9.482E+02	0.656
α_4	4.61E-06	7.06E-04	3.50E-04	2.61E-03	5.533E-01	7.832E+02	0.795
α_5	1.27E-09	3.25E-04	4.34E-05	1.63E-03	2.210E-01	6.789E+02	0.917
α_6	1.97E-16	1.54E-04	1.07E-06	8.95E-04	1.027E-01	6.651E+02	0.936

CCCG = 7, Gamma = 0.474

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9921018	0.9954134	0.9956467	0.9979285	1.396E+03	6.432E+00	--
α_2	4.50E-04	1.73E-03	1.53E-03	3.69E-03	2.840E+00	1.637E+03	0.575
α_3	1.88E-04	1.27E-03	1.04E-03	3.14E-03	1.746E+00	1.375E+03	0.684
α_4	5.43E-05	8.72E-04	6.23E-04	2.54E-03	1.084E+00	1.242E+03	0.758
α_5	2.78E-06	4.89E-04	2.37E-04	1.83E-03	5.376E-01	1.099E+03	0.857
α_6	1.74E-10	1.98E-04	2.00E-05	1.03E-03	1.979E-01	9.972E+02	0.945
α_7	6.28E-53	2.80E-05	2.81E-15	9.58E-05	2.656E-02	9.472E+02	0.995

CCCG = 8, Gamma = 0.474

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928903	0.9959200	0.9961385	0.9982036	1.492E+03	6.112E+00	--
α_2	2.85E-04	1.32E-03	1.14E-03	2.96E-03	2.364E+00	1.792E+03	0.545
α_3	1.17E-04	9.86E-04	7.79E-04	2.56E-03	1.512E+00	1.533E+03	0.638
α_4	4.55E-05	7.77E-04	5.51E-04	2.28E-03	1.056E+00	1.357E+03	0.720
α_5	8.21E-06	5.42E-04	3.09E-04	1.87E-03	6.745E-01	1.244E+03	0.786
α_6	3.73E-08	2.78E-04	7.05E-05	1.26E-03	3.076E-01	1.108E+03	0.883
α_7	7.59E-16	1.09E-04	1.07E-06	6.26E-04	1.093E-01	1.006E+03	0.972
α_8	1.10E-18	7.13E-05	1.98E-07	4.16E-04	8.885E-02	1.246E+03	0.785

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.96E-01	9.95E-01	9.96E-01	9.95E-01	9.96E-01
α_2	3.17E-03	2.47E-03	2.32E-03	2.41E-03	1.82E-03	1.73E-03	1.32E-03
α_3		9.02E-04	1.02E-03	1.32E-03	1.19E-03	1.27E-03	9.86E-04
α_4			5.13E-04	6.30E-04	7.06E-04	8.72E-04	7.77E-04
α_5				1.38E-04	3.25E-04	4.89E-04	5.42E-04
α_6					1.54E-04	1.98E-04	2.78E-04
α_7						2.80E-05	1.09E-04
α_8							7.13E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.96E-01	9.95E-01	9.96E-01	9.95E-01	9.96E-01
Beta	3.17E-03	3.37E-03	3.86E-03	4.50E-03	4.20E-03	4.59E-03	4.08E-03
Gamma		2.68E-01	3.98E-01	4.64E-01	5.67E-01	6.22E-01	6.77E-01
Delta			3.34E-01	3.67E-01	4.98E-01	5.56E-01	6.43E-01
Epsilon				1.79E-01	4.05E-01	4.51E-01	5.62E-01
Mu					3.22E-01	3.17E-01	4.58E-01
Omega						1.24E-01	3.93E-01
Sigma							3.96E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	72.80	109.20	145.60	182.00	218.40	254.80	291.20
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 30.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.194

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9689007	0.9921780	0.9967443	0.9999828	5.705E+01	4.498E-01	--
α_2	1.72E-05	7.82E-03	3.26E-03	3.11E-02	4.498E-01	5.705E+01	0.767

CCCG = 3, Gamma = 0.195

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9728933	0.9903704	0.9928787	0.9992742	1.212E+02	1.178E+00	--
α_2	3.09E-04	7.04E-03	4.78E-03	2.15E-02	9.387E-01	1.323E+02	0.606
α_3	2.70E-08	2.58E-03	4.16E-04	1.27E-02	2.396E-01	9.245E+01	0.871

CCCG = 4, Gamma = 0.195

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9745978	0.9894169	0.9911735	0.9982290	1.775E+02	1.898E+00	--
α_2	5.44E-04	6.08E-03	4.61E-03	1.66E-02	1.285E+00	2.100E+02	0.531
α_3	2.64E-06	2.87E-03	1.02E-03	1.20E-02	3.927E-01	1.365E+02	0.820
α_4	6.26E-09	1.63E-03	2.18E-04	8.19E-03	2.207E-01	1.350E+02	0.830

CCCG = 5, Gamma = 0.195

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9747948	0.9873943	0.9885431	0.9960679	2.746E+02	3.506E+00	--
α_2	1.11E-03	6.24E-03	5.24E-03	1.48E-02	1.992E+00	3.172E+02	0.577
α_3	2.58E-04	4.19E-03	3.00E-03	1.22E-02	1.078E+00	2.561E+02	0.716
α_4	9.29E-07	1.77E-03	5.72E-04	7.60E-03	3.632E-01	2.047E+02	0.898
α_5	3.70E-21	4.01E-04	2.32E-07	2.32E-03	7.248E-02	1.805E+02	1.019

CCCG = 6, Gamma = 0.195

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9774242	0.9881561	0.9890614	0.9957955	3.503E+02	4.199E+00	--
α_2	7.82E-04	4.56E-03	3.81E-03	1.09E-02	1.941E+00	4.240E+02	0.531
α_3	3.69E-04	3.86E-03	2.96E-03	1.05E-02	1.332E+00	3.436E+02	0.656
α_4	2.32E-05	2.17E-03	1.17E-03	7.72E-03	6.181E-01	2.842E+02	0.795
α_5	6.42E-09	9.37E-04	1.39E-04	4.64E-03	2.313E-01	2.465E+02	0.917
α_6	2.90E-20	3.18E-04	2.99E-07	1.85E-03	7.684E-02	2.416E+02	0.936

CCCG = 7, Gamma = 0.195

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9772347	0.9868470	0.9875269	0.9941375	4.669E+02	6.223E+00	--
α_2	1.16E-03	4.77E-03	4.19E-03	1.03E-02	2.654E+00	5.541E+02	0.575
α_3	4.79E-04	3.52E-03	2.84E-03	8.88E-03	1.645E+00	4.658E+02	0.684
α_4	1.76E-04	2.64E-03	1.91E-03	7.60E-03	1.115E+00	4.211E+02	0.758
α_5	1.56E-05	1.62E-03	8.55E-04	5.80E-03	6.034E-01	3.728E+02	0.857
α_6	9.33E-11	5.26E-04	3.91E-05	2.79E-03	1.780E-01	3.384E+02	0.945
α_7	4.63E-51	8.50E-05	1.74E-14	3.00E-04	2.734E-02	3.216E+02	0.995

CCCG = 8, Gamma = 0.195

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9793805	0.9880810	0.9886964	0.9946802	5.178E+02	6.246E+00	--
α_2	9.17E-04	3.99E-03	3.47E-03	8.81E-03	2.504E+00	6.256E+02	0.545
α_3	2.83E-04	2.64E-03	2.06E-03	7.00E-03	1.419E+00	5.355E+02	0.638
α_4	1.19E-04	2.16E-03	1.52E-03	6.40E-03	1.027E+00	4.743E+02	0.720
α_5	3.47E-05	1.68E-03	1.01E-03	5.63E-03	7.337E-01	4.348E+02	0.786
α_6	1.02E-06	1.03E-03	3.70E-04	4.27E-03	3.975E-01	3.873E+02	0.883
α_7	2.19E-20	2.19E-04	2.10E-07	1.27E-03	7.703E-02	3.522E+02	0.972
α_8	1.86E-18	2.01E-04	5.01E-07	1.17E-03	8.749E-02	4.360E+02	0.785

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.90E-01	9.89E-01	9.87E-01	9.88E-01	9.87E-01	9.88E-01
α_2	7.82E-03	7.04E-03	6.08E-03	6.24E-03	4.56E-03	4.77E-03	3.99E-03
α_3		2.58E-03	2.87E-03	4.19E-03	3.86E-03	3.52E-03	2.64E-03
α_4			1.63E-03	1.77E-03	2.17E-03	2.64E-03	2.16E-03
α_5				4.01E-04	9.37E-04	1.62E-03	1.68E-03
α_6					3.18E-04	5.26E-04	1.03E-03
α_7						8.50E-05	2.19E-04
α_8							2.01E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.90E-01	9.89E-01	9.87E-01	9.88E-01	9.87E-01	9.88E-01
Beta	7.82E-03	9.63E-03	1.06E-02	1.26E-02	1.18E-02	1.32E-02	1.19E-02
Gamma		2.68E-01	4.25E-01	5.05E-01	6.15E-01	6.38E-01	6.66E-01
Delta			3.63E-01	3.41E-01	4.70E-01	5.80E-01	6.67E-01
Epsilon				1.85E-01	3.66E-01	4.57E-01	5.92E-01
Mu					2.53E-01	2.74E-01	4.62E-01
Omega						1.39E-01	2.90E-01
Sigma							4.79E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	30.00	45.00	60.00	75.00	90.00	105.00	120.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 2.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.014

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8385411	0.9612496	0.9858817	0.9999697	9.429E+00	3.801E-01	--
α_2	3.03E-05	3.88E-02	1.41E-02	1.61E-01	3.801E-01	9.429E+00	0.767

CCCG = 3, Gamma = 0.014

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8825293	0.9605406	0.9723586	0.9981013	2.337E+01	9.600E-01	--
α_2	3.62E-04	2.42E-02	1.40E-02	8.28E-02	6.673E-01	2.691E+01	0.606
α_3	1.34E-06	1.53E-02	3.69E-03	7.02E-02	2.927E-01	1.889E+01	0.871

CCCG = 4, Gamma = 0.014

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9017936	0.9602006	0.9672920	0.9943148	4.027E+01	1.669E+00	--
α_2	1.18E-03	2.05E-02	1.46E-02	6.00E-02	1.039E+00	4.962E+01	0.531
α_3	1.03E-05	1.18E-02	4.23E-03	4.95E-02	3.887E-01	3.243E+01	0.820
α_4	8.61E-08	7.44E-03	1.23E-03	3.64E-02	2.414E-01	3.218E+01	0.830

CCCG = 5, Gamma = 0.014

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9266307	0.9630271	0.9662578	0.9883748	9.082E+01	3.487E+00	--
α_2	2.53E-03	1.63E-02	1.35E-02	3.98E-02	1.791E+00	1.081E+02	0.577
α_3	1.08E-03	1.36E-02	1.02E-02	3.80E-02	1.207E+00	8.730E+01	0.716
α_4	1.09E-05	6.15E-03	2.46E-03	2.48E-02	4.340E-01	7.016E+01	0.898
α_5	1.96E-26	8.84E-04	3.15E-08	4.87E-03	5.493E-02	6.211E+01	1.019

CCCG = 6, Gamma = 0.014

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9369305	0.9672965	0.9698746	0.9888491	1.155E+02	3.905E+00	--
α_2	8.66E-04	8.99E-03	6.90E-03	2.43E-02	1.335E+00	1.471E+02	0.531
α_3	1.56E-03	1.27E-02	1.01E-02	3.27E-02	1.531E+00	1.187E+02	0.656
α_4	1.40E-04	7.24E-03	4.31E-03	2.43E-02	7.191E-01	9.854E+01	0.795
α_5	4.20E-08	2.87E-03	4.91E-04	1.39E-02	2.467E-01	8.576E+01	0.917
α_6	9.50E-21	8.64E-04	5.20E-07	5.01E-03	7.279E-02	8.417E+01	0.936

CCCG = 7, Gamma = 0.014

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9446725	0.9684129	0.9701090	0.9863591	1.769E+02	5.770E+00	--
α_2	8.60E-04	6.93E-03	5.52E-03	1.78E-02	1.549E+00	2.221E+02	0.575
α_3	1.88E-03	1.06E-02	8.91E-03	2.50E-02	1.989E+00	1.858E+02	0.684
α_4	6.82E-04	7.59E-03	5.76E-03	2.07E-02	1.287E+00	1.683E+02	0.758
α_5	7.69E-05	4.61E-03	2.67E-03	1.57E-02	6.913E-01	1.493E+02	0.857
α_6	1.26E-08	1.71E-03	2.58E-04	8.46E-03	2.327E-01	1.358E+02	0.945
α_7	1.11E-64	1.63E-04	2.48E-17	4.12E-04	2.112E-02	1.292E+02	0.995

CCCG = 8, Gamma = 0.014

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9525587	0.9717225	0.9729816	0.9865864	2.411E+02	7.016E+00	--
α_2	6.50E-04	5.06E-03	4.06E-03	1.29E-02	1.583E+00	3.110E+02	0.545
α_3	1.32E-03	7.43E-03	6.24E-03	1.76E-02	1.986E+00	2.652E+02	0.638
α_4	9.88E-04	7.07E-03	5.74E-03	1.77E-02	1.672E+00	2.349E+02	0.720
α_5	2.47E-04	4.66E-03	3.26E-03	1.39E-02	1.011E+00	2.157E+02	0.786
α_6	2.24E-05	2.96E-03	1.51E-03	1.08E-02	5.709E-01	1.924E+02	0.883
α_7	2.37E-10	1.03E-03	8.08E-05	5.46E-03	1.809E-01	1.751E+02	0.972
α_8	8.28E-108	5.74E-05	1.73E-27	4.29E-05	1.245E-02	2.170E+02	0.785

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.61E-01	9.61E-01	9.60E-01	9.63E-01	9.67E-01	9.68E-01	9.72E-01
α_2	3.88E-02	2.42E-02	2.05E-02	1.63E-02	8.99E-03	6.93E-03	5.06E-03
α_3		1.53E-02	1.18E-02	1.36E-02	1.27E-02	1.06E-02	7.43E-03
α_4			7.44E-03	6.15E-03	7.24E-03	7.59E-03	7.07E-03
α_5				8.84E-04	2.87E-03	4.61E-03	4.66E-03
α_6					8.64E-04	1.71E-03	2.96E-03
α_7						1.63E-04	1.03E-03
α_8							5.74E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.61E-01	9.61E-01	9.60E-01	9.63E-01	9.67E-01	9.68E-01	9.72E-01
Beta	3.88E-02	3.95E-02	3.98E-02	3.70E-02	3.27E-02	3.16E-02	2.83E-02
Gamma		3.87E-01	4.85E-01	5.59E-01	7.25E-01	7.81E-01	8.21E-01
Delta			3.86E-01	3.40E-01	4.63E-01	5.71E-01	6.80E-01
Epsilon				1.26E-01	3.40E-01	4.61E-01	5.52E-01
Mu					2.31E-01	2.89E-01	4.65E-01
Omega						8.72E-02	2.69E-01
Sigma							5.27E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.10	3.15	4.20	5.25	6.30	7.35	8.40
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 39.9

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.265

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9551831	0.9827675	0.9863727	0.9980178	8.387E+01	1.471E+00	--
α_2	1.98E-03	1.72E-02	1.36E-02	4.48E-02	1.471E+00	8.387E+01	0.767

CCCG = 3, Gamma = 0.263

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9720214	0.9879546	0.9897624	0.9977064	1.724E+02	2.103E+00	--
α_2	5.98E-04	6.44E-03	4.92E-03	1.75E-02	1.310E+00	2.020E+02	0.606
α_3	1.49E-04	5.60E-03	3.51E-03	1.82E-02	7.921E-01	1.406E+02	0.871

CCCG = 4, Gamma = 0.263

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787822	0.9898963	0.9909908	0.9972700	2.893E+02	2.953E+00	--
α_2	5.33E-04	4.25E-03	3.39E-03	1.09E-02	1.562E+00	3.663E+02	0.531
α_3	1.67E-04	3.90E-03	2.63E-03	1.20E-02	9.307E-01	2.374E+02	0.820
α_4	4.85E-06	1.95E-03	8.24E-04	7.72E-03	4.599E-01	2.350E+02	0.830

CCCG = 5, Gamma = 0.262

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9822045	0.9907261	0.9914542	0.9967606	4.387E+02	4.107E+00	--
α_2	5.22E-04	3.34E-03	2.76E-03	8.18E-03	1.809E+00	5.391E+02	0.577
α_3	2.83E-04	3.02E-03	2.31E-03	8.22E-03	1.318E+00	4.346E+02	0.716
α_4	4.98E-05	2.18E-03	1.33E-03	7.20E-03	7.566E-01	3.469E+02	0.898
α_5	3.31E-09	7.31E-04	1.00E-04	3.65E-03	2.237E-01	3.059E+02	1.019

CCCG = 6, Gamma = 0.262

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9850077	0.9918629	0.9924094	0.9968515	5.878E+02	4.822E+00	--
α_2	3.58E-04	2.36E-03	1.93E-03	5.80E-03	1.777E+00	7.523E+02	0.531
α_3	2.20E-04	2.22E-03	1.71E-03	5.98E-03	1.358E+00	6.093E+02	0.656
α_4	1.11E-04	2.03E-03	1.43E-03	6.04E-03	1.026E+00	5.031E+02	0.795
α_5	4.72E-06	1.15E-03	5.29E-04	4.42E-03	5.036E-01	4.363E+02	0.917
α_6	8.88E-12	3.70E-04	1.87E-05	2.01E-03	1.582E-01	4.277E+02	0.936

CCCG = 7, Gamma = 0.261

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9862550	0.9920788	0.9924943	0.9964839	7.759E+02	6.195E+00	--
α_2	4.30E-04	2.23E-03	1.89E-03	5.17E-03	2.136E+00	9.565E+02	0.575
α_3	2.10E-04	1.83E-03	1.44E-03	4.80E-03	1.476E+00	8.034E+02	0.684
α_4	1.66E-04	1.80E-03	1.37E-03	4.91E-03	1.309E+00	7.256E+02	0.758
α_5	4.11E-05	1.30E-03	8.36E-04	4.15E-03	8.374E-01	6.421E+02	0.857
α_6	2.48E-07	6.03E-04	1.87E-04	2.62E-03	3.519E-01	5.827E+02	0.945
α_7	3.77E-19	1.52E-04	2.87E-07	8.86E-04	8.416E-02	5.536E+02	0.995

CCCG = 8, Gamma = 0.261

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9877315	0.9927728	0.9931173	0.9966377	9.385E+02	6.832E+00	--
α_2	3.89E-04	1.91E-03	1.63E-03	4.36E-03	2.245E+00	1.176E+03	0.545
α_3	1.32E-04	1.34E-03	1.03E-03	3.62E-03	1.354E+00	1.006E+03	0.638
α_4	1.26E-04	1.43E-03	1.08E-03	3.94E-03	1.276E+00	8.904E+02	0.720
α_5	8.04E-05	1.32E-03	9.39E-04	3.84E-03	1.075E+00	8.158E+02	0.786
α_6	5.40E-06	7.72E-04	3.87E-04	2.84E-03	5.615E-01	7.267E+02	0.883
α_7	2.00E-09	3.45E-04	4.96E-05	1.72E-03	2.282E-01	6.606E+02	0.972
α_8	6.24E-18	1.13E-04	4.10E-07	6.58E-04	9.245E-02	8.179E+02	0.785

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.83E-01	9.88E-01	9.90E-01	9.91E-01	9.92E-01	9.92E-01	9.93E-01
α_2	1.72E-02	6.44E-03	4.25E-03	3.34E-03	2.36E-03	2.23E-03	1.91E-03
α_3		5.60E-03	3.90E-03	3.02E-03	2.22E-03	1.83E-03	1.34E-03
α_4			1.95E-03	2.18E-03	2.03E-03	1.80E-03	1.43E-03
α_5				7.31E-04	1.15E-03	1.30E-03	1.32E-03
α_6					3.70E-04	6.03E-04	7.72E-04
α_7						1.52E-04	3.45E-04
α_8							1.13E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.83E-01	9.88E-01	9.90E-01	9.91E-01	9.92E-01	9.92E-01	9.93E-01
Beta	1.72E-02	1.20E-02	1.01E-02	9.27E-03	8.14E-03	7.92E-03	7.23E-03
Gamma		4.65E-01	5.80E-01	6.39E-01	7.10E-01	7.19E-01	7.36E-01
Delta			3.33E-01	4.90E-01	6.15E-01	6.78E-01	7.47E-01
Epsilon				2.51E-01	4.28E-01	5.33E-01	6.40E-01
Mu					2.43E-01	3.67E-01	4.83E-01
Omega						2.01E-01	3.72E-01
Sigma							2.47E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	39.90	59.85	79.80	99.75	119.70	139.65	159.60
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313	0.0156
N_3		0.5000	0.5000	0.3750	0.2500	0.1563	0.0938

N₄			0.2500	0.3750	0.3750	0.3125	0.2344
N₅				0.1250	0.2500	0.3125	0.3125
N₆					0.0625	0.1563	0.2344
N₇						0.0313	0.0938
N₈							0.0156

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 8.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.056

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9875978	0.9967828	0.9985482	0.9999882	1.528E+02	4.932E-01	--
α_2	1.18E-05	3.22E-03	1.45E-03	1.24E-02	4.932E-01	1.528E+02	0.767

CCCG = 3, Gamma = 0.056

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9917551	0.9971872	0.9980031	0.9998336	3.756E+02	1.060E+00	--
α_2	3.10E-05	1.66E-03	9.78E-04	5.60E-03	7.137E-01	4.298E+02	0.606
α_3	4.15E-07	1.15E-03	3.49E-04	5.04E-03	3.458E-01	2.991E+02	0.871

CCCG = 4, Gamma = 0.056

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940215	0.9974321	0.9978218	0.9995107	8.214E+02	2.115E+00	--
α_2	2.03E-04	1.64E-03	1.30E-03	4.22E-03	1.549E+00	9.438E+02	0.531
α_3	1.35E-08	4.32E-04	8.45E-05	2.06E-03	2.646E-01	6.122E+02	0.820
α_4	5.49E-08	4.97E-04	1.22E-04	2.27E-03	3.010E-01	6.049E+02	0.830

CCCG = 5, Gamma = 0.056

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9957348	0.9976323	0.9977781	0.9990319	2.243E+03	5.325E+00	--
α_2	4.69E-04	1.47E-03	1.34E-03	2.92E-03	3.632E+00	2.466E+03	0.577
α_3	6.68E-05	6.80E-04	5.22E-04	1.83E-03	1.354E+00	1.989E+03	0.716
α_4	1.77E-08	1.87E-04	4.45E-05	8.57E-04	2.961E-01	1.587E+03	0.898
α_5	9.03E-35	3.04E-05	3.34E-11	1.50E-04	4.243E-02	1.398E+03	1.019

CCCG = 6, Gamma = 0.056

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9957233	0.9976697	0.9978243	0.9990879	2.113E+03	4.936E+00	--
α_2	3.18E-04	1.20E-03	1.06E-03	2.53E-03	2.915E+00	2.432E+03	0.531
α_3	5.44E-05	6.37E-04	4.79E-04	1.76E-03	1.257E+00	1.971E+03	0.656
α_4	1.26E-06	3.09E-04	1.41E-04	1.18E-03	5.031E-01	1.628E+03	0.795
α_5	2.37E-15	8.19E-05	1.08E-06	4.69E-04	1.155E-01	1.411E+03	0.917
α_6	4.91E-13	1.05E-04	3.85E-06	5.82E-04	1.451E-01	1.382E+03	0.936

CCCG = 7, Gamma = 0.056

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9963973	0.9977206	0.9977985	0.9987782	4.226E+03	9.654E+00	--
α_2	3.91E-04	1.01E-03	9.41E-04	1.86E-03	4.851E+00	4.802E+03	0.575
α_3	1.78E-04	6.94E-04	6.13E-04	1.49E-03	2.800E+00	4.033E+03	0.684
α_4	3.88E-05	3.80E-04	2.93E-04	1.02E-03	1.384E+00	3.643E+03	0.758
α_5	5.38E-07	1.52E-04	6.80E-05	5.88E-04	4.902E-01	3.223E+03	0.857
α_6	9.32E-16	3.92E-05	4.97E-07	2.25E-04	1.146E-01	2.923E+03	0.945
α_7	2.77E-93	5.27E-06	5.61E-25	6.27E-06	1.464E-02	2.776E+03	0.995

CCCG = 8, Gamma = 0.056

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9963508	0.9978317	0.9979315	0.9989718	3.289E+03	7.148E+00	--
α_2	2.09E-04	7.73E-04	6.88E-04	1.62E-03	2.980E+00	3.853E+03	0.545
α_3	1.03E-04	5.95E-04	4.97E-04	1.42E-03	1.960E+00	3.295E+03	0.638
α_4	2.92E-05	3.99E-04	2.93E-04	1.13E-03	1.166E+00	2.918E+03	0.720
α_5	1.14E-06	2.01E-04	9.73E-05	7.52E-04	5.375E-01	2.673E+03	0.786
α_6	1.68E-11	7.58E-05	5.88E-06	4.01E-04	1.805E-01	2.380E+03	0.883
α_7	9.89E-36	1.91E-05	1.43E-11	9.36E-05	4.139E-02	2.163E+03	0.972
α_8	6.44E-09	1.06E-04	2.33E-05	4.92E-04	2.827E-01	2.677E+03	0.785

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.97E-01	9.98E-01	9.98E-01	9.98E-01	9.98E-01
α_2	3.22E-03	1.66E-03	1.64E-03	1.47E-03	1.20E-03	1.01E-03	7.73E-04
α_3		1.15E-03	4.32E-04	6.80E-04	6.37E-04	6.94E-04	5.95E-04
α_4			4.97E-04	1.87E-04	3.09E-04	3.80E-04	3.99E-04
α_5				3.04E-05	8.19E-05	1.52E-04	2.01E-04
α_6					1.05E-04	3.92E-05	7.58E-05
α_7						5.27E-06	1.91E-05
α_8							1.06E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.97E-01	9.98E-01	9.98E-01	9.98E-01	9.98E-01
Beta	3.22E-03	2.81E-03	2.57E-03	2.37E-03	2.33E-03	2.28E-03	2.17E-03
Gamma		4.11E-01	3.62E-01	3.79E-01	4.86E-01	5.57E-01	6.44E-01
Delta			5.35E-01	2.42E-01	4.38E-01	4.54E-01	5.74E-01
Epsilon				1.40E-01	3.77E-01	3.41E-01	5.01E-01
Mu					5.62E-01	2.26E-01	4.99E-01
Omega						1.19E-01	6.22E-01
Sigma							8.47E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.60	12.90	17.20	21.50	25.80	30.10	34.40
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.11.1.2 EPS-EDG-LR: Emergency Diesel Generators Fail to Load Run

Generic CCF Parameters

System Group: Electrical
System: Emergency Power Supply
Component Group: Emergency Power
Component Type: Generator
Component Subtype: Emergency Diesel Generator
Failure Mode: Fail to Load and Run
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 181.6

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9804798	0.9944434	0.9969387	0.9999293	0.9981649	1.140E+02	6.369E-01
α_2	6.76E-05	5.56E-03	3.06E-03	1.95E-02	1.84E-03	6.369E-01	1.140E+02

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9790312	0.9916873	0.9932894	0.9988802	0.9963231	1.948E+02	1.633E+00
α_2	6.84E-04	6.90E-03	5.32E-03	1.85E-02	3.68E-03	1.356E+00	1.951E+02
α_3	7.00E-08	1.41E-03	3.00E-04	6.61E-03	0.00E+00	2.768E-01	1.962E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9777499	0.9894552	0.9906135	0.9971904	0.9944745	2.725E+02	2.904E+00
α_2	1.71E-03	8.24E-03	7.09E-03	1.87E-02	5.53E-03	2.270E+00	2.731E+02
α_3	1.58E-06	1.46E-03	5.35E-04	6.06E-03	0.00E+00	4.024E-01	2.750E+02
α_4	5.81E-09	8.41E-04	1.25E-04	4.16E-03	0.00E+00	2.315E-01	2.751E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9802166	0.9894719	0.9902363	0.9961192	0.9955484	4.181E+02	4.448E+00
α_2	1.48E-03	6.17E-03	5.41E-03	1.35E-02	2.99E-03	2.607E+00	4.199E+02
α_3	3.35E-04	3.27E-03	2.53E-03	8.75E-03	1.46E-03	1.383E+00	4.211E+02
α_4	6.87E-07	9.05E-04	3.11E-04	3.82E-03	0.00E+00	3.822E-01	4.221E+02
α_5	1.58E-20	1.82E-04	1.69E-07	1.05E-03	0.00E+00	7.674E-02	4.224E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9822395	0.9903364	0.9909817	0.9962437	0.9962611	4.979E+02	4.858E+00
α_2	8.47E-04	4.31E-03	3.68E-03	9.95E-03	1.71E-03	2.168E+00	5.006E+02
α_3	4.50E-04	3.29E-03	2.66E-03	8.28E-03	1.63E-03	1.652E+00	5.011E+02

α_4	2.54E-05	1.41E-03	8.25E-04	4.77E-03	4.06E-04	7.071E-01	5.020E+02
α_5	1.72E-09	4.40E-04	5.87E-05	2.21E-03	0.00E+00	2.211E-01	5.025E+02
α_6	1.72E-15	2.18E-04	2.21E-06	1.26E-03	0.00E+00	1.098E-01	5.026E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9834630	0.9902693	0.9907378	0.9954878	0.9967671	6.899E+02	6.779E+00
α_2	8.71E-04	3.69E-03	3.23E-03	8.09E-03	1.02E-03	2.570E+00	6.941E+02
α_3	5.55E-04	2.98E-03	2.52E-03	6.98E-03	1.40E-03	2.076E+00	6.946E+02
α_4	1.72E-04	1.87E-03	1.42E-03	5.11E-03	6.96E-04	1.305E+00	6.954E+02
α_5	8.29E-06	8.65E-04	4.57E-04	3.11E-03	1.16E-04	6.024E-01	6.961E+02
α_6	1.51E-10	2.75E-04	2.54E-05	1.43E-03	0.00E+00	1.916E-01	6.965E+02
α_7	3.42E-41	5.00E-05	1.86E-12	2.19E-04	0.00E+00	3.480E-02	6.966E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9848649	0.9911000	0.9915243	0.9958784	0.9971441	7.535E+02	6.767E+00
α_2	6.09E-04	2.96E-03	2.54E-03	6.77E-03	6.48E-04	2.254E+00	7.580E+02
α_3	3.61E-04	2.35E-03	1.93E-03	5.78E-03	1.09E-03	1.788E+00	7.585E+02
α_4	1.77E-04	1.79E-03	1.37E-03	4.81E-03	8.13E-04	1.358E+00	7.589E+02
α_5	2.90E-05	1.05E-03	6.62E-04	3.42E-03	2.71E-04	8.014E-01	7.595E+02
α_6	2.44E-07	4.76E-04	1.53E-04	2.05E-03	3.39E-05	3.621E-01	7.599E+02
α_7	6.93E-16	1.42E-04	1.30E-06	8.19E-04	0.00E+00	1.078E-01	7.602E+02
α_8	1.45E-17	1.25E-04	5.27E-07	7.25E-04	0.00E+00	9.469E-02	7.602E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.92E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01
α_2	5.56E-03	6.90E-03	8.24E-03	6.17E-03	4.31E-03	3.69E-03	2.96E-03
α_3		1.41E-03	1.46E-03	3.27E-03	3.29E-03	2.98E-03	2.35E-03
α_4			8.41E-04	9.05E-04	1.41E-03	1.87E-03	1.79E-03
α_5				1.82E-04	4.40E-04	8.65E-04	1.05E-03
α_6					2.18E-04	2.75E-04	4.76E-04
α_7						5.00E-05	1.42E-04
α_8							1.25E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.92E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01
Beta	5.56E-03	8.31E-03	1.05E-02	1.05E-02	9.66E-03	9.73E-03	8.90E-03
Gamma		1.70E-01	2.18E-01	4.14E-01	5.54E-01	6.21E-01	6.67E-01
Delta			3.65E-01	2.49E-01	3.86E-01	5.07E-01	6.04E-01
Epsilon				1.67E-01	3.19E-01	3.88E-01	5.01E-01
Mu					3.32E-01	2.73E-01	4.13E-01
Omega						1.54E-01	3.59E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	90.80	136.20	181.60	227.00	272.40	317.80	363.20
N₁	0.7633	0.6400	0.1800	0.2175	0.2523	0.2845	0.3143
N₂	0.1683	0.5050	1.0100	0.6823	0.4668	0.3264	0.2361
N₃		0.0000	0.0000	0.3337	0.4453	0.4460	0.3976
N₄			0.0000	0.0000	0.1111	0.2223	0.2964
N₅				0.0000	0.0000	0.0370	0.0988
N₆					0.0000	0.0000	0.0123
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 76.7

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.427

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9848354	0.9956530	0.9975736	0.9999427	1.489E+02	6.501E-01	--
α_2	5.73E-05	4.35E-03	2.43E-03	1.52E-02	6.501E-01	1.489E+02	0.558

CCCG = 3, Gamma = 0.426

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9840924	0.9935852	0.9947600	0.9990615	2.673E+02	1.726E+00	--
α_2	6.53E-04	5.69E-03	4.48E-03	1.48E-02	1.477E+00	2.583E+02	0.729
α_3	1.16E-08	7.29E-04	1.26E-04	3.54E-03	2.487E-01	3.408E+02	0.555

CCCG = 4, Gamma = 0.425

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9811851	0.9909549	0.9919039	0.9974818	3.349E+02	3.057E+00	--
α_2	1.72E-03	7.68E-03	6.68E-03	1.71E-02	2.442E+00	3.155E+02	0.823
α_3	1.12E-06	8.92E-04	3.35E-04	3.67E-03	4.114E-01	4.607E+02	0.567
α_4	6.19E-10	4.72E-04	5.14E-05	2.42E-03	2.036E-01	4.308E+02	0.607

CCCG = 5, Gamma = 0.424

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9847550	0.9917860	0.9923537	0.9968778	5.654E+02	4.683E+00	--
α_2	1.37E-03	5.15E-03	4.58E-03	1.09E-02	2.910E+00	5.623E+02	0.798
α_3	2.27E-04	2.40E-03	1.83E-03	6.52E-03	1.325E+00	5.502E+02	0.818
α_4	3.82E-07	5.60E-04	1.89E-04	2.38E-03	3.765E-01	6.715E+02	0.672
α_5	9.00E-22	1.04E-04	5.92E-08	6.00E-04	7.237E-02	6.961E+02	0.648

CCCG = 6, Gamma = 0.424

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9864383	0.9925244	0.9929965	0.9969982	6.823E+02	5.139E+00	--
α_2	8.44E-04	3.57E-03	3.12E-03	7.83E-03	2.572E+00	7.175E+02	0.723
α_3	3.21E-04	2.52E-03	2.01E-03	6.44E-03	1.578E+00	6.257E+02	0.830
α_4	1.36E-05	9.51E-04	5.36E-04	3.30E-03	6.644E-01	6.983E+02	0.745
α_5	1.06E-09	2.73E-04	3.64E-05	1.37E-03	2.210E-01	8.085E+02	0.644
α_6	2.08E-16	1.63E-04	1.13E-06	9.45E-04	1.027E-01	6.297E+02	0.826

CCCG = 7, Gamma = 0.424

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9880482	0.9928281	0.9931427	0.9965341	1.029E+03	7.432E+00	--
α_2	7.87E-04	2.77E-03	2.49E-03	5.74E-03	3.136E+00	1.128E+03	0.728
α_3	4.64E-04	2.34E-03	1.99E-03	5.38E-03	2.190E+00	9.350E+02	0.878
α_4	1.22E-04	1.33E-03	1.01E-03	3.62E-03	1.306E+00	9.842E+02	0.835
α_5	4.15E-06	5.34E-04	2.73E-04	1.95E-03	5.746E-01	1.075E+03	0.765
α_6	1.55E-10	1.77E-04	1.78E-05	9.13E-04	1.979E-01	1.120E+03	0.735
α_7	5.42E-53	2.42E-05	2.43E-15	8.27E-05	2.656E-02	1.097E+03	0.750

CCCG = 8, Gamma = 0.424

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9890372	0.9934855	0.9937844	0.9969135	1.085E+03	7.112E+00	--
α_2	4.87E-04	2.07E-03	1.81E-03	4.55E-03	2.562E+00	1.234E+03	0.681
α_3	3.19E-04	1.90E-03	1.58E-03	4.58E-03	1.907E+00	9.998E+02	0.840
α_4	1.35E-04	1.37E-03	1.06E-03	3.71E-03	1.352E+00	9.823E+02	0.856
α_5	1.73E-05	7.04E-04	4.34E-04	2.31E-03	7.733E-01	1.097E+03	0.766
α_6	5.27E-08	2.78E-04	7.50E-05	1.24E-03	3.199E-01	1.151E+03	0.731
α_7	6.71E-16	9.60E-05	9.47E-07	5.53E-04	1.093E-01	1.139E+03	0.739
α_8	1.33E-18	8.62E-05	2.39E-07	5.02E-04	8.885E-02	1.031E+03	0.816

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.94E-01	9.91E-01	9.92E-01	9.93E-01	9.93E-01	9.93E-01
α_2	4.35E-03	5.69E-03	7.68E-03	5.15E-03	3.57E-03	2.77E-03	2.07E-03
α_3		7.29E-04	8.92E-04	2.40E-03	2.52E-03	2.34E-03	1.90E-03
α_4			4.72E-04	5.60E-04	9.51E-04	1.33E-03	1.37E-03
α_5				1.04E-04	2.73E-04	5.34E-04	7.04E-04
α_6					1.63E-04	1.77E-04	2.78E-04
α_7						2.42E-05	9.60E-05
α_8							8.62E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.94E-01	9.91E-01	9.92E-01	9.93E-01	9.93E-01	9.93E-01
Beta	4.35E-03	6.41E-03	9.05E-03	8.21E-03	7.48E-03	7.17E-03	6.51E-03
Gamma		1.14E-01	1.51E-01	3.73E-01	5.22E-01	6.13E-01	6.82E-01
Delta			3.46E-01	2.17E-01	3.55E-01	4.69E-01	5.71E-01
Epsilon				1.56E-01	3.15E-01	3.57E-01	4.59E-01
Mu					3.74E-01	2.73E-01	3.95E-01
Omega						1.20E-01	3.96E-01
Sigma							4.73E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	38.35	57.52	76.70	95.87	115.05	134.22	153.40
N_1	0.6667	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.1667	0.5000	1.0000	0.6667	0.4444	0.2963	0.1975
N_3		0.0000	0.0000	0.3333	0.4444	0.4444	0.3951

N₄			0.0000	0.0000	0.1111	0.2222	0.2963
N₅				0.0000	0.0000	0.0370	0.0988
N₆					0.0000	0.0000	0.0123
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 36.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.198

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9689684	0.9921848	0.9967351	0.9999824	5.732E+01	4.515E-01	--
α_2	1.76E-05	7.82E-03	3.26E-03	3.10E-02	4.515E-01	5.732E+01	0.558

CCCG = 3, Gamma = 0.198

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9633986	0.9869560	0.9903222	0.9990051	8.953E+01	1.183E+00	--
α_2	4.88E-04	1.09E-02	7.45E-03	3.32E-02	9.437E-01	8.539E+01	0.729
α_3	2.21E-08	2.11E-03	3.40E-04	1.04E-02	2.396E-01	1.131E+02	0.555

CCCG = 4, Gamma = 0.199

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9615684	0.9839220	0.9865516	0.9972806	1.168E+02	1.908E+00	--
α_2	1.10E-03	1.20E-02	9.18E-03	3.28E-02	1.295E+00	1.062E+02	0.823
α_3	2.31E-06	2.52E-03	8.98E-04	1.05E-02	3.927E-01	1.555E+02	0.567
α_4	5.81E-09	1.51E-03	2.02E-04	7.60E-03	2.207E-01	1.455E+02	0.607

CCCG = 5, Gamma = 0.199

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9641861	0.9820310	0.9836449	0.9943604	1.925E+02	3.522E+00	--
α_2	1.87E-03	1.04E-02	8.74E-03	2.45E-02	2.008E+00	1.915E+02	0.798
α_3	3.53E-04	5.71E-03	4.09E-03	1.66E-02	1.078E+00	1.877E+02	0.818
α_4	8.28E-07	1.58E-03	5.10E-04	6.78E-03	3.632E-01	2.297E+02	0.672
α_5	2.80E-21	3.04E-04	1.76E-07	1.76E-03	7.248E-02	2.383E+02	0.648

CCCG = 6, Gamma = 0.199

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9681409	0.9832337	0.9844962	0.9940131	2.476E+02	4.222E+00	--
α_2	1.30E-03	7.44E-03	6.24E-03	1.77E-02	1.963E+00	2.619E+02	0.723
α_3	5.56E-04	5.80E-03	4.44E-03	1.57E-02	1.333E+00	2.285E+02	0.830
α_4	2.58E-05	2.41E-03	1.30E-03	8.58E-03	6.181E-01	2.555E+02	0.745
α_5	5.35E-09	7.80E-04	1.16E-04	3.87E-03	2.313E-01	2.961E+02	0.644
α_6	3.03E-20	3.33E-04	3.13E-07	1.93E-03	7.684E-02	2.307E+02	0.826

CCCG = 7, Gamma = 0.199

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9693510	0.9822477	0.9831526	0.9920544	3.461E+02	6.254E+00	--
α_2	1.73E-03	7.02E-03	6.18E-03	1.52E-02	2.684E+00	3.799E+02	0.728
α_3	7.08E-04	5.19E-03	4.20E-03	1.31E-02	1.647E+00	3.155E+02	0.878
α_4	2.22E-04	3.34E-03	2.42E-03	9.62E-03	1.115E+00	3.324E+02	0.835
α_5	1.60E-05	1.66E-03	8.77E-04	5.95E-03	6.034E-01	3.633E+02	0.765
α_6	8.34E-11	4.70E-04	3.50E-05	2.49E-03	1.780E-01	3.788E+02	0.735
α_7	4.01E-51	7.36E-05	1.51E-14	2.60E-04	2.734E-02	3.712E+02	0.750

CCCG = 8, Gamma = 0.199

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9720167	0.9837798	0.9846048	0.9927256	3.813E+02	6.287E+00	--
α_2	1.37E-03	5.87E-03	5.13E-03	1.29E-02	2.543E+00	4.308E+02	0.681
α_3	4.35E-04	4.05E-03	3.15E-03	1.07E-02	1.422E+00	3.497E+02	0.840
α_4	1.64E-04	2.98E-03	2.09E-03	8.83E-03	1.027E+00	3.438E+02	0.856
α_5	3.92E-05	1.91E-03	1.14E-03	6.37E-03	7.337E-01	3.842E+02	0.766
α_6	9.80E-07	9.85E-04	3.55E-04	4.10E-03	3.975E-01	4.032E+02	0.731
α_7	1.93E-20	1.93E-04	1.85E-07	1.12E-03	7.703E-02	3.991E+02	0.739
α_8	2.25E-18	2.42E-04	6.05E-07	1.41E-03	8.749E-02	3.612E+02	0.816

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.87E-01	9.84E-01	9.82E-01	9.83E-01	9.82E-01	9.84E-01
α_2	7.82E-03	1.09E-02	1.20E-02	1.04E-02	7.44E-03	7.02E-03	5.87E-03
α_3		2.11E-03	2.52E-03	5.71E-03	5.80E-03	5.19E-03	4.05E-03
α_4			1.51E-03	1.58E-03	2.41E-03	3.34E-03	2.98E-03
α_5				3.04E-04	7.80E-04	1.66E-03	1.91E-03
α_6					3.33E-04	4.70E-04	9.85E-04
α_7						7.36E-05	1.93E-04
α_8							2.42E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.87E-01	9.84E-01	9.82E-01	9.83E-01	9.82E-01	9.84E-01
Beta	7.82E-03	1.30E-02	1.61E-02	1.80E-02	1.68E-02	1.78E-02	1.62E-02
Gamma		1.62E-01	2.51E-01	4.23E-01	5.56E-01	6.05E-01	6.38E-01
Delta			3.75E-01	2.48E-01	3.78E-01	5.16E-01	6.09E-01
Epsilon				1.61E-01	3.16E-01	3.97E-01	5.28E-01
Mu					2.99E-01	2.47E-01	4.27E-01
Omega						1.36E-01	3.06E-01
Sigma							5.56E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	18.05	27.07	36.10	45.12	54.15	63.17	72.20
N_1	0.0967	0.1400	0.1800	0.2175	0.2523	0.2845	0.3143
N_2	0.0017	0.0050	0.0100	0.0157	0.0224	0.0301	0.0385
N_3		0.0000	0.0000	0.0003	0.0008	0.0016	0.0025

N₄			0.0000	0.0000	0.0000	0.0000	0.0001
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.016

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8718116	0.9693458	0.9889860	0.9999764	1.202E+01	3.801E-01	--
α_2	2.36E-05	3.07E-02	1.10E-02	1.28E-01	3.801E-01	1.202E+01	0.558

CCCG = 3, Gamma = 0.016

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8778530	0.9589332	0.9712005	0.9980206	2.242E+01	9.600E-01	--
α_2	4.65E-04	3.08E-02	1.79E-02	1.05E-01	6.673E-01	2.101E+01	0.729
α_3	8.96E-07	1.03E-02	2.46E-03	4.74E-02	2.927E-01	2.817E+01	0.555

CCCG = 4, Gamma = 0.016

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8830960	0.9524429	0.9607948	0.9931666	3.343E+01	1.669E+00	--
α_2	1.94E-03	3.33E-02	2.39E-02	9.67E-02	1.039E+00	3.019E+01	0.823
α_3	7.43E-06	8.58E-03	3.05E-03	3.59E-02	3.887E-01	4.490E+01	0.567
α_4	6.56E-08	5.70E-03	9.40E-04	2.79E-02	2.414E-01	4.209E+01	0.607

CCCG = 5, Gamma = 0.016

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9122285	0.9556461	0.9594646	0.9860022	7.513E+01	3.487E+00	--
α_2	3.61E-03	2.31E-02	1.91E-02	5.62E-02	1.791E+00	7.571E+01	0.798
α_3	1.27E-03	1.60E-02	1.19E-02	4.44E-02	1.207E+00	7.442E+01	0.818
α_4	8.32E-06	4.71E-03	1.88E-03	1.90E-02	4.340E-01	9.170E+01	0.672
α_5	1.28E-26	5.75E-04	2.05E-08	3.17E-03	5.493E-02	9.541E+01	0.648

CCCG = 6, Gamma = 0.016

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9253551	0.9612096	0.9642304	0.9867357	9.675E+01	3.905E+00	--
α_2	1.21E-03	1.25E-02	9.63E-03	3.37E-02	1.335E+00	1.053E+02	0.723
α_3	2.02E-03	1.65E-02	1.32E-02	4.23E-02	1.531E+00	9.135E+01	0.830
α_4	1.34E-04	6.95E-03	4.13E-03	2.33E-02	7.191E-01	1.028E+02	0.745
α_5	3.01E-08	2.06E-03	3.52E-04	1.00E-02	2.467E-01	1.195E+02	0.644
α_6	8.58E-21	7.81E-04	4.70E-07	4.52E-03	7.279E-02	9.319E+01	0.826

CCCG = 7, Gamma = 0.016

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9354904	0.9631110	0.9650703	0.9840372	1.506E+02	5.770E+00	--
α_2	1.11E-03	8.92E-03	7.11E-03	2.29E-02	1.549E+00	1.722E+02	0.728
α_3	2.46E-03	1.38E-02	1.16E-02	3.26E-02	1.989E+00	1.420E+02	0.878
α_4	7.64E-04	8.50E-03	6.46E-03	2.32E-02	1.287E+00	1.501E+02	0.835
α_5	6.98E-05	4.18E-03	2.43E-03	1.43E-02	6.913E-01	1.646E+02	0.765
α_6	9.98E-09	1.35E-03	2.04E-04	6.69E-03	2.327E-01	1.718E+02	0.735
α_7	8.50E-65	1.25E-04	1.90E-17	3.15E-04	2.112E-02	1.685E+02	0.750

CCCG = 8, Gamma = 0.016

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9450244	0.9671900	0.9686374	0.9844122	2.068E+02	7.016E+00	--
α_2	8.24E-04	6.41E-03	5.14E-03	1.64E-02	1.583E+00	2.452E+02	0.681
α_3	1.76E-03	9.93E-03	8.35E-03	2.35E-02	1.986E+00	1.980E+02	0.840
α_4	1.19E-03	8.51E-03	6.91E-03	2.13E-02	1.672E+00	1.947E+02	0.856
α_5	2.44E-04	4.61E-03	3.22E-03	1.37E-02	1.011E+00	2.182E+02	0.766
α_6	1.88E-05	2.48E-03	1.26E-03	9.09E-03	5.709E-01	2.293E+02	0.731
α_7	1.83E-10	7.96E-04	6.23E-05	4.21E-03	1.809E-01	2.272E+02	0.739
α_8	8.73E-108	6.05E-05	1.83E-27	4.53E-05	1.245E-02	2.058E+02	0.816

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.69E-01	9.59E-01	9.52E-01	9.56E-01	9.61E-01	9.63E-01	9.67E-01
α_2	3.07E-02	3.08E-02	3.33E-02	2.31E-02	1.25E-02	8.92E-03	6.41E-03
α_3		1.03E-02	8.58E-03	1.60E-02	1.65E-02	1.38E-02	9.93E-03
α_4			5.70E-03	4.71E-03	6.95E-03	8.50E-03	8.51E-03
α_5				5.75E-04	2.06E-03	4.18E-03	4.61E-03
α_6					7.81E-04	1.35E-03	2.48E-03
α_7						1.25E-04	7.96E-04
α_8							6.05E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.69E-01	9.59E-01	9.52E-01	9.56E-01	9.61E-01	9.63E-01	9.67E-01
Beta	3.07E-02	4.11E-02	4.76E-02	4.44E-02	3.88E-02	3.69E-02	3.28E-02
Gamma		2.50E-01	3.00E-01	4.79E-01	6.77E-01	7.58E-01	8.05E-01
Delta			3.99E-01	2.49E-01	3.73E-01	5.06E-01	6.24E-01
Epsilon				1.09E-01	2.90E-01	4.00E-01	4.83E-01
Mu					2.75E-01	2.61E-01	4.20E-01
Omega						8.48E-02	2.56E-01
Sigma							7.07E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.50	2.25	3.00	3.75	4.50	5.25	6.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 52.3

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.285

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9797029	0.9948179	0.9977546	0.9999852	9.034E+01	4.706E-01	--
α_2	1.48E-05	5.18E-03	2.25E-03	2.03E-02	4.706E-01	9.034E+01	0.558

CCCG = 3, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9786144	0.9925847	0.9946448	0.9995173	1.476E+02	1.103E+00	--
α_2	1.67E-04	5.82E-03	3.69E-03	1.87E-02	8.104E-01	1.385E+02	0.729
α_3	1.34E-07	1.60E-03	3.74E-04	7.37E-03	2.921E-01	1.826E+02	0.555

CCCG = 4, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9792873	0.9913004	0.9927106	0.9984919	2.225E+02	1.953E+00	--
α_2	6.02E-04	6.47E-03	4.94E-03	1.76E-02	1.312E+00	2.014E+02	0.823
α_3	2.46E-06	1.46E-03	5.78E-04	5.93E-03	4.307E-01	2.936E+02	0.567
α_4	1.52E-09	7.64E-04	9.00E-05	3.89E-03	2.099E-01	2.746E+02	0.607

CCCG = 5, Gamma = 0.286

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9817720	0.9911975	0.9921070	0.9975154	3.498E+02	3.107E+00	--
α_2	6.85E-04	4.86E-03	3.95E-03	1.22E-02	1.684E+00	3.449E+02	0.798
α_3	1.23E-04	2.79E-03	1.89E-03	8.51E-03	9.426E-01	3.373E+02	0.818
α_4	6.95E-07	9.26E-04	3.18E-04	3.91E-03	3.816E-01	4.116E+02	0.672
α_5	9.22E-17	2.31E-04	1.26E-06	1.34E-03	9.865E-02	4.268E+02	0.648

CCCG = 6, Gamma = 0.287

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9842479	0.9919489	0.9926288	0.9973272	4.709E+02	3.822E+00	--
α_2	5.00E-04	3.46E-03	2.82E-03	8.60E-03	1.714E+00	4.941E+02	0.723
α_3	1.68E-04	2.57E-03	1.85E-03	7.40E-03	1.108E+00	4.308E+02	0.830
α_4	1.79E-05	1.35E-03	7.53E-04	4.72E-03	6.509E-01	4.806E+02	0.745
α_5	9.01E-09	4.55E-04	8.20E-05	2.20E-03	2.536E-01	5.566E+02	0.644
α_6	3.58E-17	2.21E-04	1.00E-06	1.28E-03	9.572E-02	4.335E+02	0.826

CCCG = 7, Gamma = 0.287

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9851899	0.9918128	0.9923236	0.9966910	6.293E+02	5.195E+00	--
α_2	5.79E-04	3.05E-03	2.59E-03	7.12E-03	2.105E+00	6.874E+02	0.728
α_3	2.17E-04	2.31E-03	1.76E-03	6.28E-03	1.320E+00	5.702E+02	0.878
α_4	8.45E-05	1.66E-03	1.15E-03	4.97E-03	9.967E-01	6.000E+02	0.835
α_5	4.04E-06	8.00E-04	3.80E-04	3.02E-03	5.249E-01	6.553E+02	0.765
α_6	2.13E-10	2.86E-04	2.80E-05	1.48E-03	1.956E-01	6.827E+02	0.735
α_7	2.26E-28	7.91E-05	1.79E-09	4.29E-04	5.291E-02	6.689E+02	0.750

CCCG = 8, Gamma = 0.287

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9866341	0.9924054	0.9928285	0.9967316	7.621E+02	5.832E+00	--
α_2	5.24E-04	2.59E-03	2.21E-03	5.93E-03	2.229E+00	8.591E+02	0.681
α_3	1.55E-04	1.81E-03	1.36E-03	4.99E-03	1.260E+00	6.966E+02	0.840
α_4	8.64E-05	1.52E-03	1.07E-03	4.49E-03	1.042E+00	6.843E+02	0.856
α_5	2.34E-05	9.97E-04	6.10E-04	3.29E-03	7.626E-01	7.643E+02	0.766
α_6	9.32E-08	4.08E-04	1.14E-04	1.81E-03	3.271E-01	8.018E+02	0.731
α_7	1.64E-13	1.69E-04	4.54E-06	9.51E-04	1.344E-01	7.932E+02	0.739
α_8	9.63E-21	1.07E-04	1.00E-07	6.21E-04	7.682E-02	7.181E+02	0.816

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.93E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01	9.92E-01
α_2	5.18E-03	5.82E-03	6.47E-03	4.86E-03	3.46E-03	3.05E-03	2.59E-03
α_3		1.60E-03	1.46E-03	2.79E-03	2.57E-03	2.31E-03	1.81E-03
α_4			7.64E-04	9.26E-04	1.35E-03	1.66E-03	1.52E-03
α_5				2.31E-04	4.55E-04	8.00E-04	9.97E-04
α_6					2.21E-04	2.86E-04	4.08E-04
α_7						7.91E-05	1.69E-04
α_8							1.07E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.93E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01	9.92E-01
Beta	5.18E-03	7.42E-03	8.70E-03	8.80E-03	8.05E-03	8.19E-03	7.59E-03
Gamma		2.15E-01	2.56E-01	4.48E-01	5.71E-01	6.27E-01	6.59E-01
Delta			3.43E-01	2.93E-01	4.42E-01	5.50E-01	6.39E-01
Epsilon				2.00E-01	3.33E-01	4.13E-01	5.25E-01
Mu					3.26E-01	3.14E-01	4.07E-01
Omega						2.16E-01	4.04E-01
Sigma							3.87E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	26.15	39.22	52.30	65.37	78.45	91.52	104.60
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 13.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.074

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9908238	0.9976205	0.9989274	0.9999913	2.068E+02	4.932E-01	--
α_2	8.73E-06	2.38E-03	1.07E-03	9.18E-03	4.932E-01	2.068E+02	0.558

CCCG = 3, Gamma = 0.074

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9919063	0.9972389	0.9980399	0.9998367	3.827E+02	1.060E+00	--
α_2	3.77E-05	2.02E-03	1.19E-03	6.81E-03	7.137E-01	3.532E+02	0.729
α_3	2.67E-07	7.44E-04	2.25E-04	3.25E-03	3.458E-01	4.643E+02	0.555

CCCG = 4, Gamma = 0.074

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9924911	0.9967738	0.9972629	0.9993850	6.533E+02	2.115E+00	--
α_2	3.17E-04	2.56E-03	2.04E-03	6.58E-03	1.549E+00	6.040E+02	0.823
α_3	9.40E-09	3.01E-04	5.89E-05	1.43E-03	2.646E-01	8.779E+02	0.567
α_4	4.05E-08	3.67E-04	8.99E-05	1.68E-03	3.010E-01	8.205E+02	0.607

CCCG = 5, Gamma = 0.074

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9946317	0.9970193	0.9972027	0.9987810	1.781E+03	5.325E+00	--
α_2	6.51E-04	2.04E-03	1.86E-03	4.06E-03	3.632E+00	1.776E+03	0.798
α_3	7.66E-05	7.80E-04	5.99E-04	2.10E-03	1.354E+00	1.735E+03	0.818
α_4	1.33E-08	1.40E-04	3.34E-05	6.43E-04	2.961E-01	2.115E+03	0.672
α_5	5.76E-35	1.94E-05	2.13E-11	9.59E-05	4.243E-02	2.191E+03	0.648

CCCG = 6, Gamma = 0.074

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9947028	0.9971131	0.9973045	0.9988698	1.705E+03	4.936E+00	--
α_2	4.35E-04	1.64E-03	1.45E-03	3.46E-03	2.915E+00	1.779E+03	0.723
α_3	6.91E-05	8.10E-04	6.08E-04	2.24E-03	1.257E+00	1.551E+03	0.830
α_4	1.18E-06	2.91E-04	1.33E-04	1.11E-03	5.031E-01	1.729E+03	0.745
α_5	1.67E-15	5.77E-05	7.61E-07	3.31E-04	1.155E-01	2.001E+03	0.644
α_6	4.35E-13	9.31E-05	3.41E-06	5.16E-04	1.451E-01	1.559E+03	0.826

CCCG = 7, Gamma = 0.074

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9956328	0.9972366	0.9973309	0.9985186	3.484E+03	9.654E+00	--
α_2	4.96E-04	1.28E-03	1.19E-03	2.36E-03	4.851E+00	3.781E+03	0.728
α_3	2.29E-04	8.92E-04	7.89E-04	1.91E-03	2.800E+00	3.136E+03	0.878
α_4	4.28E-05	4.19E-04	3.24E-04	1.12E-03	1.384E+00	3.299E+03	0.835
α_5	4.82E-07	1.36E-04	6.08E-05	5.26E-04	4.902E-01	3.601E+03	0.765
α_6	7.27E-16	3.06E-05	3.87E-07	1.75E-04	1.146E-01	3.750E+03	0.735
α_7	2.10E-93	3.99E-06	4.24E-25	4.73E-06	1.464E-02	3.674E+03	0.750

CCCG = 8, Gamma = 0.074

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9956001	0.9973853	0.9975056	0.9987600	2.727E+03	7.148E+00	--
α_2	2.62E-04	9.68E-04	8.62E-04	2.03E-03	2.980E+00	3.075E+03	0.681
α_3	1.36E-04	7.86E-04	6.57E-04	1.88E-03	1.960E+00	2.492E+03	0.840
α_4	3.48E-05	4.76E-04	3.49E-04	1.35E-03	1.166E+00	2.448E+03	0.856
α_5	1.12E-06	1.97E-04	9.51E-05	7.36E-04	5.375E-01	2.733E+03	0.766
α_6	1.39E-11	6.30E-05	4.88E-06	3.33E-04	1.805E-01	2.866E+03	0.731
α_7	7.55E-36	1.46E-05	1.09E-11	7.14E-05	4.139E-02	2.835E+03	0.739
α_8	6.72E-09	1.10E-04	2.43E-05	5.14E-04	2.827E-01	2.566E+03	0.816

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	2.38E-03	2.02E-03	2.56E-03	2.04E-03	1.64E-03	1.28E-03	9.68E-04
α_3		7.44E-04	3.01E-04	7.80E-04	8.10E-04	8.92E-04	7.86E-04
α_4			3.67E-04	1.40E-04	2.91E-04	4.19E-04	4.76E-04
α_5				1.94E-05	5.77E-05	1.36E-04	1.97E-04
α_6					9.31E-05	3.06E-05	6.30E-05
α_7						3.99E-06	1.46E-05
α_8							1.10E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	2.38E-03	2.76E-03	3.23E-03	2.98E-03	2.89E-03	2.76E-03	2.61E-03
Gamma		2.70E-01	2.07E-01	3.15E-01	4.33E-01	5.36E-01	6.30E-01
Delta			5.49E-01	1.70E-01	3.53E-01	3.98E-01	5.23E-01
Epsilon				1.21E-01	3.41E-01	2.89E-01	4.47E-01
Mu					6.17E-01	2.02E-01	4.88E-01
Omega						1.15E-01	6.65E-01
Sigma							8.83E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.75	10.13	13.50	16.88	20.25	23.63	27.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.11.1.3 EPS-EDG-FR: Emergency Diesel Generators Fail to Run

Generic CCF Parameters

System Group: Electrical
System: Emergency Power Supply
Component Group: Emergency Power
Component Type: Generator
Component Subtype: Emergency Diesel Generator
Failure Mode: Fail to Run
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 181.6

Total Number of Common-Cause Failure Events: 3

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9667472	0.9862465	0.9885732	0.9977766	0.9876264	1.325E+02	1.848E+00
α_2	2.23E-03	1.38E-02	1.14E-02	3.32E-02	1.24E-02	1.848E+00	1.325E+02

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9705371	0.9855576	0.9869717	0.9957530	0.9872090	2.220E+02	3.253E+00
α_2	2.50E-03	1.10E-02	9.55E-03	2.43E-02	9.74E-03	2.470E+00	2.228E+02
α_3	8.93E-05	3.48E-03	2.16E-03	1.13E-02	3.05E-03	7.832E-01	2.245E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9748188	0.9868493	0.9878732	0.9953857	0.9899123	3.092E+02	4.121E+00
α_2	1.42E-03	7.06E-03	6.05E-03	1.62E-02	4.32E-03	2.214E+00	3.111E+02
α_3	4.90E-04	4.55E-03	3.55E-03	1.20E-02	4.63E-03	1.425E+00	3.119E+02
α_4	5.00E-06	1.54E-03	6.79E-04	5.99E-03	1.14E-03	4.823E-01	3.129E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9783404	0.9877019	0.9883897	0.9947283	0.9914891	4.639E+02	5.776E+00
α_2	1.31E-03	5.52E-03	4.83E-03	1.21E-02	2.42E-03	2.591E+00	4.671E+02
α_3	7.35E-04	4.20E-03	3.52E-03	9.99E-03	3.35E-03	1.973E+00	4.677E+02
α_4	1.14E-04	2.15E-03	1.50E-03	6.42E-03	2.28E-03	1.011E+00	4.687E+02
α_5	4.99E-10	4.30E-04	4.57E-05	2.21E-03	4.54E-04	2.018E-01	4.695E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9805690	0.9887547	0.9893304	0.9949677	0.9925704	5.528E+02	6.287E+00
α_2	8.17E-04	4.01E-03	3.43E-03	9.16E-03	1.63E-03	2.240E+00	5.568E+02
α_3	5.81E-04	3.44E-03	2.86E-03	8.24E-03	2.16E-03	1.921E+00	5.571E+02

α_4	2.40E-04	2.43E-03	1.87E-03	6.53E-03	2.31E-03	1.357E+00	5.577E+02
α_5	9.82E-06	1.07E-03	5.60E-04	3.85E-03	1.14E-03	5.968E-01	5.584E+02
α_6	3.22E-11	3.08E-04	2.07E-05	1.65E-03	1.89E-04	1.723E-01	5.589E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9822788	0.9890998	0.9895269	0.9944697	0.9933436	7.538E+02	8.307E+00
α_2	9.03E-04	3.59E-03	3.17E-03	7.73E-03	1.29E-03	2.739E+00	7.594E+02
α_3	5.58E-04	2.84E-03	2.42E-03	6.57E-03	1.40E-03	2.167E+00	7.599E+02
α_4	3.63E-04	2.35E-03	1.94E-03	5.78E-03	1.85E-03	1.794E+00	7.603E+02
α_5	1.01E-04	1.48E-03	1.08E-03	4.25E-03	1.47E-03	1.130E+00	7.610E+02
α_6	6.63E-07	5.39E-04	2.01E-04	2.22E-03	5.69E-04	4.105E-01	7.617E+02
α_7	1.56E-23	8.67E-05	2.15E-08	4.95E-04	8.13E-05	6.605E-02	7.620E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9836866	0.9899496	0.9903405	0.9948815	0.9939306	8.265E+02	8.391E+00
α_2	6.91E-04	3.00E-03	2.62E-03	6.63E-03	1.11E-03	2.506E+00	8.324E+02
α_3	3.41E-04	2.18E-03	1.79E-03	5.32E-03	9.70E-04	1.817E+00	8.330E+02
α_4	2.70E-04	1.98E-03	1.60E-03	4.98E-03	1.34E-03	1.650E+00	8.332E+02
α_5	1.53E-04	1.60E-03	1.22E-03	4.33E-03	1.44E-03	1.333E+00	8.335E+02
α_6	1.89E-05	8.87E-04	5.34E-04	2.96E-03	8.91E-04	7.409E-01	8.341E+02
α_7	2.07E-09	2.79E-04	4.19E-05	1.38E-03	2.85E-04	2.329E-01	8.346E+02
α_8	1.18E-15	1.32E-04	1.37E-06	7.61E-04	3.56E-05	1.103E-01	8.348E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01
α_2	1.38E-02	1.10E-02	7.06E-03	5.52E-03	4.01E-03	3.59E-03	3.00E-03
α_3		3.48E-03	4.55E-03	4.20E-03	3.44E-03	2.84E-03	2.18E-03
α_4			1.54E-03	2.15E-03	2.43E-03	2.35E-03	1.98E-03
α_5				4.30E-04	1.07E-03	1.48E-03	1.60E-03
α_6					3.08E-04	5.39E-04	8.87E-04
α_7						8.67E-05	2.79E-04
α_8							1.32E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01
Beta	1.38E-02	1.44E-02	1.32E-02	1.23E-02	1.12E-02	1.09E-02	1.01E-02
Gamma		2.41E-01	4.63E-01	5.51E-01	6.44E-01	6.70E-01	7.01E-01
Delta			2.53E-01	3.81E-01	5.25E-01	6.11E-01	6.91E-01
Epsilon				1.66E-01	3.62E-01	4.72E-01	5.94E-01
Mu					2.24E-01	2.97E-01	4.48E-01
Omega						1.39E-01	3.17E-01
Sigma							3.21E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	108.96	163.44	217.92	272.40	326.88	381.36	435.84
N₁	1.1347	0.5832	0.6415	0.6561	0.6580	0.6415	0.6127
N₂	1.3793	1.6188	0.9541	0.6666	0.5390	0.4956	0.4881
N₃		0.5064	1.0223	0.9236	0.7135	0.5380	0.4261
N₄			0.2508	0.6286	0.7610	0.7112	0.5883
N₅				0.1251	0.3757	0.5649	0.6309
N₆					0.0625	0.2189	0.3911
N₇						0.0313	0.1250
N₈							0.0156

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 75.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.413

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9618709	0.9853147	0.9883752	0.9982896	9.953E+01	1.483E+00	--
α_2	1.71E-03	1.47E-02	1.16E-02	3.81E-02	1.483E+00	9.953E+01	0.894

CCCG = 3, Gamma = 0.412

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9769510	0.9899092	0.9913477	0.9979491	2.183E+02	2.226E+00	--
α_2	7.45E-04	6.49E-03	5.11E-03	1.69E-02	1.477E+00	2.261E+02	0.876
α_3	7.97E-05	3.60E-03	2.19E-03	1.19E-02	7.487E-01	2.071E+02	0.959

CCCG = 4, Gamma = 0.412

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9810434	0.9908865	0.9918425	0.9974626	3.324E+02	3.057E+00	--
α_2	6.11E-04	4.30E-03	3.50E-03	1.08E-02	1.692E+00	3.914E+02	0.699
α_3	1.37E-04	3.39E-03	2.27E-03	1.05E-02	9.114E-01	2.679E+02	1.023
α_4	3.25E-06	1.42E-03	5.90E-04	5.64E-03	4.536E-01	3.193E+02	0.860

CCCG = 5, Gamma = 0.412

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9846743	0.9917424	0.9923131	0.9968612	5.624E+02	4.683E+00	--
α_2	7.68E-04	3.54E-03	3.06E-03	7.96E-03	2.368E+00	6.659E+02	0.700
α_3	2.55E-04	2.55E-03	1.97E-03	6.86E-03	1.366E+00	5.336E+02	0.874
α_4	3.80E-05	1.70E-03	1.03E-03	5.63E-03	7.515E-01	4.416E+02	1.057
α_5	3.90E-10	4.61E-04	4.63E-05	2.39E-03	1.974E-01	4.275E+02	1.094

CCCG = 6, Gamma = 0.412

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9862603	0.9924260	0.9929043	0.9969585	6.734E+02	5.139E+00	--
α_2	5.36E-04	2.70E-03	2.30E-03	6.21E-03	2.191E+00	8.096E+02	0.666
α_3	2.06E-04	2.01E-03	1.56E-03	5.39E-03	1.384E+00	6.857E+02	0.787
α_4	6.98E-05	1.65E-03	1.11E-03	5.06E-03	9.283E-01	5.624E+02	0.959
α_5	2.59E-06	9.13E-04	3.93E-04	3.58E-03	4.710E-01	5.156E+02	1.047
α_6	1.55E-11	3.01E-04	1.76E-05	1.62E-03	1.652E-01	5.494E+02	0.983

CCCG = 7, Gamma = 0.412

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9881575	0.9928938	0.9932055	0.9965659	1.038E+03	7.432E+00	--
α_2	6.17E-04	2.35E-03	2.09E-03	4.99E-03	2.871E+00	1.219E+03	0.693
α_3	2.95E-04	1.77E-03	1.47E-03	4.26E-03	1.902E+00	1.073E+03	0.787
α_4	1.53E-04	1.47E-03	1.14E-03	3.92E-03	1.397E+00	9.475E+02	0.892
α_5	3.31E-05	1.00E-03	6.48E-04	3.18E-03	8.501E-01	8.475E+02	0.997
α_6	1.91E-07	4.41E-04	1.38E-04	1.91E-03	3.542E-01	8.023E+02	1.054
α_7	2.27E-26	7.14E-05	4.51E-09	3.97E-04	5.781E-02	8.099E+02	1.045

CCCG = 8, Gamma = 0.412

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9890763	0.9935088	0.9938066	0.9969246	1.089E+03	7.112E+00	--
α_2	4.02E-04	1.84E-03	1.59E-03	4.14E-03	2.380E+00	1.288E+03	0.673
α_3	1.81E-04	1.38E-03	1.11E-03	3.52E-03	1.606E+00	1.161E+03	0.747
α_4	1.12E-04	1.25E-03	9.43E-04	3.41E-03	1.290E+00	1.035E+03	0.838
α_5	5.22E-05	1.05E-03	7.24E-04	3.16E-03	9.870E-01	9.391E+02	0.924
α_6	3.68E-06	6.22E-04	3.03E-04	2.32E-03	5.420E-01	8.702E+02	0.997
α_7	3.07E-10	2.43E-04	2.63E-05	1.25E-03	2.031E-01	8.340E+02	1.041
α_8	2.13E-16	1.04E-04	7.96E-07	6.00E-04	1.045E-01	1.007E+03	0.862

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.90E-01	9.91E-01	9.92E-01	9.92E-01	9.93E-01	9.94E-01
α_2	1.47E-02	6.49E-03	4.30E-03	3.54E-03	2.70E-03	2.35E-03	1.84E-03
α_3		3.60E-03	3.39E-03	2.55E-03	2.01E-03	1.77E-03	1.38E-03
α_4			1.42E-03	1.70E-03	1.65E-03	1.47E-03	1.25E-03
α_5				4.61E-04	9.13E-04	1.00E-03	1.05E-03
α_6					3.01E-04	4.41E-04	6.22E-04
α_7						7.14E-05	2.43E-04
α_8							1.04E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.90E-01	9.91E-01	9.92E-01	9.92E-01	9.93E-01	9.94E-01
Beta	1.47E-02	1.01E-02	9.11E-03	8.26E-03	7.57E-03	7.11E-03	6.49E-03
Gamma		3.57E-01	5.28E-01	5.71E-01	6.44E-01	6.69E-01	7.16E-01
Delta			2.95E-01	4.58E-01	5.87E-01	6.28E-01	7.03E-01
Epsilon				2.14E-01	4.24E-01	5.07E-01	6.18E-01
Mu					2.48E-01	3.38E-01	4.80E-01
Omega						1.39E-01	3.58E-01
Sigma							2.99E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	45.00	67.50	90.00	112.50	135.00	157.50	180.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313	0.0156
N_3		0.5000	0.5000	0.3750	0.2500	0.1563	0.0938

N₄			0.2500	0.3750	0.3750	0.3125	0.2344
N₅				0.1250	0.2500	0.3125	0.3125
N₆					0.0625	0.1563	0.2344
N₇						0.0313	0.0938
N₈							0.0156

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 36.5

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.205

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9387460	0.9810790	0.9880862	0.9995057	4.061E+01	7.831E-01	--
α_2	4.94E-04	1.89E-02	1.19E-02	6.13E-02	7.831E-01	4.061E+01	0.894

CCCG = 3, Gamma = 0.204

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9367736	0.9722906	0.9761959	0.9944434	7.643E+01	2.178E+00	--
α_2	4.24E-03	2.44E-02	2.05E-02	5.78E-02	1.939E+00	7.750E+01	0.876
α_3	3.46E-08	3.30E-03	5.32E-04	1.62E-02	2.396E-01	7.230E+01	0.959

CCCG = 4, Gamma = 0.203

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9490990	0.9757555	0.9783596	0.9935070	1.167E+02	2.898E+00	--
α_2	1.98E-03	1.29E-02	1.06E-02	3.15E-02	1.785E+00	1.369E+02	0.699
α_3	3.61E-04	9.42E-03	6.26E-03	2.92E-02	8.927E-01	9.392E+01	1.023
α_4	7.51E-09	1.96E-03	2.61E-04	9.82E-03	2.207E-01	1.126E+02	0.860

CCCG = 5, Gamma = 0.202

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9583933	0.9776959	0.9792542	0.9916737	1.975E+02	4.506E+00	--
α_2	1.95E-03	9.52E-03	8.17E-03	2.17E-02	2.242E+00	2.333E+02	0.700
α_3	1.07E-03	8.37E-03	6.71E-03	2.14E-02	1.578E+00	1.869E+02	0.874
α_4	4.08E-05	3.93E-03	2.11E-03	1.40E-02	6.132E-01	1.553E+02	1.057
α_5	4.44E-21	4.81E-04	2.78E-07	2.78E-03	7.248E-02	1.507E+02	1.094

CCCG = 6, Gamma = 0.202

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9634366	0.9797063	0.9809420	0.9917547	2.510E+02	5.199E+00	--
α_2	1.26E-03	6.78E-03	5.73E-03	1.59E-02	2.066E+00	3.028E+02	0.666
α_3	9.53E-04	6.61E-03	5.39E-03	1.65E-02	1.707E+00	2.564E+02	0.787
α_4	2.38E-04	4.69E-03	3.25E-03	1.41E-02	9.931E-01	2.106E+02	0.959
α_5	8.34E-07	1.84E-03	5.79E-04	7.94E-03	3.563E-01	1.935E+02	1.047
α_6	3.39E-20	3.72E-04	3.50E-07	2.16E-03	7.684E-02	2.063E+02	0.983

CCCG = 7, Gamma = 0.202

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9666782	0.9800589	0.9809362	0.9904437	3.550E+02	7.223E+00	--
α_2	1.61E-03	6.43E-03	5.67E-03	1.39E-02	2.717E+00	4.197E+02	0.693
α_3	8.48E-04	5.10E-03	4.24E-03	1.23E-02	1.895E+00	3.699E+02	0.787
α_4	5.29E-04	4.54E-03	3.58E-03	1.18E-02	1.490E+00	3.267E+02	0.892
α_5	9.73E-05	2.91E-03	1.89E-03	9.21E-03	8.534E-01	2.925E+02	0.997
α_6	9.43E-09	8.66E-04	1.40E-04	4.24E-03	2.405E-01	2.773E+02	1.054
α_7	5.31E-51	9.76E-05	2.00E-14	3.45E-04	2.734E-02	2.801E+02	1.045

CCCG = 8, Gamma = 0.202

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9693215	0.9816360	0.9824440	0.9911917	3.873E+02	7.246E+00	--
α_2	1.28E-03	5.49E-03	4.79E-03	1.21E-02	2.535E+00	4.596E+02	0.673
α_3	4.81E-04	3.78E-03	3.02E-03	9.68E-03	1.575E+00	4.149E+02	0.747
α_4	3.48E-04	3.61E-03	2.77E-03	9.75E-03	1.340E+00	3.698E+02	0.838
α_5	1.78E-04	3.11E-03	2.20E-03	9.14E-03	1.046E+00	3.358E+02	0.924
α_6	1.17E-05	1.78E-03	8.81E-04	6.57E-03	5.538E-01	3.114E+02	0.997
α_7	1.98E-15	3.62E-04	3.40E-06	2.09E-03	1.083E-01	2.988E+02	1.041
α_8	2.25E-18	2.42E-04	6.05E-07	1.41E-03	8.749E-02	3.608E+02	0.862

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.72E-01	9.76E-01	9.78E-01	9.80E-01	9.80E-01	9.82E-01
α_2	1.89E-02	2.44E-02	1.29E-02	9.52E-03	6.78E-03	6.43E-03	5.49E-03
α_3		3.30E-03	9.42E-03	8.37E-03	6.61E-03	5.10E-03	3.78E-03
α_4			1.96E-03	3.93E-03	4.69E-03	4.54E-03	3.61E-03
α_5				4.81E-04	1.84E-03	2.91E-03	3.11E-03
α_6					3.72E-04	8.66E-04	1.78E-03
α_7						9.76E-05	3.62E-04
α_8							2.42E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.72E-01	9.76E-01	9.78E-01	9.80E-01	9.80E-01	9.82E-01
Beta	1.89E-02	2.77E-02	2.42E-02	2.23E-02	2.03E-02	1.99E-02	1.84E-02
Gamma		1.19E-01	4.69E-01	5.73E-01	6.66E-01	6.77E-01	7.01E-01
Delta			1.72E-01	3.45E-01	5.11E-01	6.23E-01	7.06E-01
Epsilon				1.09E-01	3.20E-01	4.60E-01	6.03E-01
Mu					1.68E-01	2.49E-01	4.34E-01
Omega						1.01E-01	2.54E-01
Sigma							4.01E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	21.90	32.85	43.80	54.75	65.70	76.65	87.60
N_1	0.6667	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.3333	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313
N_3		0.0000	0.5000	0.5000	0.3750	0.2500	0.1563

N₄			0.0000	0.2500	0.3750	0.3750	0.3125
N₅				0.0000	0.1250	0.2500	0.3125
N₆					0.0000	0.0625	0.1563
N₇						0.0000	0.0313
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 6.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8440108	0.9625855	0.9863999	0.9999708	9.779E+00	3.801E-01	--
α_2	2.92E-05	3.74E-02	1.36E-02	1.56E-01	3.801E-01	9.779E+00	0.894

CCCG = 3, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8651940	0.9545666	0.9680412	0.9978002	2.017E+01	9.600E-01	--
α_2	4.63E-04	3.07E-02	1.79E-02	1.05E-01	6.673E-01	2.107E+01	0.876
α_3	1.30E-06	1.47E-02	3.56E-03	6.78E-02	2.927E-01	1.956E+01	0.959

CCCG = 4, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8907621	0.9556310	0.9634698	0.9936401	3.595E+01	1.669E+00	--
α_2	1.40E-03	2.42E-02	1.73E-02	7.07E-02	1.039E+00	4.188E+01	0.699
α_3	1.16E-05	1.32E-02	4.75E-03	5.53E-02	3.887E-01	2.896E+01	1.023
α_4	7.98E-08	6.92E-03	1.14E-03	3.38E-02	2.414E-01	3.466E+01	0.860

CCCG = 5, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9167270	0.9579561	0.9615927	0.9867467	7.945E+01	3.487E+00	--
α_2	2.90E-03	1.86E-02	1.54E-02	4.54E-02	1.791E+00	9.430E+01	0.700
α_3	1.25E-03	1.57E-02	1.17E-02	4.37E-02	1.207E+00	7.572E+01	0.874
α_4	1.21E-05	6.82E-03	2.73E-03	2.75E-02	4.340E-01	6.318E+01	1.057
α_5	1.99E-26	8.93E-04	3.18E-08	4.93E-03	5.493E-02	6.145E+01	1.094

CCCG = 6, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9282687	0.9627443	0.9656546	0.9872697	1.009E+02	3.905E+00	--
α_2	1.03E-03	1.06E-02	8.17E-03	2.87E-02	1.335E+00	1.242E+02	0.666
α_3	1.77E-03	1.44E-02	1.15E-02	3.70E-02	1.531E+00	1.047E+02	0.787
α_4	1.60E-04	8.26E-03	4.92E-03	2.77E-02	7.191E-01	8.638E+01	0.959
α_5	4.53E-08	3.09E-03	5.30E-04	1.50E-02	2.467E-01	7.954E+01	1.047
α_6	9.42E-21	8.57E-04	5.16E-07	4.97E-03	7.279E-02	8.489E+01	0.983

CCCG = 7, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9380760	0.9646058	0.9664915	0.9846928	1.573E+02	5.770E+00	--
α_2	9.96E-04	8.01E-03	6.39E-03	2.06E-02	1.549E+00	1.919E+02	0.693
α_3	2.08E-03	1.17E-02	9.83E-03	2.76E-02	1.989E+00	1.683E+02	0.787
α_4	7.70E-04	8.56E-03	6.50E-03	2.34E-02	1.287E+00	1.490E+02	0.892
α_5	8.59E-05	5.15E-03	2.99E-03	1.75E-02	6.913E-01	1.337E+02	0.997
α_6	1.35E-08	1.83E-03	2.76E-04	9.05E-03	2.327E-01	1.269E+02	1.054
α_7	1.12E-64	1.65E-04	2.50E-17	4.15E-04	2.112E-02	1.282E+02	1.045

CCCG = 8, Gamma = 0.033

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9463784	0.9680055	0.9694192	0.9848039	2.123E+02	7.016E+00	--
α_2	7.75E-04	6.03E-03	4.83E-03	1.54E-02	1.583E+00	2.609E+02	0.673
α_3	1.49E-03	8.40E-03	7.06E-03	1.99E-02	1.986E+00	2.345E+02	0.747
α_4	1.11E-03	7.93E-03	6.44E-03	1.99E-02	1.672E+00	2.091E+02	0.838
α_5	2.80E-04	5.29E-03	3.69E-03	1.57E-02	1.011E+00	1.903E+02	0.924
α_6	2.44E-05	3.22E-03	1.64E-03	1.18E-02	5.709E-01	1.766E+02	0.997
α_7	2.45E-10	1.07E-03	8.35E-05	5.63E-03	1.809E-01	1.696E+02	1.041
α_8	8.77E-108	6.08E-05	1.84E-27	4.55E-05	1.245E-02	2.049E+02	0.862

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.63E-01	9.55E-01	9.56E-01	9.58E-01	9.63E-01	9.65E-01	9.68E-01
α_2	3.74E-02	3.07E-02	2.42E-02	1.86E-02	1.06E-02	8.01E-03	6.03E-03
α_3		1.47E-02	1.32E-02	1.57E-02	1.44E-02	1.17E-02	8.40E-03
α_4			6.92E-03	6.82E-03	8.26E-03	8.56E-03	7.93E-03
α_5				8.93E-04	3.09E-03	5.15E-03	5.29E-03
α_6					8.57E-04	1.83E-03	3.22E-03
α_7						1.65E-04	1.07E-03
α_8							6.08E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.63E-01	9.55E-01	9.56E-01	9.58E-01	9.63E-01	9.65E-01	9.68E-01
Beta	3.74E-02	4.54E-02	4.44E-02	4.20E-02	3.73E-02	3.54E-02	3.20E-02
Gamma		3.24E-01	4.54E-01	5.57E-01	7.14E-01	7.74E-01	8.11E-01
Delta			3.43E-01	3.30E-01	4.59E-01	5.73E-01	6.77E-01
Epsilon				1.16E-01	3.24E-01	4.55E-01	5.48E-01
Mu					2.17E-01	2.79E-01	4.51E-01
Omega						8.25E-02	2.59E-01
Sigma							5.39E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.66	5.49	7.32	9.15	10.98	12.81	14.64
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 54.9

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9698734	0.9920376	0.9962363	0.9999625	6.436E+01	5.166E-01	--
α_2	3.75E-05	7.96E-03	3.76E-03	3.01E-02	5.166E-01	6.436E+01	0.894

CCCG = 3, Gamma = 0.302

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9728478	0.9902157	0.9926690	0.9991975	1.242E+02	1.228E+00	--
α_2	3.09E-04	7.24E-03	4.89E-03	2.22E-02	9.292E-01	1.274E+02	0.876
α_3	2.62E-07	2.55E-03	6.19E-04	1.17E-02	2.985E-01	1.169E+02	0.959

CCCG = 4, Gamma = 0.302

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9783744	0.9905956	0.9919651	0.9981345	2.296E+02	2.180E+00	--
α_2	7.01E-04	5.85E-03	4.64E-03	1.51E-02	1.516E+00	2.577E+02	0.699
α_3	5.82E-06	2.56E-03	1.06E-03	1.02E-02	4.530E-01	1.768E+02	1.023
α_4	2.09E-09	1.00E-03	1.19E-04	5.08E-03	2.107E-01	2.106E+02	0.860

CCCG = 5, Gamma = 0.303

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9811334	0.9906162	0.9914901	0.9971132	3.643E+02	3.451E+00	--
α_2	8.24E-04	4.69E-03	3.94E-03	1.12E-02	1.976E+00	4.190E+02	0.700
α_3	1.48E-04	2.94E-03	2.04E-03	8.83E-03	9.912E-01	3.360E+02	0.874
α_4	1.11E-06	1.38E-03	4.81E-04	5.82E-03	3.852E-01	2.783E+02	1.057
α_5	1.51E-16	3.67E-04	2.02E-06	2.13E-03	9.875E-02	2.693E+02	1.094

CCCG = 6, Gamma = 0.303

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9834398	0.9912816	0.9919404	0.9968729	4.859E+02	4.274E+00	--
α_2	6.71E-04	3.62E-03	3.06E-03	8.49E-03	2.065E+00	5.685E+02	0.666
α_3	1.92E-04	2.48E-03	1.83E-03	6.96E-03	1.197E+00	4.817E+02	0.787
α_4	2.36E-05	1.67E-03	9.41E-04	5.80E-03	6.619E-01	3.953E+02	0.959
α_5	1.43E-08	7.01E-04	1.27E-04	3.38E-03	2.543E-01	3.625E+02	1.047
α_6	4.02E-17	2.48E-04	1.12E-06	1.44E-03	9.572E-02	3.862E+02	0.983

CCCG = 7, Gamma = 0.303

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9846670	0.9913120	0.9918015	0.9962856	6.566E+02	5.755E+00	--
α_2	7.59E-04	3.30E-03	2.87E-03	7.28E-03	2.507E+00	7.579E+02	0.693
α_3	2.41E-04	2.17E-03	1.70E-03	5.71E-03	1.452E+00	6.679E+02	0.787
α_4	9.33E-05	1.73E-03	1.21E-03	5.13E-03	1.020E+00	5.897E+02	0.892
α_5	5.16E-06	9.98E-04	4.76E-04	3.76E-03	5.273E-01	5.276E+02	0.997
α_6	2.94E-10	3.92E-04	3.84E-05	2.03E-03	1.957E-01	4.995E+02	1.054
α_7	2.99E-28	1.05E-04	2.38E-09	5.69E-04	5.291E-02	5.042E+02	1.045

CCCG = 8, Gamma = 0.303

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9859838	0.9918337	0.9922422	0.9962890	7.891E+02	6.497E+00	--
α_2	7.17E-04	2.92E-03	2.57E-03	6.34E-03	2.670E+00	9.107E+02	0.673
α_3	1.90E-04	1.74E-03	1.36E-03	4.61E-03	1.436E+00	8.217E+02	0.747
α_4	9.19E-05	1.48E-03	1.06E-03	4.30E-03	1.083E+00	7.324E+02	0.838
α_5	2.78E-05	1.15E-03	7.09E-04	3.80E-03	7.685E-01	6.649E+02	0.924
α_6	1.23E-07	5.31E-04	1.49E-04	2.36E-03	3.276E-01	6.162E+02	0.997
α_7	2.20E-13	2.28E-04	6.10E-06	1.28E-03	1.344E-01	5.906E+02	1.041
α_8	9.70E-21	1.08E-04	1.01E-07	6.25E-04	7.682E-02	7.131E+02	0.862

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.90E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01
α_2	7.96E-03	7.24E-03	5.85E-03	4.69E-03	3.62E-03	3.30E-03	2.92E-03
α_3		2.55E-03	2.56E-03	2.94E-03	2.48E-03	2.17E-03	1.74E-03
α_4			1.00E-03	1.38E-03	1.67E-03	1.73E-03	1.48E-03
α_5				3.67E-04	7.01E-04	9.98E-04	1.15E-03
α_6					2.48E-04	3.92E-04	5.31E-04
α_7						1.05E-04	2.28E-04
α_8							1.08E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.90E-01	9.91E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01
Beta	7.96E-03	9.78E-03	9.40E-03	9.38E-03	8.72E-03	8.69E-03	8.17E-03
Gamma		2.60E-01	3.78E-01	5.00E-01	5.85E-01	6.21E-01	6.42E-01
Delta			2.81E-01	3.73E-01	5.14E-01	5.98E-01	6.67E-01
Epsilon				2.10E-01	3.62E-01	4.64E-01	5.78E-01
Mu					2.61E-01	3.32E-01	4.29E-01
Omega						2.11E-01	3.87E-01
Sigma							3.21E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	32.94	49.41	65.88	82.35	98.82	115.29	131.76
N_1	0.4680	0.5832	0.6415	0.6561	0.6580	0.6415	0.6127
N_2	0.0460	0.1188	0.2041	0.2916	0.3515	0.4018	0.4412
N_3		0.0064	0.0223	0.0486	0.0885	0.1317	0.1761

N₄			0.0008	0.0036	0.0110	0.0237	0.0415
N₅				0.0001	0.0007	0.0024	0.0059
N₆					0.0000	0.0001	0.0005
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 9.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9851500	0.9961468	0.9982597	0.9999858	1.275E+02	4.932E-01	--
α_2	1.42E-05	3.85E-03	1.74E-03	1.49E-02	4.932E-01	1.275E+02	0.894

CCCG = 3, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9890525	0.9962635	0.9973458	0.9997788	2.825E+02	1.059E+00	--
α_2	4.56E-05	2.44E-03	1.44E-03	8.24E-03	7.137E-01	2.916E+02	0.876
α_3	4.66E-07	1.30E-03	3.92E-04	5.65E-03	3.458E-01	2.666E+02	0.959

CCCG = 4, Gamma = 0.049

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9924272	0.9967464	0.9972396	0.9993797	6.478E+02	2.115E+00	--
α_2	2.71E-04	2.19E-03	1.74E-03	5.63E-03	1.549E+00	7.072E+02	0.699
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.844E+02	1.023
α_4	5.77E-08	5.22E-04	1.28E-04	2.39E-03	3.010E-01	5.761E+02	0.860

CCCG = 5, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9948064	0.9971164	0.9972938	0.9988207	1.841E+03	5.325E+00	--
α_2	5.72E-04	1.79E-03	1.63E-03	3.57E-03	3.632E+00	2.021E+03	0.700
α_3	8.21E-05	8.36E-04	6.42E-04	2.25E-03	1.354E+00	1.619E+03	0.874
α_4	2.10E-08	2.21E-04	5.27E-05	1.01E-03	2.961E-01	1.340E+03	1.057
α_5	9.75E-35	3.28E-05	3.61E-11	1.62E-04	4.243E-02	1.296E+03	1.094

CCCG = 6, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9947484	0.9971379	0.9973277	0.9988795	1.720E+03	4.936E+00	--
α_2	4.02E-04	1.51E-03	1.34E-03	3.20E-03	2.915E+00	1.926E+03	0.666
α_3	6.57E-05	7.70E-04	5.78E-04	2.13E-03	1.257E+00	1.631E+03	0.787
α_4	1.53E-06	3.76E-04	1.72E-04	1.44E-03	5.031E-01	1.338E+03	0.959
α_5	2.73E-15	9.42E-05	1.24E-06	5.40E-04	1.155E-01	1.226E+03	1.047
α_6	5.20E-13	1.11E-04	4.07E-06	6.15E-04	1.451E-01	1.306E+03	0.983

CCCG = 7, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9957357	0.9973018	0.9973939	0.9985536	3.568E+03	9.654E+00	--
α_2	4.73E-04	1.22E-03	1.14E-03	2.25E-03	4.851E+00	3.966E+03	0.693
α_3	2.05E-04	8.01E-04	7.08E-04	1.71E-03	2.800E+00	3.493E+03	0.787
α_4	4.58E-05	4.49E-04	3.46E-04	1.20E-03	1.384E+00	3.084E+03	0.892
α_5	6.29E-07	1.78E-04	7.94E-05	6.87E-04	4.902E-01	2.758E+03	0.997
α_6	1.04E-15	4.39E-05	5.56E-07	2.52E-04	1.146E-01	2.610E+03	1.054
α_7	2.92E-93	5.56E-06	5.91E-25	6.60E-06	1.464E-02	2.633E+03	1.045

CCCG = 8, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9956440	0.9974114	0.9975305	0.9987724	2.754E+03	7.148E+00	--
α_2	2.60E-04	9.60E-04	8.55E-04	2.02E-03	2.980E+00	3.102E+03	0.673
α_3	1.21E-04	7.00E-04	5.86E-04	1.67E-03	1.960E+00	2.796E+03	0.747
α_4	3.42E-05	4.68E-04	3.43E-04	1.33E-03	1.166E+00	2.493E+03	0.838
α_5	1.35E-06	2.38E-04	1.15E-04	8.89E-04	5.375E-01	2.263E+03	0.924
α_6	1.90E-11	8.61E-05	6.68E-06	4.55E-04	1.805E-01	2.096E+03	0.997
α_7	1.07E-35	2.06E-05	1.54E-11	1.01E-04	4.139E-02	2.008E+03	1.041
α_8	7.11E-09	1.17E-04	2.57E-05	5.44E-04	2.827E-01	2.424E+03	0.862

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	3.85E-03	2.44E-03	2.19E-03	1.79E-03	1.51E-03	1.22E-03	9.60E-04
α_3		1.30E-03	5.46E-04	8.36E-04	7.70E-04	8.01E-04	7.00E-04
α_4			5.22E-04	2.21E-04	3.76E-04	4.49E-04	4.68E-04
α_5				3.28E-05	9.42E-05	1.78E-04	2.38E-04
α_6					1.11E-04	4.39E-05	8.61E-05
α_7						5.56E-06	2.06E-05
α_8							1.17E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	3.85E-03	3.74E-03	3.25E-03	2.88E-03	2.86E-03	2.70E-03	2.59E-03
Gamma		3.47E-01	3.28E-01	3.78E-01	4.72E-01	5.47E-01	6.29E-01
Delta			4.89E-01	2.33E-01	4.30E-01	4.58E-01	5.70E-01
Epsilon				1.29E-01	3.53E-01	3.36E-01	4.96E-01
Mu					5.41E-01	2.18E-01	4.85E-01
Omega						1.12E-01	6.14E-01
Sigma							8.50E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.46	8.19	10.92	13.65	16.38	19.11	21.84
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.12 Vacuum Breakers

2.12.1 BWR Pressure Suppression Vacuum Breakers

2.12.1.1 CVR-VAC-CC: Containment Vacuum Breakers Fail to Open

Generic CCF Parameters

System Group: Atmosphere
System: Vapor Suppression
Component Group: Valve
Component Type: Vacuum Breaker
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 6.2

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9370942	0.9838891	0.9929464	0.9999513	1.0000000	2.861E+01	4.685E-01
α_2	4.55E-05	1.61E-02	7.06E-03	6.29E-02	0.00E+00	4.685E-01	2.861E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9508244	0.9827271	0.9873505	0.9988086	1.0000000	6.418E+01	1.128E+00
α_2	4.37E-04	1.30E-02	8.51E-03	4.11E-02	0.00E+00	8.512E-01	6.446E+01
α_3	2.12E-07	4.24E-03	9.09E-04	1.99E-02	0.00E+00	2.768E-01	6.503E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9541217	0.9808279	0.9839723	0.9967863	1.0000000	9.688E+01	1.894E+00
α_2	1.10E-03	1.28E-02	9.65E-03	3.50E-02	0.00E+00	1.260E+00	9.751E+01
α_3	4.43E-06	4.07E-03	1.50E-03	1.69E-02	0.00E+00	4.024E-01	9.837E+01
α_4	1.63E-08	2.34E-03	3.50E-04	1.16E-02	0.00E+00	2.315E-01	9.854E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9656276	0.9828795	0.9844573	0.9947371	1.0000000	1.970E+02	3.432E+00
α_2	1.63E-03	9.60E-03	8.02E-03	2.29E-02	0.00E+00	1.924E+00	1.985E+02
α_3	3.03E-04	5.23E-03	3.71E-03	1.54E-02	0.00E+00	1.049E+00	1.994E+02
α_4	1.45E-06	1.91E-03	6.57E-04	8.04E-03	0.00E+00	3.822E-01	2.001E+02
α_5	3.32E-20	3.83E-04	3.57E-07	2.22E-03	0.00E+00	7.674E-02	2.004E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9682297	0.9836988	0.9850477	0.9945513	1.0000000	2.314E+02	3.835E+00

α_2	1.04E-03	7.23E-03	5.89E-03	1.80E-02	0.00E+00	1.701E+00	2.336E+02
α_3	4.05E-04	5.13E-03	3.81E-03	1.44E-02	0.00E+00	1.207E+00	2.340E+02
α_4	2.32E-05	2.53E-03	1.33E-03	9.13E-03	0.00E+00	5.960E-01	2.347E+02
α_5	3.68E-09	9.40E-04	1.26E-04	4.71E-03	0.00E+00	2.211E-01	2.350E+02
α_6	3.67E-15	4.67E-04	4.72E-06	2.69E-03	0.00E+00	1.098E-01	2.351E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9736123	0.9850231	0.9858556	0.9935842	1.0000000	3.780E+02	5.747E+00
α_2	1.20E-03	5.85E-03	5.01E-03	1.33E-02	0.00E+00	2.243E+00	3.815E+02
α_3	5.70E-04	4.25E-03	3.42E-03	1.07E-02	0.00E+00	1.630E+00	3.821E+02
α_4	1.76E-04	2.82E-03	2.02E-03	8.21E-03	0.00E+00	1.083E+00	3.827E+02
α_5	1.06E-05	1.47E-03	7.43E-04	5.41E-03	0.00E+00	5.654E-01	3.832E+02
α_6	2.74E-10	4.99E-04	4.61E-05	2.60E-03	0.00E+00	1.916E-01	3.836E+02
α_7	6.21E-41	9.07E-05	3.37E-12	3.98E-04	0.00E+00	3.480E-02	3.837E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9748702	0.9857554	0.9865514	0.9939105	1.0000000	3.962E+02	5.726E+00
α_2	9.05E-04	5.02E-03	4.23E-03	1.18E-02	0.00E+00	2.018E+00	3.999E+02
α_3	3.57E-04	3.46E-03	2.68E-03	9.23E-03	0.00E+00	1.391E+00	4.006E+02
α_4	1.57E-04	2.64E-03	1.88E-03	7.74E-03	0.00E+00	1.062E+00	4.009E+02
α_5	3.08E-05	1.75E-03	1.02E-03	5.94E-03	0.00E+00	7.026E-01	4.012E+02
α_6	3.42E-07	8.70E-04	2.67E-04	3.78E-03	0.00E+00	3.497E-01	4.016E+02
α_7	1.31E-15	2.68E-04	2.46E-06	1.55E-03	0.00E+00	1.078E-01	4.018E+02
α_8	2.74E-17	2.36E-04	9.98E-07	1.37E-03	0.00E+00	9.469E-02	4.019E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.83E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.61E-02	1.30E-02	1.28E-02	9.60E-03	7.23E-03	5.85E-03	5.02E-03
α_3		4.24E-03	4.07E-03	5.23E-03	5.13E-03	4.25E-03	3.46E-03
α_4			2.34E-03	1.91E-03	2.53E-03	2.82E-03	2.64E-03
α_5				3.83E-04	9.40E-04	1.47E-03	1.75E-03
α_6					4.67E-04	4.99E-04	8.70E-04
α_7						9.07E-05	2.68E-04
α_8							2.36E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.83E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.61E-02	1.73E-02	1.92E-02	1.71E-02	1.63E-02	1.50E-02	1.42E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.20	6.20	6.20	6.20	6.20	6.20	6.20
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 1.2

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.194

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9701752	0.9923038	0.9965694	0.9999745	6.233E+01	4.834E-01	--
α_2	2.55E-05	7.70E-03	3.43E-03	2.98E-02	4.834E-01	6.233E+01	0.725

CCCG = 3, Gamma = 0.194

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9805145	0.9929922	0.9947599	0.9994286	1.737E+02	1.226E+00	--
α_2	2.81E-04	5.77E-03	3.98E-03	1.74E-02	9.769E-01	1.683E+02	0.780
α_3	1.98E-08	1.24E-03	2.15E-04	6.00E-03	2.487E-01	2.007E+02	0.658

CCCG = 4, Gamma = 0.194

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9792752	0.9911507	0.9925148	0.9983624	2.304E+02	2.057E+00	--
α_2	6.97E-04	6.32E-03	4.95E-03	1.66E-02	1.442E+00	2.268E+02	0.811
α_3	2.09E-06	1.67E-03	6.27E-04	6.87E-03	4.114E-01	2.459E+02	0.752
α_4	1.13E-09	8.60E-04	9.37E-05	4.41E-03	2.036E-01	2.367E+02	0.782

CCCG = 5, Gamma = 0.194

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9830490	0.9914204	0.9921710	0.9972273	4.256E+02	3.683E+00	--
α_2	1.11E-03	5.43E-03	4.66E-03	1.24E-02	2.243E+00	4.108E+02	0.861
α_3	1.10E-04	2.19E-03	1.52E-03	6.58E-03	9.912E-01	4.513E+02	0.786
α_4	5.43E-07	7.97E-04	2.69E-04	3.38E-03	3.765E-01	4.718E+02	0.753
α_5	1.39E-21	1.61E-04	9.16E-08	9.29E-04	7.237E-02	4.502E+02	0.790

CCCG = 6, Gamma = 0.194

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9831199	0.9911866	0.9918738	0.9969058	4.655E+02	4.139E+00	--
α_2	9.31E-04	4.84E-03	4.11E-03	1.12E-02	2.128E+00	4.375E+02	0.923
α_3	1.54E-04	2.24E-03	1.63E-03	6.40E-03	1.134E+00	5.061E+02	0.800
α_4	6.80E-06	1.04E-03	5.16E-04	3.85E-03	5.533E-01	5.310E+02	0.763
α_5	1.63E-09	4.19E-04	5.59E-05	2.10E-03	2.210E-01	5.275E+02	0.769
α_6	3.53E-16	2.77E-04	1.93E-06	1.61E-03	1.027E-01	3.703E+02	1.095

CCCG = 7, Gamma = 0.194

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9860257	0.9918768	0.9922872	0.9963266	7.854E+02	6.432E+00	--
α_2	1.02E-03	3.94E-03	3.49E-03	8.38E-03	2.840E+00	7.185E+02	0.955
α_3	3.09E-04	2.08E-03	1.70E-03	5.15E-03	1.746E+00	8.372E+02	0.821
α_4	7.78E-05	1.25E-03	8.93E-04	3.63E-03	1.084E+00	8.669E+02	0.794
α_5	3.48E-06	6.11E-04	2.96E-04	2.29E-03	5.376E-01	8.789E+02	0.783
α_6	1.89E-10	2.15E-04	2.17E-05	1.11E-03	1.979E-01	9.206E+02	0.748
α_7	6.65E-53	2.97E-05	2.97E-15	1.01E-04	2.656E-02	8.943E+02	0.770

CCCG = 8, Gamma = 0.194

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9863018	0.9921303	0.9925487	0.9965303	7.706E+02	6.112E+00	--
α_2	7.19E-04	3.32E-03	2.87E-03	7.47E-03	2.364E+00	7.094E+02	0.967
α_3	2.23E-04	1.87E-03	1.48E-03	4.85E-03	1.512E+00	8.071E+02	0.851
α_4	7.12E-05	1.22E-03	8.61E-04	3.57E-03	1.056E+00	8.679E+02	0.792
α_5	1.18E-05	7.77E-04	4.43E-04	2.68E-03	6.745E-01	8.669E+02	0.794
α_6	4.81E-08	3.58E-04	9.09E-05	1.62E-03	3.076E-01	8.587E+02	0.801
α_7	7.67E-16	1.10E-04	1.08E-06	6.33E-04	1.093E-01	9.960E+02	0.691
α_8	3.37E-18	2.18E-04	6.06E-07	1.27E-03	8.885E-02	4.071E+02	1.691

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01
α_2	7.70E-03	5.77E-03	6.32E-03	5.43E-03	4.84E-03	3.94E-03	3.32E-03
α_3		1.24E-03	1.67E-03	2.19E-03	2.24E-03	2.08E-03	1.87E-03
α_4			8.60E-04	7.97E-04	1.04E-03	1.25E-03	1.22E-03
α_5				1.61E-04	4.19E-04	6.11E-04	7.77E-04
α_6					2.77E-04	2.15E-04	3.58E-04
α_7						2.97E-05	1.10E-04
α_8							2.18E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01
Beta	7.70E-03	7.01E-03	8.85E-03	8.58E-03	8.81E-03	8.12E-03	7.87E-03
Gamma		1.77E-01	2.86E-01	3.67E-01	4.51E-01	5.15E-01	5.78E-01
Delta			3.40E-01	3.04E-01	4.37E-01	5.03E-01	5.89E-01
Epsilon				1.68E-01	4.01E-01	4.07E-01	5.46E-01
Mu					3.98E-01	2.86E-01	4.69E-01
Omega						1.21E-01	4.78E-01
Sigma							6.65E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.20	1.20	1.20	1.20	1.20	1.20	1.20
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.161

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8216725	0.9571168	0.9842635	0.9999662	8.484E+00	3.801E-01	--
α_2	3.38E-05	4.29E-02	1.57E-02	1.78E-01	3.801E-01	8.484E+00	0.725

CCCG = 3, Gamma = 0.161

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8549459	0.9510147	0.9654573	0.9976194	1.864E+01	9.600E-01	--
α_2	5.43E-04	3.58E-02	2.09E-02	1.22E-01	6.673E-01	1.799E+01	0.780
α_3	1.16E-06	1.32E-02	3.18E-03	6.08E-02	2.927E-01	2.185E+01	0.658

CCCG = 4, Gamma = 0.161

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8632331	0.9441329	0.9537902	0.9919215	2.821E+01	1.669E+00	--
α_2	2.07E-03	3.56E-02	2.56E-02	1.03E-01	1.039E+00	2.817E+01	0.811
α_3	1.07E-05	1.23E-02	4.41E-03	5.15E-02	3.887E-01	3.113E+01	0.752
α_4	9.22E-08	7.96E-03	1.32E-03	3.90E-02	2.414E-01	3.007E+01	0.782

CCCG = 5, Gamma = 0.161

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9044073	0.9516201	0.9557510	0.9847006	6.859E+01	3.487E+00	--
α_2	4.08E-03	2.61E-02	2.16E-02	6.33E-02	1.791E+00	6.691E+01	0.861
α_3	1.28E-03	1.60E-02	1.20E-02	4.47E-02	1.207E+00	7.400E+01	0.786
α_4	9.78E-06	5.53E-03	2.21E-03	2.23E-02	4.340E-01	7.809E+01	0.753
α_5	1.63E-26	7.34E-04	2.61E-08	4.04E-03	5.493E-02	7.482E+01	0.790

CCCG = 6, Gamma = 0.161

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9145358	0.9554956	0.9589211	0.9847406	8.383E+01	3.905E+00	--
α_2	1.62E-03	1.67E-02	1.29E-02	4.50E-02	1.335E+00	7.840E+01	0.923
α_3	2.04E-03	1.66E-02	1.33E-02	4.27E-02	1.531E+00	9.046E+01	0.800
α_4	1.44E-04	7.46E-03	4.44E-03	2.50E-02	7.191E-01	9.569E+01	0.763
α_5	3.77E-08	2.58E-03	4.41E-04	1.25E-02	2.467E-01	9.546E+01	0.769
α_6	1.19E-20	1.08E-03	6.53E-07	6.29E-03	7.279E-02	6.711E+01	1.095

CCCG = 7, Gamma = 0.161

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9304277	0.9601802	0.9622824	0.9827497	1.391E+02	5.770E+00	--
α_2	1.51E-03	1.21E-02	9.67E-03	3.10E-02	1.549E+00	1.264E+02	0.955
α_3	2.38E-03	1.34E-02	1.13E-02	3.16E-02	1.989E+00	1.468E+02	0.821
α_4	7.51E-04	8.36E-03	6.35E-03	2.28E-02	1.287E+00	1.527E+02	0.794
α_5	7.39E-05	4.43E-03	2.57E-03	1.51E-02	6.913E-01	1.553E+02	0.783
α_6	1.05E-08	1.42E-03	2.14E-04	7.04E-03	2.327E-01	1.631E+02	0.748
α_7	9.04E-65	1.33E-04	2.02E-17	3.35E-04	2.112E-02	1.586E+02	0.770

CCCG = 8, Gamma = 0.161

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9388840	0.9634874	0.9650858	0.9826310	1.851E+02	7.016E+00	--
α_2	1.21E-03	9.39E-03	7.53E-03	2.39E-02	1.583E+00	1.670E+02	0.967
α_3	1.84E-03	1.04E-02	8.72E-03	2.45E-02	1.986E+00	1.895E+02	0.851
α_4	1.14E-03	8.13E-03	6.60E-03	2.03E-02	1.672E+00	2.041E+02	0.792
α_5	2.61E-04	4.92E-03	3.44E-03	1.46E-02	1.011E+00	2.044E+02	0.794
α_6	2.13E-05	2.81E-03	1.43E-03	1.03E-02	5.709E-01	2.029E+02	0.801
α_7	1.76E-10	7.67E-04	6.00E-05	4.05E-03	1.809E-01	2.357E+02	0.691
α_8	1.87E-107	1.29E-04	3.92E-27	9.70E-05	1.245E-02	9.640E+01	1.691

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.57E-01	9.51E-01	9.44E-01	9.52E-01	9.55E-01	9.60E-01	9.63E-01
α_2	4.29E-02	3.58E-02	3.56E-02	2.61E-02	1.67E-02	1.21E-02	9.39E-03
α_3		1.32E-02	1.23E-02	1.60E-02	1.66E-02	1.34E-02	1.04E-02
α_4			7.96E-03	5.53E-03	7.46E-03	8.36E-03	8.13E-03
α_5				7.34E-04	2.58E-03	4.43E-03	4.92E-03
α_6					1.08E-03	1.42E-03	2.81E-03
α_7						1.33E-04	7.67E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.57E-01	9.51E-01	9.44E-01	9.52E-01	9.55E-01	9.60E-01	9.63E-01
Beta	4.29E-02	4.90E-02	5.59E-02	4.84E-02	4.45E-02	3.98E-02	3.65E-02
Gamma		2.70E-01	3.63E-01	4.61E-01	6.24E-01	6.96E-01	7.43E-01
Delta			3.92E-01	2.81E-01	4.01E-01	5.18E-01	6.18E-01
Epsilon				1.17E-01	3.29E-01	4.17E-01	5.15E-01
Mu					2.96E-01	2.60E-01	4.29E-01
Omega						8.55E-02	2.42E-01
Sigma							1.44E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.645

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9533599	0.9880577	0.9947776	0.9999656	3.894E+01	4.706E-01	--
α_2	3.44E-05	1.19E-02	5.22E-03	4.66E-02	4.706E-01	3.894E+01	0.725

CCCG = 3, Gamma = 0.645

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9642589	0.9875757	0.9910004	0.9991875	8.763E+01	1.103E+00	--
α_2	2.75E-04	9.53E-03	6.06E-03	3.06E-02	8.104E-01	8.423E+01	0.780
α_3	2.43E-07	2.89E-03	6.79E-04	1.33E-02	2.921E-01	1.006E+02	0.658

CCCG = 4, Gamma = 0.645

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9688830	0.9869048	0.9890112	0.9977232	1.472E+02	1.953E+00	--
α_2	8.38E-04	8.98E-03	6.86E-03	2.44E-02	1.312E+00	1.448E+02	0.811
α_3	4.59E-06	2.73E-03	1.08E-03	1.10E-02	4.307E-01	1.572E+02	0.752
α_4	2.75E-09	1.38E-03	1.63E-04	7.04E-03	2.099E-01	1.514E+02	0.782

CCCG = 5, Gamma = 0.645

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9754528	0.9881321	0.9893513	0.9966447	2.587E+02	3.107E+00	--
α_2	9.51E-04	6.73E-03	5.47E-03	1.68E-02	1.684E+00	2.485E+02	0.861
α_3	1.52E-04	3.44E-03	2.33E-03	1.05E-02	9.426E-01	2.730E+02	0.786
α_4	1.00E-06	1.33E-03	4.59E-04	5.63E-03	3.816E-01	2.856E+02	0.753
α_5	1.44E-16	3.62E-04	1.98E-06	2.10E-03	9.865E-02	2.726E+02	0.790

CCCG = 6, Gamma = 0.645

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9775340	0.9885033	0.9894679	0.9961772	3.286E+02	3.822E+00	--
α_2	8.07E-04	5.57E-03	4.54E-03	1.38E-02	1.714E+00	3.060E+02	0.923
α_3	2.05E-04	3.12E-03	2.25E-03	9.00E-03	1.108E+00	3.539E+02	0.800
α_4	2.31E-05	1.75E-03	9.75E-04	6.11E-03	6.509E-01	3.714E+02	0.763
α_5	1.36E-08	6.87E-04	1.24E-04	3.31E-03	2.536E-01	3.691E+02	0.769
α_6	5.99E-17	3.69E-04	1.68E-06	2.15E-03	9.572E-02	2.591E+02	1.095

CCCG = 7, Gamma = 0.645

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9804394	0.9891777	0.9898495	0.9956214	4.748E+02	5.195E+00	--
α_2	9.21E-04	4.85E-03	4.12E-03	1.13E-02	2.105E+00	4.317E+02	0.955
α_3	2.46E-04	2.62E-03	2.00E-03	7.11E-03	1.320E+00	5.032E+02	0.821
α_4	9.73E-05	1.91E-03	1.32E-03	5.72E-03	9.967E-01	5.210E+02	0.794
α_5	5.02E-06	9.92E-04	4.71E-04	3.75E-03	5.249E-01	5.284E+02	0.783
α_6	2.62E-10	3.53E-04	3.45E-05	1.83E-03	1.956E-01	5.536E+02	0.748
α_7	2.81E-28	9.84E-05	2.23E-09	5.34E-04	5.291E-02	5.378E+02	0.770

CCCG = 8, Gamma = 0.645

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9813790	0.9894099	0.9899966	0.9954374	5.449E+02	5.832E+00	--
α_2	9.00E-04	4.44E-03	3.80E-03	1.02E-02	2.229E+00	5.000E+02	0.967
α_3	1.89E-04	2.21E-03	1.66E-03	6.10E-03	1.260E+00	5.693E+02	0.851
α_4	9.65E-05	1.70E-03	1.20E-03	5.01E-03	1.042E+00	6.120E+02	0.792
α_5	2.92E-05	1.25E-03	7.62E-04	4.11E-03	7.626E-01	6.114E+02	0.794
α_6	1.23E-07	5.40E-04	1.51E-04	2.40E-03	3.271E-01	6.058E+02	0.801
α_7	1.85E-13	1.91E-04	5.12E-06	1.07E-03	1.344E-01	7.027E+02	0.691
α_8	2.41E-20	2.67E-04	2.51E-07	1.55E-03	7.682E-02	2.872E+02	1.691

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.88E-01	9.87E-01	9.88E-01	9.89E-01	9.89E-01	9.89E-01
α_2	1.19E-02	9.53E-03	8.98E-03	6.73E-03	5.57E-03	4.85E-03	4.44E-03
α_3		2.89E-03	2.73E-03	3.44E-03	3.12E-03	2.62E-03	2.21E-03
α_4			1.38E-03	1.33E-03	1.75E-03	1.91E-03	1.70E-03
α_5				3.62E-04	6.87E-04	9.92E-04	1.25E-03
α_6					3.69E-04	3.53E-04	5.40E-04
α_7						9.84E-05	1.91E-04
α_8							2.67E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.88E-01	9.87E-01	9.88E-01	9.89E-01	9.89E-01	9.89E-01
Beta	1.19E-02	1.24E-02	1.31E-02	1.19E-02	1.15E-02	1.08E-02	1.06E-02
Gamma		2.33E-01	3.14E-01	4.33E-01	5.15E-01	5.52E-01	5.81E-01
Delta			3.36E-01	3.30E-01	4.73E-01	5.62E-01	6.41E-01
Epsilon				2.13E-01	3.76E-01	4.31E-01	5.69E-01
Mu					3.50E-01	3.13E-01	4.45E-01
Omega						2.18E-01	4.59E-01
Sigma							5.83E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.13 AC Power Distribution Breakers

2.13.1 480 V Circuit Breakers

2.13.1.1 ACP-CRB-480-CC: AC Power 480 V Circuit Breakers Fail to Open

Generic CCF Parameters

System Group: Electrical
System: Plant AC Power
Component Group: Electrical
Component Type: Circuit Breaker
Component Subtype: 480 V
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 15.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9517531	0.9876643	0.9946216	0.9999626	1.0000000	3.751E+01	4.685E-01
α_2	3.47E-05	1.23E-02	5.38E-03	4.82E-02	0.00E+00	4.685E-01	3.751E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9566767	0.9847987	0.9888814	0.9989494	1.0000000	7.308E+01	1.128E+00
α_2	3.84E-04	1.15E-02	7.48E-03	3.62E-02	0.00E+00	8.512E-01	7.336E+01
α_3	1.86E-07	3.73E-03	7.99E-04	1.75E-02	0.00E+00	2.768E-01	7.393E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9578837	0.9824127	0.9853053	0.9970552	1.0000000	1.058E+02	1.894E+00
α_2	1.01E-03	1.17E-02	8.84E-03	3.22E-02	0.00E+00	1.260E+00	1.064E+02
α_3	4.06E-06	3.74E-03	1.37E-03	1.55E-02	0.00E+00	4.024E-01	1.073E+02
α_4	1.49E-08	2.15E-03	3.20E-04	1.06E-02	0.00E+00	2.315E-01	1.074E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9670800	0.9836073	0.9851200	0.9949630	1.0000000	2.059E+02	3.432E+00
α_2	1.56E-03	9.19E-03	7.68E-03	2.20E-02	0.00E+00	1.924E+00	2.074E+02
α_3	2.90E-04	5.01E-03	3.55E-03	1.47E-02	0.00E+00	1.049E+00	2.083E+02
α_4	1.39E-06	1.83E-03	6.29E-04	7.70E-03	0.00E+00	3.822E-01	2.090E+02
α_5	3.18E-20	3.67E-04	3.42E-07	2.13E-03	0.00E+00	7.674E-02	2.093E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
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α_1	0.9693815	0.9842930	0.9855943	0.9947563	1.0000000	2.403E+02	3.835E+00
α_2	9.99E-04	6.97E-03	5.68E-03	1.74E-02	0.00E+00	1.701E+00	2.425E+02
α_3	3.90E-04	4.94E-03	3.67E-03	1.38E-02	0.00E+00	1.207E+00	2.429E+02
α_4	2.24E-05	2.44E-03	1.28E-03	8.79E-03	0.00E+00	5.960E-01	2.436E+02
α_5	3.55E-09	9.06E-04	1.21E-04	4.54E-03	0.00E+00	2.211E-01	2.439E+02
α_6	3.54E-15	4.50E-04	4.55E-06	2.59E-03	0.00E+00	1.098E-01	2.440E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9742037	0.9853625	0.9861768	0.9937352	1.0000000	3.869E+02	5.747E+00
α_2	1.17E-03	5.71E-03	4.90E-03	1.30E-02	0.00E+00	2.243E+00	3.904E+02
α_3	5.57E-04	4.15E-03	3.34E-03	1.05E-02	0.00E+00	1.630E+00	3.910E+02
α_4	1.72E-04	2.76E-03	1.97E-03	8.02E-03	0.00E+00	1.083E+00	3.916E+02
α_5	1.04E-05	1.44E-03	7.26E-04	5.29E-03	0.00E+00	5.654E-01	3.921E+02
α_6	2.68E-10	4.88E-04	4.51E-05	2.54E-03	0.00E+00	1.916E-01	3.925E+02
α_7	6.07E-41	8.86E-05	3.30E-12	3.89E-04	0.00E+00	3.480E-02	3.926E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9754121	0.9860640	0.9868433	0.9940433	1.0000000	4.051E+02	5.726E+00
α_2	8.86E-04	4.91E-03	4.14E-03	1.16E-02	0.00E+00	2.018E+00	4.088E+02
α_3	3.49E-04	3.38E-03	2.62E-03	9.03E-03	0.00E+00	1.391E+00	4.095E+02
α_4	1.54E-04	2.59E-03	1.84E-03	7.57E-03	0.00E+00	1.062E+00	4.098E+02
α_5	3.02E-05	1.71E-03	9.99E-04	5.81E-03	0.00E+00	7.026E-01	4.101E+02
α_6	3.34E-07	8.51E-04	2.61E-04	3.70E-03	0.00E+00	3.497E-01	4.105E+02
α_7	1.28E-15	2.62E-04	2.41E-06	1.52E-03	0.00E+00	1.078E-01	4.107E+02
α_8	2.68E-17	2.30E-04	9.76E-07	1.34E-03	0.00E+00	9.469E-02	4.108E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.85E-01	9.82E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.23E-02	1.15E-02	1.17E-02	9.19E-03	6.97E-03	5.71E-03	4.91E-03
α_3		3.73E-03	3.74E-03	5.01E-03	4.94E-03	4.15E-03	3.38E-03
α_4			2.15E-03	1.83E-03	2.44E-03	2.76E-03	2.59E-03
α_5				3.67E-04	9.06E-04	1.44E-03	1.71E-03
α_6					4.50E-04	4.88E-04	8.51E-04
α_7						8.86E-05	2.62E-04
α_8							2.30E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.85E-01	9.82E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.23E-02	1.52E-02	1.76E-02	1.64E-02	1.57E-02	1.46E-02	1.39E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01

Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	15.10	15.10	15.10	15.10	15.10	15.10	15.10
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 5.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.331

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9632723	0.9905152	0.9957621	0.9999684	5.048E+01	4.834E-01	--
α_2	3.16E-05	9.48E-03	4.24E-03	3.67E-02	4.834E-01	5.048E+01	0.968

CCCG = 3, Gamma = 0.331

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9708955	0.9895147	0.9921450	0.9991425	1.157E+02	1.226E+00	--
α_2	4.07E-04	8.34E-03	5.76E-03	2.51E-02	9.769E-01	1.162E+02	1.160
α_3	3.43E-08	2.14E-03	3.73E-04	1.04E-02	2.487E-01	1.157E+02	1.172

CCCG = 4, Gamma = 0.331

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9681414	0.9863681	0.9884516	0.9974694	1.488E+02	2.057E+00	--
α_2	1.03E-03	9.33E-03	7.31E-03	2.45E-02	1.442E+00	1.532E+02	1.222
α_3	3.49E-06	2.78E-03	1.05E-03	1.14E-02	4.114E-01	1.476E+02	1.277
α_4	2.01E-09	1.53E-03	1.67E-04	7.83E-03	2.036E-01	1.332E+02	1.416

CCCG = 5, Gamma = 0.331

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9737756	0.9867043	0.9878572	0.9956935	2.733E+02	3.683E+00	--
α_2	1.63E-03	7.97E-03	6.84E-03	1.82E-02	2.243E+00	2.793E+02	1.276
α_3	1.88E-04	3.74E-03	2.59E-03	1.12E-02	9.912E-01	2.642E+02	1.355
α_4	9.29E-07	1.36E-03	4.60E-04	5.77E-03	3.765E-01	2.761E+02	1.299
α_5	1.98E-21	2.28E-04	1.30E-07	1.32E-03	7.237E-02	3.175E+02	1.131

CCCG = 6, Gamma = 0.331

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9749790	0.9869169	0.9879288	0.9953979	3.122E+02	4.139E+00	--
α_2	1.21E-03	6.30E-03	5.36E-03	1.46E-02	2.128E+00	3.355E+02	1.213
α_3	2.71E-04	3.93E-03	2.86E-03	1.12E-02	1.134E+00	2.877E+02	1.418
α_4	1.16E-05	1.78E-03	8.84E-04	6.59E-03	5.533E-01	3.102E+02	1.318
α_5	2.67E-09	6.86E-04	9.16E-05	3.44E-03	2.210E-01	3.220E+02	1.271
α_6	4.95E-16	3.88E-04	2.70E-06	2.25E-03	1.027E-01	2.646E+02	1.547

CCCG = 7, Gamma = 0.331

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9792568	0.9879283	0.9885335	0.9945335	5.264E+02	6.432E+00	--
α_2	1.28E-03	4.92E-03	4.36E-03	1.05E-02	2.840E+00	5.739E+02	1.201
α_3	5.27E-04	3.55E-03	2.90E-03	8.78E-03	1.746E+00	4.903E+02	1.407
α_4	1.32E-04	2.12E-03	1.52E-03	6.16E-03	1.084E+00	5.107E+02	1.353
α_5	6.05E-06	1.06E-03	5.16E-04	3.98E-03	5.376E-01	5.046E+02	1.371
α_6	3.29E-10	3.74E-04	3.78E-05	1.93E-03	1.979E-01	5.283E+02	1.310
α_7	9.44E-53	4.22E-05	4.22E-15	1.44E-04	2.656E-02	6.299E+02	1.099

CCCG = 8, Gamma = 0.331

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9801548	0.9885870	0.9891896	0.9949616	5.294E+02	6.112E+00	--
α_2	8.67E-04	4.01E-03	3.46E-03	9.01E-03	2.364E+00	5.877E+02	1.173
α_3	3.56E-04	2.99E-03	2.37E-03	7.76E-03	1.512E+00	5.038E+02	1.370
α_4	1.23E-04	2.10E-03	1.49E-03	6.17E-03	1.056E+00	5.013E+02	1.378
α_5	1.94E-05	1.28E-03	7.30E-04	4.42E-03	6.745E-01	5.254E+02	1.316
α_6	8.66E-08	6.44E-04	1.64E-04	2.92E-03	3.076E-01	4.773E+02	1.449
α_7	1.41E-15	2.02E-04	1.99E-06	1.16E-03	1.093E-01	5.415E+02	1.278
α_8	2.85E-18	1.85E-04	5.13E-07	1.08E-03	8.885E-02	4.813E+02	1.438

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.90E-01	9.86E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01
α_2	9.48E-03	8.34E-03	9.33E-03	7.97E-03	6.30E-03	4.92E-03	4.01E-03
α_3		2.14E-03	2.78E-03	3.74E-03	3.93E-03	3.55E-03	2.99E-03
α_4			1.53E-03	1.36E-03	1.78E-03	2.12E-03	2.10E-03
α_5				2.28E-04	6.86E-04	1.06E-03	1.28E-03
α_6					3.88E-04	3.74E-04	6.44E-04
α_7						4.22E-05	2.02E-04
α_8							1.85E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.90E-01	9.86E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01
Beta	9.48E-03	1.05E-02	1.36E-02	1.33E-02	1.31E-02	1.21E-02	1.14E-02
Gamma		2.05E-01	3.16E-01	4.01E-01	5.18E-01	5.92E-01	6.49E-01
Delta			3.54E-01	2.98E-01	4.21E-01	5.04E-01	5.96E-01
Epsilon				1.43E-01	3.76E-01	4.11E-01	5.24E-01
Mu					3.61E-01	2.81E-01	4.46E-01
Omega						1.01E-01	3.75E-01
Sigma							4.78E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.00	5.00	5.00	5.00	5.00	5.00	5.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8865199	0.9711905	0.9876420	0.9999343	1.516E+01	4.498E-01	--
α_2	6.57E-05	2.88E-02	1.24E-02	1.13E-01	4.498E-01	1.516E+01	0.968

CCCG = 3, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8965243	0.9627135	0.9719936	0.9971185	3.042E+01	1.178E+00	--
α_2	1.33E-03	2.96E-02	2.04E-02	8.94E-02	9.387E-01	3.073E+01	1.160
α_3	8.10E-08	7.64E-03	1.25E-03	3.75E-02	2.396E-01	3.111E+01	1.172

CCCG = 4, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8940838	0.9551723	0.9621613	0.9923177	4.045E+01	1.898E+00	--
α_2	2.69E-03	2.95E-02	2.27E-02	7.99E-02	1.285E+00	4.224E+01	1.222
α_3	8.77E-06	9.42E-03	3.40E-03	3.93E-02	3.927E-01	4.127E+01	1.277
α_4	2.28E-08	5.88E-03	7.93E-04	2.95E-02	2.207E-01	3.734E+01	1.416

CCCG = 5, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9181245	0.9586122	0.9621779	0.9869041	8.120E+01	3.506E+00	--
α_2	4.15E-03	2.31E-02	1.95E-02	5.43E-02	1.992E+00	8.428E+01	1.276
α_3	8.25E-04	1.33E-02	9.54E-03	3.84E-02	1.078E+00	8.018E+01	1.355
α_4	2.26E-06	4.29E-03	1.39E-03	1.84E-02	3.632E-01	8.438E+01	1.299
α_5	6.89E-21	7.45E-04	4.32E-07	4.31E-03	7.248E-02	9.725E+01	1.131

CCCG = 6, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9248039	0.9601665	0.9630472	0.9856803	1.012E+02	4.199E+00	--
α_2	2.97E-03	1.71E-02	1.44E-02	4.07E-02	1.941E+00	1.113E+02	1.213
α_3	1.32E-03	1.38E-02	1.06E-02	3.70E-02	1.332E+00	9.552E+01	1.418
α_4	6.38E-05	5.93E-03	3.21E-03	2.11E-02	6.181E-01	1.036E+02	1.318
α_5	1.47E-08	2.14E-03	3.19E-04	1.06E-02	2.313E-01	1.078E+02	1.271
α_6	7.92E-20	8.66E-04	8.18E-07	5.04E-03	7.684E-02	8.868E+01	1.547

CCCG = 7, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9355235	0.9624799	0.9643265	0.9831277	1.596E+02	6.223E+00	--
α_2	3.62E-03	1.48E-02	1.30E-02	3.19E-02	2.654E+00	1.772E+02	1.201
α_3	1.47E-03	1.07E-02	8.68E-03	2.70E-02	1.645E+00	1.518E+02	1.407
α_4	4.66E-04	6.99E-03	5.06E-03	2.01E-02	1.115E+00	1.585E+02	1.353
α_5	3.71E-05	3.83E-03	2.03E-03	1.37E-02	6.034E-01	1.569E+02	1.371
α_6	1.92E-10	1.08E-03	8.06E-05	5.73E-03	1.780E-01	1.646E+02	1.310
α_7	7.58E-51	1.39E-04	2.86E-14	4.92E-04	2.734E-02	1.964E+02	1.099

CCCG = 8, Gamma = 0.066

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9380225	0.9639194	0.9656939	0.9837542	1.669E+02	6.246E+00	--
α_2	3.04E-03	1.31E-02	1.15E-02	2.89E-02	2.504E+00	1.880E+02	1.173
α_3	9.35E-04	8.70E-03	6.79E-03	2.30E-02	1.419E+00	1.617E+02	1.370
α_4	3.49E-04	6.33E-03	4.45E-03	1.87E-02	1.027E+00	1.611E+02	1.378
α_5	8.92E-05	4.32E-03	2.59E-03	1.44E-02	7.337E-01	1.691E+02	1.316
α_6	2.57E-06	2.58E-03	9.32E-04	1.07E-02	3.975E-01	1.538E+02	1.449
α_7	4.41E-20	4.41E-04	4.23E-07	2.56E-03	7.703E-02	1.748E+02	1.278
α_8	5.23E-18	5.63E-04	1.41E-06	3.29E-03	8.749E-02	1.553E+02	1.438

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.71E-01	9.63E-01	9.55E-01	9.59E-01	9.60E-01	9.62E-01	9.64E-01
α_2	2.88E-02	2.96E-02	2.95E-02	2.31E-02	1.71E-02	1.48E-02	1.31E-02
α_3		7.64E-03	9.42E-03	1.33E-02	1.38E-02	1.07E-02	8.70E-03
α_4			5.88E-03	4.29E-03	5.93E-03	6.99E-03	6.33E-03
α_5				7.45E-04	2.14E-03	3.83E-03	4.32E-03
α_6					8.66E-04	1.08E-03	2.58E-03
α_7						1.39E-04	4.41E-04
α_8							5.63E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.71E-01	9.63E-01	9.55E-01	9.59E-01	9.60E-01	9.62E-01	9.64E-01
Beta	2.88E-02	3.73E-02	4.48E-02	4.14E-02	3.98E-02	3.75E-02	3.61E-02
Gamma		2.05E-01	3.41E-01	4.42E-01	5.70E-01	6.07E-01	6.36E-01
Delta			3.84E-01	2.75E-01	3.94E-01	5.29E-01	6.21E-01
Epsilon				1.48E-01	3.36E-01	4.20E-01	5.55E-01
Mu					2.88E-01	2.41E-01	4.53E-01
Omega						1.14E-01	2.80E-01
Sigma							5.61E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 7.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.464

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9437041	0.9855695	0.9936679	0.9999583	3.214E+01	4.706E-01	--
α_2	4.17E-05	1.44E-02	6.33E-03	5.63E-02	4.706E-01	3.214E+01	0.968

CCCG = 3, Gamma = 0.464

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9469596	0.9815048	0.9865542	0.9987836	5.851E+01	1.103E+00	--
α_2	3.92E-04	1.36E-02	8.65E-03	4.35E-02	8.104E-01	5.896E+01	1.160
α_3	4.17E-07	4.94E-03	1.16E-03	2.28E-02	2.921E-01	5.888E+01	1.172

CCCG = 4, Gamma = 0.464

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9522466	0.9798398	0.9830418	0.9964779	9.490E+01	1.953E+00	--
α_2	1.23E-03	1.32E-02	1.01E-02	3.57E-02	1.312E+00	9.815E+01	1.222
α_3	7.62E-06	4.52E-03	1.79E-03	1.83E-02	4.307E-01	9.479E+01	1.277
α_4	4.88E-09	2.45E-03	2.89E-04	1.25E-02	2.099E-01	8.562E+01	1.416

CCCG = 5, Gamma = 0.464

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9618766	0.9815215	0.9833963	0.9947576	1.650E+02	3.107E+00	--
α_2	1.39E-03	9.85E-03	8.01E-03	2.46E-02	1.684E+00	1.694E+02	1.276
α_3	2.59E-04	5.85E-03	3.97E-03	1.78E-02	9.426E-01	1.602E+02	1.355
α_4	1.71E-06	2.27E-03	7.82E-04	9.58E-03	3.816E-01	1.676E+02	1.299
α_5	2.04E-16	5.11E-04	2.80E-06	2.97E-03	9.865E-02	1.929E+02	1.131

CCCG = 6, Gamma = 0.464

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9661731	0.9826536	0.9840927	0.9942162	2.165E+02	3.822E+00	--
α_2	1.05E-03	7.24E-03	5.91E-03	1.80E-02	1.714E+00	2.349E+02	1.213
α_3	3.60E-04	5.47E-03	3.96E-03	1.58E-02	1.108E+00	2.013E+02	1.418
α_4	3.95E-05	2.99E-03	1.67E-03	1.04E-02	6.509E-01	2.171E+02	1.318
α_5	2.23E-08	1.12E-03	2.02E-04	5.41E-03	2.536E-01	2.256E+02	1.271
α_6	8.37E-17	5.16E-04	2.35E-06	3.01E-03	9.572E-02	1.854E+02	1.547

CCCG = 7, Gamma = 0.464

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9707273	0.9837767	0.9847734	0.9934222	3.150E+02	5.195E+00	--
α_2	1.15E-03	6.06E-03	5.14E-03	1.41E-02	2.105E+00	3.453E+02	1.201
α_3	4.19E-04	4.45E-03	3.40E-03	1.21E-02	1.320E+00	2.951E+02	1.407
α_4	1.65E-04	3.23E-03	2.24E-03	9.68E-03	9.967E-01	3.073E+02	1.353
α_5	8.73E-06	1.72E-03	8.20E-04	6.51E-03	5.249E-01	3.038E+02	1.371
α_6	4.57E-10	6.14E-04	6.01E-05	3.18E-03	1.956E-01	3.182E+02	1.310
α_7	3.98E-28	1.39E-04	3.16E-09	7.57E-04	5.291E-02	3.794E+02	1.099

CCCG = 8, Gamma = 0.464

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9729253	0.9845799	0.9854261	0.9933445	3.724E+02	5.832E+00	--
α_2	1.09E-03	5.35E-03	4.58E-03	1.22E-02	2.229E+00	4.144E+02	1.173
α_3	3.03E-04	3.53E-03	2.66E-03	9.74E-03	1.260E+00	3.555E+02	1.370
α_4	1.67E-04	2.94E-03	2.07E-03	8.66E-03	1.042E+00	3.537E+02	1.378
α_5	4.82E-05	2.05E-03	1.26E-03	6.77E-03	7.626E-01	3.706E+02	1.316
α_6	2.22E-07	9.70E-04	2.71E-04	4.31E-03	3.271E-01	3.369E+02	1.449
α_7	3.41E-13	3.51E-04	9.42E-06	1.97E-03	1.344E-01	3.823E+02	1.278
α_8	2.04E-20	2.26E-04	2.12E-07	1.31E-03	7.682E-02	3.398E+02	1.438

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.82E-01	9.80E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01
α_2	1.44E-02	1.36E-02	1.32E-02	9.85E-03	7.24E-03	6.06E-03	5.35E-03
α_3		4.94E-03	4.52E-03	5.85E-03	5.47E-03	4.45E-03	3.53E-03
α_4			2.45E-03	2.27E-03	2.99E-03	3.23E-03	2.94E-03
α_5				5.11E-04	1.12E-03	1.72E-03	2.05E-03
α_6					5.16E-04	6.14E-04	9.70E-04
α_7						1.39E-04	3.51E-04
α_8							2.26E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.82E-01	9.80E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01
Beta	1.44E-02	1.85E-02	2.02E-02	1.85E-02	1.73E-02	1.62E-02	1.54E-02
Gamma		2.67E-01	3.46E-01	4.67E-01	5.82E-01	6.27E-01	6.53E-01
Delta			3.51E-01	3.22E-01	4.58E-01	5.62E-01	6.49E-01
Epsilon				1.84E-01	3.54E-01	4.34E-01	5.51E-01
Mu					3.15E-01	3.04E-01	4.30E-01
Omega						1.85E-01	3.73E-01
Sigma							3.91E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.00	7.00	7.00	7.00	7.00	7.00	7.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 2.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.139

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9834448	0.9957035	0.9980584	0.9999842	1.143E+02	4.932E-01	--
α_2	1.58E-05	4.30E-03	1.94E-03	1.66E-02	4.932E-01	1.143E+02	0.968

CCCG = 3, Gamma = 0.139

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9855549	0.9950668	0.9964931	0.9997076	2.137E+02	1.059E+00	--
α_2	6.20E-05	3.31E-03	1.96E-03	1.12E-02	7.137E-01	2.148E+02	1.160
α_3	5.83E-07	1.62E-03	4.91E-04	7.08E-03	3.458E-01	2.130E+02	1.172

CCCG = 4, Gamma = 0.139

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9873107	0.9945429	0.9953669	0.9989582	3.854E+02	2.115E+00	--
α_2	4.82E-04	3.89E-03	3.10E-03	1.00E-02	1.549E+00	3.969E+02	1.222
α_3	2.17E-08	6.94E-04	1.36E-04	3.30E-03	2.646E-01	3.812E+02	1.277
α_4	9.68E-08	8.75E-04	2.15E-04	4.00E-03	3.010E-01	3.435E+02	1.416

CCCG = 5, Gamma = 0.139

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9911591	0.9950883	0.9953893	0.9979897	1.079E+03	5.325E+00	--
α_2	1.05E-03	3.30E-03	3.00E-03	6.55E-03	3.632E+00	1.098E+03	1.276
α_3	1.28E-04	1.31E-03	1.00E-03	3.52E-03	1.354E+00	1.036E+03	1.355
α_4	2.60E-08	2.74E-04	6.53E-05	1.26E-03	2.961E-01	1.081E+03	1.299
α_5	1.02E-34	3.42E-05	3.76E-11	1.69E-04	4.243E-02	1.242E+03	1.131

CCCG = 6, Gamma = 0.139

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9908307	0.9949995	0.9953297	0.9980407	9.821E+02	4.936E+00	--
α_2	7.41E-04	2.78E-03	2.47E-03	5.88E-03	2.915E+00	1.044E+03	1.213
α_3	1.20E-04	1.40E-03	1.05E-03	3.88E-03	1.257E+00	8.947E+02	1.418
α_4	2.12E-06	5.22E-04	2.39E-04	2.00E-03	5.031E-01	9.633E+02	1.318
α_5	3.35E-15	1.16E-04	1.52E-06	6.63E-04	1.155E-01	9.994E+02	1.271
α_6	8.27E-13	1.77E-04	6.47E-06	9.79E-04	1.451E-01	8.209E+02	1.547

CCCG = 7, Gamma = 0.139

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9927902	0.9954360	0.9955911	0.9975521	2.106E+03	9.654E+00	--
α_2	8.25E-04	2.13E-03	1.99E-03	3.93E-03	4.851E+00	2.272E+03	1.201
α_3	3.69E-04	1.44E-03	1.27E-03	3.08E-03	2.800E+00	1.940E+03	1.407
α_4	7.00E-05	6.85E-04	5.29E-04	1.83E-03	1.384E+00	2.019E+03	1.353
α_5	8.70E-07	2.46E-04	1.10E-04	9.51E-04	4.902E-01	1.994E+03	1.371
α_6	1.31E-15	5.49E-05	6.96E-07	3.15E-04	1.146E-01	2.086E+03	1.310
α_7	3.10E-93	5.89E-06	6.26E-25	6.99E-06	1.464E-02	2.487E+03	1.099

CCCG = 8, Gamma = 0.139

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9925131	0.9955486	0.9957526	0.9978877	1.599E+03	7.148E+00	--
α_2	4.58E-04	1.69E-03	1.50E-03	3.55E-03	2.980E+00	1.762E+03	1.173
α_3	2.25E-04	1.30E-03	1.08E-03	3.09E-03	1.960E+00	1.509E+03	1.370
α_4	5.68E-05	7.76E-04	5.69E-04	2.20E-03	1.166E+00	1.501E+03	1.378
α_5	1.94E-06	3.42E-04	1.65E-04	1.28E-03	5.375E-01	1.573E+03	1.316
α_6	2.79E-11	1.26E-04	9.80E-06	6.68E-04	1.805E-01	1.428E+03	1.449
α_7	1.32E-35	2.56E-05	1.91E-11	1.25E-04	4.139E-02	1.620E+03	1.278
α_8	1.20E-08	1.96E-04	4.33E-05	9.15E-04	2.827E-01	1.440E+03	1.438

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01
α_2	4.30E-03	3.31E-03	3.89E-03	3.30E-03	2.78E-03	2.13E-03	1.69E-03
α_3		1.62E-03	6.94E-04	1.31E-03	1.40E-03	1.44E-03	1.30E-03
α_4			8.75E-04	2.74E-04	5.22E-04	6.85E-04	7.76E-04
α_5				3.42E-05	1.16E-04	2.46E-04	3.42E-04
α_6					1.77E-04	5.49E-05	1.26E-04
α_7						5.89E-06	2.56E-05
α_8							1.96E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.96E-01
Beta	4.30E-03	4.93E-03	5.46E-03	4.91E-03	5.00E-03	4.56E-03	4.45E-03
Gamma		3.29E-01	2.88E-01	3.28E-01	4.43E-01	5.33E-01	6.21E-01
Delta			5.58E-01	1.91E-01	3.67E-01	4.08E-01	5.31E-01
Epsilon				1.11E-01	3.59E-01	3.09E-01	4.71E-01
Mu					6.05E-01	1.98E-01	5.05E-01
Omega						9.68E-02	6.37E-01
Sigma							8.85E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.10	2.10	2.10	2.10	2.10	2.10	2.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.13.1.2 ACP-CRB-480-OO: AC Power 480 V Circuit Breakers Fail to Close

Generic CCF Parameters

System Group: Electrical
System: Plant AC Power
Component Group: Electrical
Component Type: Circuit Breaker
Component Subtype: 480 V
Failure Mode: Fail to Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 21.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9586783	0.9894431	0.9954138	0.9999679	1.0000000	4.391E+01	4.685E-01
α_2	2.96E-05	1.06E-02	4.59E-03	4.13E-02	0.00E+00	4.685E-01	4.391E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9600968	0.9860057	0.9897716	0.9990334	1.0000000	7.948E+01	1.128E+00
α_2	3.54E-04	1.06E-02	6.88E-03	3.33E-02	0.00E+00	8.512E-01	7.976E+01
α_3	1.71E-07	3.43E-03	7.35E-04	1.61E-02	0.00E+00	2.768E-01	8.033E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9602289	0.9833994	0.9861345	0.9972223	1.0000000	1.122E+02	1.894E+00
α_2	9.54E-04	1.10E-02	8.35E-03	3.04E-02	0.00E+00	1.260E+00	1.128E+02
α_3	3.83E-06	3.53E-03	1.30E-03	1.46E-02	0.00E+00	4.024E-01	1.137E+02
α_4	1.41E-08	2.03E-03	3.02E-04	1.00E-02	0.00E+00	2.315E-01	1.138E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9680508	0.9840935	0.9855628	0.9951137	1.0000000	2.123E+02	3.432E+00
α_2	1.52E-03	8.92E-03	7.45E-03	2.13E-02	0.00E+00	1.924E+00	2.138E+02
α_3	2.81E-04	4.86E-03	3.44E-03	1.43E-02	0.00E+00	1.049E+00	2.147E+02
α_4	1.35E-06	1.77E-03	6.11E-04	7.47E-03	0.00E+00	3.822E-01	2.154E+02
α_5	3.09E-20	3.56E-04	3.31E-07	2.07E-03	0.00E+00	7.674E-02	2.157E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9701593	0.9846943	0.9859632	0.9948914	1.0000000	2.467E+02	3.835E+00
α_2	9.73E-04	6.79E-03	5.53E-03	1.69E-02	0.00E+00	1.701E+00	2.489E+02
α_3	3.80E-04	4.82E-03	3.58E-03	1.35E-02	0.00E+00	1.207E+00	2.493E+02

α_4	2.18E-05	2.38E-03	1.25E-03	8.57E-03	0.00E+00	5.960E-01	2.500E+02
α_5	3.45E-09	8.82E-04	1.18E-04	4.43E-03	0.00E+00	2.211E-01	2.503E+02
α_6	3.45E-15	4.38E-04	4.44E-06	2.53E-03	0.00E+00	1.098E-01	2.504E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9746156	0.9855973	0.9863989	0.9938356	1.0000000	3.933E+02	5.747E+00
α_2	1.15E-03	5.62E-03	4.82E-03	1.28E-02	0.00E+00	2.243E+00	3.968E+02
α_3	5.48E-04	4.08E-03	3.29E-03	1.03E-02	0.00E+00	1.630E+00	3.974E+02
α_4	1.69E-04	2.71E-03	1.94E-03	7.89E-03	0.00E+00	1.083E+00	3.980E+02
α_5	1.02E-05	1.42E-03	7.15E-04	5.21E-03	0.00E+00	5.654E-01	3.985E+02
α_6	2.64E-10	4.80E-04	4.44E-05	2.50E-03	0.00E+00	1.916E-01	3.989E+02
α_7	5.97E-41	8.72E-05	3.24E-12	3.83E-04	0.00E+00	3.480E-02	3.990E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9757881	0.9862777	0.9870454	0.9941358	1.0000000	4.115E+02	5.726E+00
α_2	8.72E-04	4.84E-03	4.07E-03	1.14E-02	0.00E+00	2.018E+00	4.152E+02
α_3	3.44E-04	3.33E-03	2.58E-03	8.89E-03	0.00E+00	1.391E+00	4.159E+02
α_4	1.51E-04	2.55E-03	1.81E-03	7.46E-03	0.00E+00	1.062E+00	4.162E+02
α_5	2.97E-05	1.68E-03	9.84E-04	5.72E-03	0.00E+00	7.026E-01	4.165E+02
α_6	3.29E-07	8.38E-04	2.57E-04	3.65E-03	0.00E+00	3.497E-01	4.169E+02
α_7	1.26E-15	2.58E-04	2.37E-06	1.49E-03	0.00E+00	1.078E-01	4.171E+02
α_8	2.64E-17	2.27E-04	9.61E-07	1.32E-03	0.00E+00	9.469E-02	4.172E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.86E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
α_2	1.06E-02	1.06E-02	1.10E-02	8.92E-03	6.79E-03	5.62E-03	4.84E-03
α_3		3.43E-03	3.53E-03	4.86E-03	4.82E-03	4.08E-03	3.33E-03
α_4			2.03E-03	1.77E-03	2.38E-03	2.71E-03	2.55E-03
α_5				3.56E-04	8.82E-04	1.42E-03	1.68E-03
α_6					4.38E-04	4.80E-04	8.38E-04
α_7						8.72E-05	2.58E-04
α_8							2.27E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.86E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
Beta	1.06E-02	1.40E-02	1.66E-02	1.59E-02	1.53E-02	1.44E-02	1.37E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	21.50	21.50	21.50	21.50	21.50	21.50	21.50
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 10.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.465

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9658568	0.9911852	0.9960650	0.9999707	5.436E+01	4.834E-01	--
α_2	2.93E-05	8.81E-03	3.94E-03	3.41E-02	4.834E-01	5.436E+01	0.991

CCCG = 3, Gamma = 0.465

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9698960	0.9891527	0.9918722	0.9991126	1.118E+02	1.226E+00	--
α_2	4.21E-04	8.64E-03	5.97E-03	2.60E-02	9.769E-01	1.121E+02	1.246
α_3	3.53E-08	2.21E-03	3.84E-04	1.07E-02	2.487E-01	1.124E+02	1.251

CCCG = 4, Gamma = 0.465

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9665899	0.9857000	0.9878830	0.9973442	1.418E+02	2.057E+00	--
α_2	1.08E-03	9.74E-03	7.64E-03	2.56E-02	1.442E+00	1.466E+02	1.310
α_3	3.65E-06	2.91E-03	1.09E-03	1.20E-02	4.114E-01	1.409E+02	1.372
α_4	2.17E-09	1.65E-03	1.80E-04	8.45E-03	2.036E-01	1.234E+02	1.569

CCCG = 5, Gamma = 0.465

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9718985	0.9857477	0.9869813	0.9953815	2.547E+02	3.683E+00	--
α_2	1.74E-03	8.48E-03	7.28E-03	1.93E-02	2.243E+00	2.622E+02	1.377
α_3	2.06E-04	4.08E-03	2.83E-03	1.22E-02	9.912E-01	2.419E+02	1.500
α_4	9.88E-07	1.45E-03	4.90E-04	6.14E-03	3.765E-01	2.595E+02	1.402
α_5	2.09E-21	2.41E-04	1.38E-07	1.40E-03	7.237E-02	2.996E+02	1.215

CCCG = 6, Gamma = 0.465

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9731463	0.9859540	0.9870384	0.9950571	2.905E+02	4.139E+00	--
α_2	1.29E-03	6.68E-03	5.68E-03	1.55E-02	2.128E+00	3.164E+02	1.301
α_3	2.98E-04	4.31E-03	3.14E-03	1.23E-02	1.134E+00	2.618E+02	1.576
α_4	1.26E-05	1.92E-03	9.54E-04	7.12E-03	5.533E-01	2.872E+02	1.440
α_5	2.85E-09	7.31E-04	9.76E-05	3.67E-03	2.210E-01	3.021E+02	1.371
α_6	5.09E-16	3.99E-04	2.78E-06	2.32E-03	1.027E-01	2.572E+02	1.611

CCCG = 7, Gamma = 0.465

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9774097	0.9868494	0.9875073	0.9940426	4.827E+02	6.432E+00	--
α_2	1.39E-03	5.35E-03	4.75E-03	1.14E-02	2.840E+00	5.276E+02	1.315
α_3	5.73E-04	3.86E-03	3.16E-03	9.54E-03	1.746E+00	4.508E+02	1.541
α_4	1.45E-04	2.32E-03	1.66E-03	6.74E-03	1.084E+00	4.665E+02	1.492
α_5	6.70E-06	1.18E-03	5.70E-04	4.40E-03	5.376E-01	4.562E+02	1.527
α_6	3.50E-10	3.99E-04	4.02E-05	2.06E-03	1.979E-01	4.964E+02	1.405
α_7	1.01E-52	4.49E-05	4.50E-15	1.54E-04	2.656E-02	5.911E+02	1.180

CCCG = 8, Gamma = 0.465

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9783153	0.9875253	0.9881825	0.9944908	4.839E+02	6.112E+00	--
α_2	9.56E-04	4.41E-03	3.81E-03	9.92E-03	2.364E+00	5.333E+02	1.302
α_3	3.86E-04	3.24E-03	2.56E-03	8.41E-03	1.512E+00	4.651E+02	1.494
α_4	1.34E-04	2.28E-03	1.61E-03	6.68E-03	1.056E+00	4.630E+02	1.503
α_5	2.13E-05	1.40E-03	8.00E-04	4.84E-03	6.745E-01	4.797E+02	1.452
α_6	9.80E-08	7.29E-04	1.85E-04	3.31E-03	3.076E-01	4.219E+02	1.652
α_7	1.45E-15	2.07E-04	2.04E-06	1.19E-03	1.093E-01	5.277E+02	1.321
α_8	3.17E-18	2.05E-04	5.69E-07	1.20E-03	8.885E-02	4.333E+02	1.609

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.89E-01	9.86E-01	9.86E-01	9.86E-01	9.87E-01	9.88E-01
α_2	8.81E-03	8.64E-03	9.74E-03	8.48E-03	6.68E-03	5.35E-03	4.41E-03
α_3		2.21E-03	2.91E-03	4.08E-03	4.31E-03	3.86E-03	3.24E-03
α_4			1.65E-03	1.45E-03	1.92E-03	2.32E-03	2.28E-03
α_5				2.41E-04	7.31E-04	1.18E-03	1.40E-03
α_6					3.99E-04	3.99E-04	7.29E-04
α_7						4.49E-05	2.07E-04
α_8							2.05E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.89E-01	9.86E-01	9.86E-01	9.86E-01	9.87E-01	9.88E-01
Beta	8.81E-03	1.08E-02	1.43E-02	1.43E-02	1.40E-02	1.32E-02	1.25E-02
Gamma		2.03E-01	3.19E-01	4.05E-01	5.24E-01	5.93E-01	6.46E-01
Delta			3.61E-01	2.93E-01	4.14E-01	5.05E-01	5.98E-01
Epsilon				1.43E-01	3.70E-01	4.11E-01	5.28E-01
Mu					3.53E-01	2.74E-01	4.48E-01
Omega						1.01E-01	3.61E-01
Sigma							4.97E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	10.00	10.00	10.00	10.00	10.00	10.00	10.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 9.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.442

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9465890	0.9863135	0.9940005	0.9999605	3.391E+01	4.706E-01	--
α_2	3.95E-05	1.37E-02	6.00E-03	5.34E-02	4.706E-01	3.391E+01	0.991

CCCG = 3, Gamma = 0.442

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9451296	0.9808603	0.9860803	0.9987404	5.650E+01	1.103E+00	--
α_2	4.07E-04	1.41E-02	8.97E-03	4.51E-02	8.104E-01	5.685E+01	1.246
α_3	4.29E-07	5.08E-03	1.20E-03	2.34E-02	2.921E-01	5.716E+01	1.251

CCCG = 4, Gamma = 0.442

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9496243	0.9787220	0.9820948	0.9962798	8.981E+01	1.953E+00	--
α_2	1.30E-03	1.39E-02	1.06E-02	3.75E-02	1.312E+00	9.335E+01	1.310
α_3	8.03E-06	4.76E-03	1.89E-03	1.93E-02	4.307E-01	8.998E+01	1.372
α_4	5.30E-09	2.65E-03	3.14E-04	1.35E-02	2.099E-01	7.886E+01	1.569

CCCG = 5, Gamma = 0.442

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9590217	0.9801270	0.9821380	0.9943578	1.532E+02	3.107E+00	--
α_2	1.49E-03	1.05E-02	8.55E-03	2.62E-02	1.684E+00	1.586E+02	1.377
α_3	2.84E-04	6.40E-03	4.35E-03	1.95E-02	9.426E-01	1.463E+02	1.500
α_4	1.82E-06	2.42E-03	8.34E-04	1.02E-02	3.816E-01	1.572E+02	1.402
α_5	2.17E-16	5.43E-04	2.98E-06	3.16E-03	9.865E-02	1.816E+02	1.215

CCCG = 6, Gamma = 0.442

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9635282	0.9812882	0.9828365	0.9937570	2.004E+02	3.822E+00	--
α_2	1.12E-03	7.70E-03	6.29E-03	1.91E-02	1.714E+00	2.207E+02	1.301
α_3	3.97E-04	6.03E-03	4.36E-03	1.74E-02	1.108E+00	1.825E+02	1.576
α_4	4.29E-05	3.24E-03	1.81E-03	1.13E-02	6.509E-01	2.003E+02	1.440
α_5	2.38E-08	1.20E-03	2.17E-04	5.79E-03	2.536E-01	2.109E+02	1.371
α_6	8.65E-17	5.33E-04	2.42E-06	3.10E-03	9.572E-02	1.796E+02	1.611

CCCG = 7, Gamma = 0.442

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9680796	0.9823012	0.9833853	0.9928197	2.883E+02	5.195E+00	--
α_2	1.25E-03	6.60E-03	5.60E-03	1.53E-02	2.105E+00	3.171E+02	1.315
α_3	4.56E-04	4.85E-03	3.70E-03	1.32E-02	1.320E+00	2.710E+02	1.541
α_4	1.81E-04	3.54E-03	2.46E-03	1.06E-02	9.967E-01	2.804E+02	1.492
α_5	9.67E-06	1.91E-03	9.08E-04	7.20E-03	5.249E-01	2.743E+02	1.527
α_6	4.87E-10	6.55E-04	6.41E-05	3.39E-03	1.956E-01	2.986E+02	1.405
α_7	4.24E-28	1.49E-04	3.37E-09	8.07E-04	5.291E-02	3.556E+02	1.180

CCCG = 8, Gamma = 0.442

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9703534	0.9831076	0.9840319	0.9927050	3.394E+02	5.832E+00	--
α_2	1.20E-03	5.91E-03	5.06E-03	1.35E-02	2.229E+00	3.752E+02	1.302
α_3	3.29E-04	3.83E-03	2.89E-03	1.06E-02	1.260E+00	3.275E+02	1.494
α_4	1.81E-04	3.19E-03	2.25E-03	9.40E-03	1.042E+00	3.259E+02	1.503
α_5	5.29E-05	2.25E-03	1.38E-03	7.43E-03	7.626E-01	3.377E+02	1.452
α_6	2.52E-07	1.10E-03	3.07E-04	4.89E-03	3.271E-01	2.971E+02	1.652
α_7	3.50E-13	3.61E-04	9.69E-06	2.03E-03	1.344E-01	3.718E+02	1.321
α_8	2.27E-20	2.52E-04	2.36E-07	1.46E-03	7.682E-02	3.053E+02	1.609

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.81E-01	9.79E-01	9.80E-01	9.81E-01	9.82E-01	9.83E-01
α_2	1.37E-02	1.41E-02	1.39E-02	1.05E-02	7.70E-03	6.60E-03	5.91E-03
α_3		5.08E-03	4.76E-03	6.40E-03	6.03E-03	4.85E-03	3.83E-03
α_4			2.65E-03	2.42E-03	3.24E-03	3.54E-03	3.19E-03
α_5				5.43E-04	1.20E-03	1.91E-03	2.25E-03
α_6					5.33E-04	6.55E-04	1.10E-03
α_7						1.49E-04	3.61E-04
α_8							2.52E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.81E-01	9.79E-01	9.80E-01	9.81E-01	9.82E-01	9.83E-01
Beta	1.37E-02	1.91E-02	2.13E-02	1.99E-02	1.87E-02	1.77E-02	1.69E-02
Gamma		2.66E-01	3.49E-01	4.71E-01	5.88E-01	6.27E-01	6.50E-01
Delta			3.58E-01	3.17E-01	4.52E-01	5.63E-01	6.51E-01
Epsilon				1.83E-01	3.49E-01	4.34E-01	5.54E-01
Mu					3.07E-01	2.96E-01	4.32E-01
Omega						1.85E-01	3.58E-01
Sigma							4.10E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	9.50	9.50	9.50	9.50	9.50	9.50	9.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9830401	0.9955983	0.9980106	0.9999838	1.116E+02	4.932E-01	--
α_2	1.62E-05	4.40E-03	1.99E-03	1.70E-02	4.932E-01	1.116E+02	0.991

CCCG = 3, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845156	0.9947109	0.9962393	0.9996864	1.993E+02	1.059E+00	--
α_2	6.66E-05	3.56E-03	2.10E-03	1.20E-02	7.137E-01	1.998E+02	1.246
α_3	6.23E-07	1.73E-03	5.24E-04	7.55E-03	3.458E-01	1.995E+02	1.251

CCCG = 4, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9863170	0.9941144	0.9950025	0.9988761	3.572E+02	2.115E+00	--
α_2	5.17E-04	4.17E-03	3.32E-03	1.07E-02	1.549E+00	3.699E+02	1.310
α_3	2.33E-08	7.46E-04	1.46E-04	3.55E-03	2.646E-01	3.545E+02	1.372
α_4	1.07E-07	9.70E-04	2.38E-04	4.43E-03	3.010E-01	3.100E+02	1.569

CCCG = 5, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9903948	0.9946630	0.9949898	0.9978153	9.923E+02	5.325E+00	--
α_2	1.14E-03	3.56E-03	3.24E-03	7.07E-03	3.632E+00	1.017E+03	1.377
α_3	1.42E-04	1.45E-03	1.11E-03	3.89E-03	1.354E+00	9.356E+02	1.500
α_4	2.80E-08	2.95E-04	7.05E-05	1.36E-03	2.961E-01	1.002E+03	1.402
α_5	1.09E-34	3.67E-05	4.04E-11	1.82E-04	4.243E-02	1.156E+03	1.215

CCCG = 6, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9900523	0.9945743	0.9949323	0.9978737	9.047E+02	4.936E+00	--
α_2	7.95E-04	2.99E-03	2.65E-03	6.31E-03	2.915E+00	9.732E+02	1.301
α_3	1.33E-04	1.56E-03	1.17E-03	4.31E-03	1.257E+00	8.044E+02	1.576
α_4	2.32E-06	5.71E-04	2.61E-04	2.19E-03	5.031E-01	8.813E+02	1.440
α_5	3.61E-15	1.25E-04	1.65E-06	7.15E-04	1.155E-01	9.262E+02	1.371
α_6	8.61E-13	1.84E-04	6.74E-06	1.02E-03	1.451E-01	7.883E+02	1.611

CCCG = 7, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9920921	0.9949935	0.9951636	0.9973144	1.919E+03	9.654E+00	--
α_2	9.04E-04	2.33E-03	2.18E-03	4.30E-03	4.851E+00	2.074E+03	1.315
α_3	4.05E-04	1.58E-03	1.40E-03	3.38E-03	2.800E+00	1.771E+03	1.541
α_4	7.72E-05	7.55E-04	5.83E-04	2.02E-03	1.384E+00	1.831E+03	1.492
α_5	9.69E-07	2.74E-04	1.22E-04	1.06E-03	4.902E-01	1.790E+03	1.527
α_6	1.40E-15	5.89E-05	7.46E-07	3.38E-04	1.146E-01	1.946E+03	1.405
α_7	3.32E-93	6.32E-06	6.72E-25	7.51E-06	1.464E-02	2.317E+03	1.180

CCCG = 8, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9917566	0.9950982	0.9953227	0.9976736	1.451E+03	7.148E+00	--
α_2	5.08E-04	1.87E-03	1.67E-03	3.94E-03	2.980E+00	1.587E+03	1.302
α_3	2.45E-04	1.41E-03	1.18E-03	3.38E-03	1.960E+00	1.383E+03	1.494
α_4	6.19E-05	8.46E-04	6.21E-04	2.40E-03	1.166E+00	1.377E+03	1.503
α_5	2.14E-06	3.77E-04	1.82E-04	1.41E-03	5.375E-01	1.426E+03	1.452
α_6	3.18E-11	1.44E-04	1.12E-05	7.61E-04	1.805E-01	1.253E+03	1.652
α_7	1.37E-35	2.64E-05	1.98E-11	1.29E-04	4.139E-02	1.567E+03	1.321
α_8	1.34E-08	2.20E-04	4.84E-05	1.02E-03	2.827E-01	1.287E+03	1.609

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.95E-01	9.94E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01
α_2	4.40E-03	3.56E-03	4.17E-03	3.56E-03	2.99E-03	2.33E-03	1.87E-03
α_3		1.73E-03	7.46E-04	1.45E-03	1.56E-03	1.58E-03	1.41E-03
α_4			9.70E-04	2.95E-04	5.71E-04	7.55E-04	8.46E-04
α_5				3.67E-05	1.25E-04	2.74E-04	3.77E-04
α_6					1.84E-04	5.89E-05	1.44E-04
α_7						6.32E-06	2.64E-05
α_8							2.20E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.95E-01	9.94E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01
Beta	4.40E-03	5.29E-03	5.89E-03	5.34E-03	5.43E-03	5.01E-03	4.90E-03
Gamma		3.27E-01	2.92E-01	3.33E-01	4.50E-01	5.34E-01	6.18E-01
Delta			5.65E-01	1.87E-01	3.60E-01	4.09E-01	5.33E-01
Epsilon				1.11E-01	3.51E-01	3.10E-01	4.75E-01
Mu					5.96E-01	1.92E-01	5.09E-01
Omega						9.69E-02	6.31E-01
Sigma							8.93E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.13.1.3 ACP-CRB-480-SA: AC Power 480 V Circuit Breakers Spurious Actuation

Generic CCF Parameters

System Group: Electrical
System: Plant AC Power
Component Group: Electrical
Component Type: Circuit Breaker
Component Subtype: 480 V
Failure Mode: Spurious Closing, Spurious Opening, Spurious Operation
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 39.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9485562	0.9853014	0.9918316	0.9998174	0.9918033	4.258E+01	6.352E-01
α_2	1.79E-04	1.47E-02	8.17E-03	5.14E-02	8.20E-03	6.352E-01	4.258E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9542031	0.9817805	0.9852383	0.9975352	0.9834711	8.773E+01	1.628E+00
α_2	1.50E-03	1.51E-02	1.17E-02	4.05E-02	1.65E-02	1.351E+00	8.801E+01
α_3	1.55E-07	3.10E-03	6.62E-04	1.45E-02	0.00E+00	2.768E-01	8.908E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9541066	0.9781728	0.9805351	0.9941740	0.9750000	1.297E+02	2.894E+00
α_2	3.54E-03	1.70E-02	1.47E-02	3.86E-02	2.50E-02	2.260E+00	1.303E+02
α_3	3.30E-06	3.04E-03	1.11E-03	1.26E-02	0.00E+00	4.024E-01	1.322E+02
α_4	1.21E-08	1.75E-03	2.60E-04	8.65E-03	0.00E+00	2.315E-01	1.323E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9659263	0.9818370	0.9831353	0.9932992	0.9798995	2.396E+02	4.432E+00
α_2	2.54E-03	1.06E-02	9.31E-03	2.32E-02	1.34E-02	2.591E+00	2.414E+02
α_3	5.80E-04	5.66E-03	4.38E-03	1.51E-02	6.70E-03	1.382E+00	2.426E+02
α_4	1.19E-06	1.57E-03	5.40E-04	6.61E-03	0.00E+00	3.822E-01	2.436E+02
α_5	2.73E-20	3.14E-04	2.93E-07	1.83E-03	0.00E+00	7.674E-02	2.439E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9692314	0.9832443	0.9843462	0.9934811	0.9831933	2.837E+02	4.835E+00
α_2	1.45E-03	7.44E-03	6.33E-03	1.72E-02	7.47E-03	2.146E+00	2.864E+02
α_3	7.84E-04	5.72E-03	4.63E-03	1.44E-02	7.47E-03	1.651E+00	2.869E+02

α_4	4.43E-05	2.45E-03	1.44E-03	8.30E-03	1.87E-03	7.071E-01	2.878E+02
α_5	3.00E-09	7.66E-04	1.02E-04	3.84E-03	0.00E+00	2.211E-01	2.883E+02
α_6	2.99E-15	3.80E-04	3.85E-06	2.19E-03	0.00E+00	1.098E-01	2.884E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9743522	0.9848984	0.9856139	0.9929984	0.9855596	4.401E+02	6.747E+00
α_2	1.33E-03	5.68E-03	4.97E-03	1.25E-02	4.28E-03	2.539E+00	4.443E+02
α_3	8.65E-04	4.64E-03	3.93E-03	1.09E-02	6.42E-03	2.074E+00	4.447E+02
α_4	2.68E-04	2.92E-03	2.22E-03	7.96E-03	3.21E-03	1.305E+00	4.455E+02
α_5	1.29E-05	1.35E-03	7.12E-04	4.84E-03	5.35E-04	6.024E-01	4.462E+02
α_6	2.35E-10	4.29E-04	3.96E-05	2.23E-03	0.00E+00	1.916E-01	4.466E+02
α_7	5.33E-41	7.79E-05	2.90E-12	3.42E-04	0.00E+00	3.480E-02	4.468E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9759172	0.9858333	0.9865080	0.9934401	0.9873418	4.680E+02	6.726E+00
α_2	9.40E-04	4.67E-03	3.99E-03	1.07E-02	2.50E-03	2.216E+00	4.725E+02
α_3	5.76E-04	3.76E-03	3.09E-03	9.24E-03	5.00E-03	1.786E+00	4.730E+02
α_4	2.83E-04	2.86E-03	2.20E-03	7.70E-03	3.75E-03	1.358E+00	4.734E+02
α_5	4.65E-05	1.69E-03	1.06E-03	5.47E-03	1.25E-03	8.014E-01	4.739E+02
α_6	3.90E-07	7.63E-04	2.45E-04	3.28E-03	1.56E-04	3.621E-01	4.744E+02
α_7	1.11E-15	2.27E-04	2.08E-06	1.31E-03	0.00E+00	1.078E-01	4.746E+02
α_8	2.32E-17	1.99E-04	8.45E-07	1.16E-03	0.00E+00	9.469E-02	4.747E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.82E-01	9.78E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
α_2	1.47E-02	1.51E-02	1.70E-02	1.06E-02	7.44E-03	5.68E-03	4.67E-03
α_3		3.10E-03	3.04E-03	5.66E-03	5.72E-03	4.64E-03	3.76E-03
α_4			1.75E-03	1.57E-03	2.45E-03	2.92E-03	2.86E-03
α_5				3.14E-04	7.66E-04	1.35E-03	1.69E-03
α_6					3.80E-04	4.29E-04	7.63E-04
α_7						7.79E-05	2.27E-04
α_8							1.99E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.82E-01	9.78E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
Beta	1.47E-02	1.82E-02	2.18E-02	1.82E-02	1.68E-02	1.51E-02	1.42E-02
Gamma		1.70E-01	2.19E-01	4.15E-01	5.56E-01	6.24E-01	6.71E-01
Delta			3.65E-01	2.49E-01	3.86E-01	5.07E-01	6.04E-01
Epsilon				1.67E-01	3.19E-01	3.88E-01	5.01E-01
Mu					3.32E-01	2.73E-01	4.13E-01
Omega						1.54E-01	3.59E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	19.50	29.25	39.00	48.75	58.50	68.25	78.00
N₁	0.6667	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.1667	0.5000	1.0000	0.6667	0.4444	0.2963	0.1975
N₃		0.0000	0.0000	0.3333	0.4444	0.4444	0.3951
N₄			0.0000	0.0000	0.1111	0.2222	0.2963
N₅				0.0000	0.0000	0.0370	0.0988
N₆					0.0000	0.0000	0.0123
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 9.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.221

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9681572	0.9917813	0.9963340	0.9999727	5.833E+01	4.834E-01	--
α_2	2.73E-05	8.22E-03	3.67E-03	3.18E-02	4.834E-01	5.833E+01	0.830

CCCG = 3, Gamma = 0.223

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9769698	0.9917121	0.9937985	0.9993235	1.467E+02	1.226E+00	--
α_2	3.31E-04	6.81E-03	4.70E-03	2.05E-02	9.769E-01	1.425E+02	0.960
α_3	2.36E-08	1.48E-03	2.57E-04	7.17E-03	2.487E-01	1.679E+02	0.819

CCCG = 4, Gamma = 0.225

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9757049	0.9896193	0.9912151	0.9980770	1.961E+02	2.057E+00	--
α_2	8.50E-04	7.70E-03	6.03E-03	2.02E-02	1.442E+00	1.859E+02	1.030
α_3	2.23E-06	1.78E-03	6.70E-04	7.33E-03	4.114E-01	2.303E+02	0.836
α_4	1.18E-09	9.02E-04	9.83E-05	4.63E-03	2.036E-01	2.256E+02	0.855

CCCG = 5, Gamma = 0.226

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9805405	0.9901463	0.9910063	0.9968136	3.701E+02	3.683E+00	--
α_2	1.23E-03	6.03E-03	5.17E-03	1.38E-02	2.243E+00	3.696E+02	0.983
α_3	1.36E-04	2.71E-03	1.87E-03	8.12E-03	9.912E-01	3.653E+02	0.998
α_4	6.39E-07	9.37E-04	3.17E-04	3.98E-03	3.765E-01	4.012E+02	0.910
α_5	1.55E-21	1.79E-04	1.02E-07	1.03E-03	7.237E-02	4.050E+02	0.902

CCCG = 6, Gamma = 0.227

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9817562	0.9904723	0.9912142	0.9966539	4.303E+02	4.139E+00	--
α_2	9.08E-04	4.72E-03	4.01E-03	1.10E-02	2.128E+00	4.483E+02	0.928
α_3	1.91E-04	2.77E-03	2.01E-03	7.92E-03	1.134E+00	4.088E+02	1.020
α_4	8.37E-06	1.28E-03	6.35E-04	4.74E-03	5.533E-01	4.313E+02	0.968
α_5	1.83E-09	4.70E-04	6.27E-05	2.36E-03	2.210E-01	4.704E+02	0.888
α_6	3.64E-16	2.86E-04	1.99E-06	1.66E-03	1.027E-01	3.593E+02	1.163

CCCG = 7, Gamma = 0.227

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9850493	0.9913078	0.9917464	0.9960685	7.335E+02	6.432E+00	--
α_2	9.28E-04	3.57E-03	3.16E-03	7.60E-03	2.840E+00	7.929E+02	0.884
α_3	3.79E-04	2.56E-03	2.09E-03	6.33E-03	1.746E+00	6.813E+02	1.030
α_4	9.59E-05	1.54E-03	1.10E-03	4.48E-03	1.084E+00	7.031E+02	0.999
α_5	4.09E-06	7.19E-04	3.48E-04	2.69E-03	5.376E-01	7.470E+02	0.941
α_6	2.37E-10	2.70E-04	2.72E-05	1.39E-03	1.979E-01	7.331E+02	0.959
α_7	8.63E-53	3.85E-05	3.86E-15	1.32E-04	2.656E-02	6.897E+02	1.020

CCCG = 8, Gamma = 0.228

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9858762	0.9918853	0.9923165	0.9964220	7.471E+02	6.112E+00	--
α_2	6.09E-04	2.82E-03	2.43E-03	6.34E-03	2.364E+00	8.369E+02	0.840
α_3	2.57E-04	2.16E-03	1.71E-03	5.60E-03	1.512E+00	6.989E+02	1.007
α_4	9.06E-05	1.55E-03	1.10E-03	4.54E-03	1.056E+00	6.820E+02	1.032
α_5	1.38E-05	9.13E-04	5.20E-04	3.15E-03	6.745E-01	7.379E+02	0.955
α_6	5.31E-08	3.95E-04	1.00E-04	1.79E-03	3.076E-01	7.787E+02	0.905
α_7	1.12E-15	1.60E-04	1.58E-06	9.21E-04	1.093E-01	6.842E+02	1.031
α_8	1.94E-18	1.25E-04	3.48E-07	7.31E-04	8.885E-02	7.081E+02	0.996

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.92E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01	9.92E-01
α_2	8.22E-03	6.81E-03	7.70E-03	6.03E-03	4.72E-03	3.57E-03	2.82E-03
α_3		1.48E-03	1.78E-03	2.71E-03	2.77E-03	2.56E-03	2.16E-03
α_4			9.02E-04	9.37E-04	1.28E-03	1.54E-03	1.55E-03
α_5				1.79E-04	4.70E-04	7.19E-04	9.13E-04
α_6					2.86E-04	2.70E-04	3.95E-04
α_7						3.85E-05	1.60E-04
α_8							1.25E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.92E-01	9.90E-01	9.90E-01	9.90E-01	9.91E-01	9.92E-01
Beta	8.22E-03	8.29E-03	1.04E-02	9.85E-03	9.53E-03	8.69E-03	8.11E-03
Gamma		1.78E-01	2.59E-01	3.88E-01	5.04E-01	5.89E-01	6.53E-01
Delta			3.36E-01	2.92E-01	4.24E-01	5.01E-01	5.93E-01
Epsilon				1.60E-01	3.71E-01	4.00E-01	5.08E-01
Mu					3.78E-01	3.00E-01	4.27E-01
Omega						1.25E-01	4.19E-01
Sigma							4.40E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.50	6.75	9.00	11.25	13.50	15.75	18.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 11.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.311

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9119093	0.9749684	0.9862168	0.9997268	2.401E+01	6.165E-01	--
α_2	2.73E-04	2.50E-02	1.38E-02	8.81E-02	6.165E-01	2.401E+01	0.830

CCCG = 3, Gamma = 0.306

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9134919	0.9649600	0.9712250	0.9949720	4.622E+01	1.678E+00	--
α_2	3.44E-03	3.07E-02	2.43E-02	7.98E-02	1.439E+00	4.545E+01	0.960
α_3	4.58E-08	4.36E-03	7.04E-04	2.14E-02	2.396E-01	5.473E+01	0.819

CCCG = 4, Gamma = 0.300

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9068918	0.9552857	0.9598999	0.9878885	6.192E+01	2.898E+00	--
α_2	7.80E-03	3.67E-02	3.18E-02	8.21E-02	2.285E+00	6.005E+01	1.030
α_3	4.72E-06	5.12E-03	1.83E-03	2.14E-02	3.927E-01	7.636E+01	0.836
α_4	1.13E-08	2.94E-03	3.94E-04	1.48E-02	2.207E-01	7.488E+01	0.855

CCCG = 5, Gamma = 0.296

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9337628	0.9643319	0.9667584	0.9866074	1.218E+02	4.506E+00	--
α_2	5.20E-03	2.11E-02	1.86E-02	4.55E-02	2.659E+00	1.233E+02	0.983
α_3	1.21E-03	1.14E-02	8.87E-03	3.01E-02	1.411E+00	1.227E+02	0.998
α_4	1.40E-06	2.67E-03	8.64E-04	1.15E-02	3.632E-01	1.357E+02	0.910
α_5	4.88E-21	5.28E-04	3.06E-07	3.06E-03	7.248E-02	1.372E+02	0.902

CCCG = 6, Gamma = 0.294

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9413615	0.9673259	0.9692668	0.9866585	1.539E+02	5.199E+00	--
α_2	3.17E-03	1.44E-02	1.25E-02	3.21E-02	2.385E+00	1.634E+02	0.928
α_3	1.80E-03	1.18E-02	9.70E-03	2.89E-02	1.776E+00	1.491E+02	1.020
α_4	9.28E-05	4.59E-03	2.75E-03	1.54E-02	7.292E-01	1.582E+02	0.968
α_5	9.16E-09	1.34E-03	1.98E-04	6.61E-03	2.313E-01	1.730E+02	0.888
α_6	5.30E-20	5.81E-04	5.48E-07	3.38E-03	7.684E-02	1.322E+02	1.163

CCCG = 7, Gamma = 0.292

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9511304	0.9706787	0.9719445	0.9859042	2.391E+02	7.223E+00	--
α_2	3.00E-03	1.11E-02	9.89E-03	2.33E-02	2.950E+00	2.631E+02	0.884
α_3	1.73E-03	9.15E-03	7.76E-03	2.13E-02	2.089E+00	2.263E+02	1.030
α_4	5.47E-04	5.68E-03	4.36E-03	1.53E-02	1.337E+00	2.341E+02	0.999
α_5	3.17E-05	2.56E-03	1.41E-03	8.99E-03	6.404E-01	2.493E+02	0.941
α_6	1.29E-10	7.26E-04	5.41E-05	3.85E-03	1.780E-01	2.450E+02	0.959
α_7	6.46E-51	1.19E-04	2.43E-14	4.19E-04	2.734E-02	2.306E+02	1.020

CCCG = 8, Gamma = 0.291

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9538687	0.9723152	0.9735106	0.9866795	2.545E+02	7.246E+00	--
α_2	2.30E-03	9.25E-03	8.15E-03	1.99E-02	2.702E+00	2.894E+02	0.840
α_3	1.17E-03	7.44E-03	6.14E-03	1.81E-02	1.814E+00	2.420E+02	1.007
α_4	5.26E-04	5.57E-03	4.26E-03	1.51E-02	1.323E+00	2.364E+02	1.032
α_5	1.01E-04	3.24E-03	2.08E-03	1.03E-02	8.325E-01	2.562E+02	0.955
α_6	1.85E-06	1.51E-03	5.65E-04	6.22E-03	4.098E-01	2.707E+02	0.905
α_7	3.24E-20	3.23E-04	3.10E-07	1.88E-03	7.703E-02	2.381E+02	1.031
α_8	3.29E-18	3.55E-04	8.87E-07	2.07E-03	8.749E-02	2.464E+02	0.996

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.75E-01	9.65E-01	9.55E-01	9.64E-01	9.67E-01	9.71E-01	9.72E-01
α_2	2.50E-02	3.07E-02	3.67E-02	2.11E-02	1.44E-02	1.11E-02	9.25E-03
α_3		4.36E-03	5.12E-03	1.14E-02	1.18E-02	9.15E-03	7.44E-03
α_4			2.94E-03	2.67E-03	4.59E-03	5.68E-03	5.57E-03
α_5				5.28E-04	1.34E-03	2.56E-03	3.24E-03
α_6					5.81E-04	7.26E-04	1.51E-03
α_7						1.19E-04	3.23E-04
α_8							3.55E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.75E-01	9.65E-01	9.55E-01	9.64E-01	9.67E-01	9.71E-01	9.72E-01
Beta	2.50E-02	3.50E-02	4.47E-02	3.57E-02	3.27E-02	2.93E-02	2.77E-02
Gamma		1.24E-01	1.80E-01	4.08E-01	5.60E-01	6.22E-01	6.66E-01
Delta			3.65E-01	2.19E-01	3.56E-01	4.98E-01	5.96E-01
Epsilon				1.65E-01	2.95E-01	3.75E-01	4.94E-01
Mu					3.03E-01	2.48E-01	4.03E-01
Omega						1.40E-01	3.10E-01
Sigma							5.23E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.50	8.25	11.00	13.75	16.50	19.25	22.00
N_1	0.6667	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.1667	0.5000	1.0000	0.6667	0.4444	0.2963	0.1975
N_3		0.0000	0.0000	0.3333	0.4444	0.4444	0.3951

N₄			0.0000	0.0000	0.1111	0.2222	0.2963
N₅				0.0000	0.0000	0.0370	0.0988
N₆					0.0000	0.0000	0.0123
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.025

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7796924	0.9467399	0.9800972	0.9999571	6.757E+00	3.801E-01	--
α_2	4.29E-05	5.33E-02	1.99E-02	2.20E-01	3.801E-01	6.757E+00	0.830

CCCG = 3, Gamma = 0.025

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8192158	0.9385076	0.9562559	0.9969718	1.465E+01	9.600E-01	--
α_2	6.88E-04	4.47E-02	2.64E-02	1.51E-01	6.673E-01	1.424E+01	0.960
α_3	1.48E-06	1.67E-02	4.06E-03	7.70E-02	2.927E-01	1.719E+01	0.819

CCCG = 4, Gamma = 0.025

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8355552	0.9324299	0.9438460	0.9901410	2.303E+01	1.669E+00	--
α_2	2.66E-03	4.51E-02	3.27E-02	1.30E-01	1.039E+00	2.197E+01	1.030
α_3	1.20E-05	1.37E-02	4.92E-03	5.73E-02	3.887E-01	2.795E+01	0.836
α_4	1.01E-07	8.71E-03	1.45E-03	4.26E-02	2.414E-01	2.749E+01	0.855

CCCG = 5, Gamma = 0.025

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8869143	0.9425688	0.9473813	0.9817548	5.723E+01	3.487E+00	--
α_2	4.65E-03	2.97E-02	2.46E-02	7.19E-02	1.791E+00	5.861E+01	0.983
α_3	1.62E-03	2.03E-02	1.52E-02	5.63E-02	1.207E+00	5.828E+01	0.998
α_4	1.18E-05	6.65E-03	2.67E-03	2.68E-02	4.340E-01	6.479E+01	0.910
α_5	1.86E-26	8.35E-04	2.98E-08	4.60E-03	5.493E-02	6.574E+01	0.902

CCCG = 6, Gamma = 0.025

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9017438	0.9487081	0.9526011	0.9823566	7.222E+01	3.905E+00	--
α_2	1.62E-03	1.67E-02	1.29E-02	4.49E-02	1.335E+00	7.849E+01	0.928
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.112E+01	1.020
α_4	1.82E-04	9.39E-03	5.60E-03	3.15E-02	7.191E-01	7.582E+01	0.968
α_5	4.33E-08	2.96E-03	5.06E-04	1.44E-02	2.467E-01	8.317E+01	0.888
α_6	1.26E-20	1.14E-03	6.89E-07	6.63E-03	7.279E-02	6.363E+01	1.163

CCCG = 7, Gamma = 0.025

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9205779	0.9544626	0.9568382	0.9802296	1.209E+02	5.770E+00	--
α_2	1.39E-03	1.11E-02	8.90E-03	2.86E-02	1.549E+00	1.375E+02	0.884
α_3	2.97E-03	1.67E-02	1.40E-02	3.93E-02	1.989E+00	1.174E+02	1.030
α_4	9.42E-04	1.05E-02	7.95E-03	2.85E-02	1.287E+00	1.218E+02	0.999
α_5	8.84E-05	5.29E-03	3.07E-03	1.80E-02	6.913E-01	1.300E+02	0.941
α_6	1.34E-08	1.82E-03	2.74E-04	8.98E-03	2.327E-01	1.279E+02	0.959
α_7	1.19E-64	1.75E-04	2.66E-17	4.41E-04	2.112E-02	1.205E+02	1.020

CCCG = 8, Gamma = 0.025

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9313352	0.9589247	0.9607058	0.9804299	1.638E+02	7.016E+00	--
α_2	1.04E-03	8.11E-03	6.50E-03	2.07E-02	1.583E+00	1.936E+02	0.840
α_3	2.16E-03	1.22E-02	1.03E-02	2.88E-02	1.986E+00	1.609E+02	1.007
α_4	1.47E-03	1.05E-02	8.55E-03	2.63E-02	1.672E+00	1.572E+02	1.032
α_5	3.12E-04	5.89E-03	4.11E-03	1.75E-02	1.011E+00	1.708E+02	0.955
α_6	2.39E-05	3.15E-03	1.60E-03	1.15E-02	5.709E-01	1.806E+02	0.905
α_7	2.61E-10	1.14E-03	8.91E-05	6.01E-03	1.809E-01	1.590E+02	1.031
α_8	1.09E-107	7.56E-05	2.29E-27	5.66E-05	1.245E-02	1.647E+02	0.996

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.47E-01	9.39E-01	9.32E-01	9.43E-01	9.49E-01	9.54E-01	9.59E-01
α_2	5.33E-02	4.47E-02	4.51E-02	2.97E-02	1.67E-02	1.11E-02	8.11E-03
α_3		1.67E-02	1.37E-02	2.03E-02	2.11E-02	1.67E-02	1.22E-02
α_4			8.71E-03	6.65E-03	9.39E-03	1.05E-02	1.05E-02
α_5				8.35E-04	2.96E-03	5.29E-03	5.89E-03
α_6					1.14E-03	1.82E-03	3.15E-03
α_7						1.75E-04	1.14E-03
α_8							7.56E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.47E-01	9.39E-01	9.32E-01	9.43E-01	9.49E-01	9.54E-01	9.59E-01
Beta	5.33E-02	6.15E-02	6.76E-02	5.74E-02	5.13E-02	4.55E-02	4.11E-02
Gamma		2.72E-01	3.32E-01	4.84E-01	6.74E-01	7.55E-01	8.03E-01
Delta			3.88E-01	2.70E-01	3.90E-01	5.16E-01	6.30E-01
Epsilon				1.11E-01	3.04E-01	4.10E-01	4.93E-01
Mu					2.79E-01	2.73E-01	4.26E-01
Omega						8.80E-02	2.78E-01
Sigma							6.23E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.50	0.75	1.00	1.25	1.50	1.75	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 9.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.221

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9475362	0.9865577	0.9941095	0.9999612	3.454E+01	4.706E-01	--
α_2	3.88E-05	1.34E-02	5.89E-03	5.25E-02	4.706E-01	3.454E+01	0.830

CCCG = 3, Gamma = 0.223

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577270	0.9852880	0.9893287	0.9990358	7.384E+01	1.103E+00	--
α_2	3.25E-04	1.13E-02	7.16E-03	3.61E-02	8.104E-01	7.121E+01	0.960
α_3	2.91E-07	3.46E-03	8.13E-04	1.60E-02	2.921E-01	8.414E+01	0.819

CCCG = 4, Gamma = 0.225

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9636733	0.9846973	0.9871491	0.9973354	1.256E+02	1.953E+00	--
α_2	1.02E-03	1.09E-02	8.36E-03	2.96E-02	1.312E+00	1.187E+02	1.030
α_3	4.90E-06	2.92E-03	1.15E-03	1.18E-02	4.307E-01	1.473E+02	0.836
α_4	2.89E-09	1.45E-03	1.71E-04	7.39E-03	2.099E-01	1.443E+02	0.855

CCCG = 5, Gamma = 0.226

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9718383	0.9863754	0.9877704	0.9961445	2.249E+02	3.107E+00	--
α_2	1.05E-03	7.44E-03	6.05E-03	1.86E-02	1.684E+00	2.247E+02	0.983
α_3	1.87E-04	4.23E-03	2.87E-03	1.29E-02	9.426E-01	2.221E+02	0.998
α_4	1.17E-06	1.56E-03	5.37E-04	6.59E-03	3.816E-01	2.441E+02	0.910
α_5	1.60E-16	4.00E-04	2.19E-06	2.33E-03	9.865E-02	2.466E+02	0.902

CCCG = 6, Gamma = 0.227

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9754572	0.9874358	0.9884878	0.9958202	3.004E+02	3.822E+00	--
α_2	7.85E-04	5.42E-03	4.42E-03	1.35E-02	1.714E+00	3.145E+02	0.928
α_3	2.53E-04	3.85E-03	2.78E-03	1.11E-02	1.108E+00	2.867E+02	1.020
α_4	2.84E-05	2.15E-03	1.20E-03	7.49E-03	6.509E-01	3.025E+02	0.968
α_5	1.52E-08	7.68E-04	1.38E-04	3.70E-03	2.536E-01	3.302E+02	0.888
α_6	6.15E-17	3.79E-04	1.72E-06	2.21E-03	9.572E-02	2.522E+02	1.163

CCCG = 7, Gamma = 0.227

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9789991	0.9883779	0.9890983	0.9952964	4.418E+02	5.195E+00	--
α_2	8.29E-04	4.37E-03	3.70E-03	1.02E-02	2.105E+00	4.798E+02	0.884
α_3	3.00E-04	3.19E-03	2.43E-03	8.67E-03	1.320E+00	4.124E+02	1.030
α_4	1.19E-04	2.34E-03	1.62E-03	7.00E-03	9.967E-01	4.255E+02	0.999
α_5	5.86E-06	1.16E-03	5.51E-04	4.37E-03	5.249E-01	4.522E+02	0.941
α_6	3.27E-10	4.40E-04	4.31E-05	2.28E-03	1.956E-01	4.439E+02	0.959
α_7	3.61E-28	1.27E-04	2.87E-09	6.87E-04	5.291E-02	4.177E+02	1.020

CCCG = 8, Gamma = 0.228

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9808023	0.9890808	0.9896854	0.9952951	5.283E+02	5.832E+00	--
α_2	7.60E-04	3.75E-03	3.21E-03	8.58E-03	2.229E+00	5.925E+02	0.840
α_3	2.18E-04	2.54E-03	1.91E-03	7.01E-03	1.260E+00	4.951E+02	1.007
α_4	1.22E-04	2.15E-03	1.52E-03	6.35E-03	1.042E+00	4.830E+02	1.032
α_5	3.42E-05	1.46E-03	8.92E-04	4.81E-03	7.626E-01	5.226E+02	0.955
α_6	1.36E-07	5.93E-04	1.65E-04	2.64E-03	3.271E-01	5.517E+02	0.905
α_7	2.69E-13	2.77E-04	7.43E-06	1.56E-03	1.344E-01	4.848E+02	1.031
α_8	1.38E-20	1.53E-04	1.44E-07	8.89E-04	7.682E-02	5.018E+02	0.996

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01
α_2	1.34E-02	1.13E-02	1.09E-02	7.44E-03	5.42E-03	4.37E-03	3.75E-03
α_3		3.46E-03	2.92E-03	4.23E-03	3.85E-03	3.19E-03	2.54E-03
α_4			1.45E-03	1.56E-03	2.15E-03	2.34E-03	2.15E-03
α_5				4.00E-04	7.68E-04	1.16E-03	1.46E-03
α_6					3.79E-04	4.40E-04	5.93E-04
α_7						1.27E-04	2.77E-04
α_8							1.53E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.85E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01
Beta	1.34E-02	1.47E-02	1.53E-02	1.36E-02	1.26E-02	1.16E-02	1.09E-02
Gamma		2.35E-01	2.85E-01	4.54E-01	5.69E-01	6.24E-01	6.57E-01
Delta			3.32E-01	3.17E-01	4.61E-01	5.60E-01	6.46E-01
Epsilon				2.04E-01	3.48E-01	4.25E-01	5.35E-01
Mu					3.31E-01	3.28E-01	4.12E-01
Omega						2.23E-01	4.21E-01
Sigma							3.56E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.50	6.75	9.00	11.25	13.50	15.75	18.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 9.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.221

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9860962	0.9963927	0.9983713	0.9999867	1.362E+02	4.932E-01	--
α_2	1.33E-05	3.61E-03	1.63E-03	1.39E-02	4.932E-01	1.362E+02	0.830

CCCG = 3, Gamma = 0.223

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9888662	0.9961998	0.9973005	0.9997750	2.777E+02	1.059E+00	--
α_2	5.03E-05	2.69E-03	1.59E-03	9.08E-03	7.137E-01	2.647E+02	0.960
α_3	3.99E-07	1.11E-03	3.36E-04	4.85E-03	3.458E-01	3.108E+02	0.819

CCCG = 4, Gamma = 0.225

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9902301	0.9958006	0.9964362	0.9991989	5.014E+02	2.115E+00	--
α_2	4.00E-04	3.23E-03	2.57E-03	8.31E-03	1.549E+00	4.780E+02	1.030
α_3	1.40E-08	4.48E-04	8.76E-05	2.13E-03	2.646E-01	5.902E+02	0.836
α_4	5.76E-08	5.21E-04	1.28E-04	2.38E-03	3.010E-01	5.775E+02	0.855

CCCG = 5, Gamma = 0.226

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9933438	0.9963035	0.9965305	0.9984878	1.435E+03	5.325E+00	--
α_2	8.05E-04	2.52E-03	2.30E-03	5.02E-03	3.632E+00	1.435E+03	0.983
α_3	9.38E-05	9.55E-04	7.33E-04	2.57E-03	1.354E+00	1.416E+03	0.998
α_4	1.81E-08	1.91E-04	4.55E-05	8.75E-04	2.961E-01	1.554E+03	0.910
α_5	8.06E-35	2.71E-05	2.98E-11	1.34E-04	4.243E-02	1.568E+03	0.902

CCCG = 6, Gamma = 0.227

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9932077	0.9962973	0.9965424	0.9985500	1.328E+03	4.936E+00	--
α_2	5.61E-04	2.11E-03	1.88E-03	4.46E-03	2.915E+00	1.378E+03	0.928
α_3	8.53E-05	1.00E-03	7.51E-04	2.76E-03	1.257E+00	1.256E+03	1.020
α_4	1.54E-06	3.80E-04	1.74E-04	1.46E-03	5.031E-01	1.324E+03	0.968
α_5	2.32E-15	8.00E-05	1.06E-06	4.59E-04	1.155E-01	1.443E+03	0.888
α_6	6.16E-13	1.32E-04	4.82E-06	7.29E-04	1.451E-01	1.102E+03	1.163

CCCG = 7, Gamma = 0.227

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9947439	0.9966737	0.9967871	0.9982166	2.893E+03	9.654E+00	--
α_2	6.04E-04	1.56E-03	1.46E-03	2.88E-03	4.851E+00	3.104E+03	0.884
α_3	2.69E-04	1.05E-03	9.28E-04	2.25E-03	2.800E+00	2.666E+03	1.030
α_4	5.14E-05	5.03E-04	3.89E-04	1.35E-03	1.384E+00	2.749E+03	0.999
α_5	5.94E-07	1.68E-04	7.50E-05	6.49E-04	4.902E-01	2.920E+03	0.941
α_6	9.51E-16	4.00E-05	5.07E-07	2.30E-04	1.146E-01	2.864E+03	0.959
α_7	2.86E-93	5.43E-06	5.78E-25	6.46E-06	1.464E-02	2.694E+03	1.020

CCCG = 8, Gamma = 0.228

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9946109	0.9967970	0.9969441	0.9984807	2.225E+03	7.148E+00	--
α_2	3.25E-04	1.20E-03	1.07E-03	2.52E-03	2.980E+00	2.480E+03	0.840
α_3	1.64E-04	9.46E-04	7.91E-04	2.26E-03	1.960E+00	2.070E+03	1.007
α_4	4.22E-05	5.77E-04	4.23E-04	1.64E-03	1.166E+00	2.019E+03	1.032
α_5	1.40E-06	2.46E-04	1.19E-04	9.21E-04	5.375E-01	2.184E+03	0.955
α_6	1.73E-11	7.83E-05	6.08E-06	4.14E-04	1.805E-01	2.304E+03	0.905
α_7	1.06E-35	2.04E-05	1.53E-11	1.00E-04	4.139E-02	2.024E+03	1.031
α_8	8.23E-09	1.35E-04	2.98E-05	6.29E-04	2.827E-01	2.095E+03	0.996

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
α_2	3.61E-03	2.69E-03	3.23E-03	2.52E-03	2.11E-03	1.56E-03	1.20E-03
α_3		1.11E-03	4.48E-04	9.55E-04	1.00E-03	1.05E-03	9.46E-04
α_4			5.21E-04	1.91E-04	3.80E-04	5.03E-04	5.77E-04
α_5				2.71E-05	8.00E-05	1.68E-04	2.46E-04
α_6					1.32E-04	4.00E-05	7.83E-05
α_7						5.43E-06	2.04E-05
α_8							1.35E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
Beta	3.61E-03	3.80E-03	4.20E-03	3.70E-03	3.70E-03	3.33E-03	3.20E-03
Gamma		2.92E-01	2.31E-01	3.17E-01	4.30E-01	5.31E-01	6.25E-01
Delta			5.38E-01	1.86E-01	3.72E-01	4.06E-01	5.28E-01
Epsilon				1.24E-01	3.58E-01	2.98E-01	4.54E-01
Mu					6.22E-01	2.13E-01	4.87E-01
Omega						1.20E-01	6.65E-01
Sigma							8.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.50	6.75	9.00	11.25	13.50	15.75	18.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.13.1.4 ACP-CRB-480-FTOC: AC Power 480 V Circuit Breakers Fail to Open/Close

Generic CCF Parameters

System Group: Electrical
System: Plant AC Power
Component Group: Electrical
Component Type: Circuit Breaker
Component Subtype: 480 V
Failure Mode: Fail to Close, Fail to Open, Fail to Open or Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 38.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9701381	0.9923793	0.9967033	0.9999767	1.0000000	6.101E+01	4.685E-01
α_2	2.13E-05	7.62E-03	3.30E-03	2.99E-02	0.00E+00	4.685E-01	6.101E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9670397	0.9884549	0.9915779	0.9992035	1.0000000	9.658E+01	1.128E+00
α_2	2.91E-04	8.71E-03	5.67E-03	2.75E-02	0.00E+00	8.512E-01	9.686E+01
α_3	1.41E-07	2.83E-03	6.05E-04	1.33E-02	0.00E+00	2.768E-01	9.743E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9653834	0.9855636	0.9879510	0.9975879	1.0000000	1.293E+02	1.894E+00
α_2	8.29E-04	9.60E-03	7.25E-03	2.64E-02	0.00E+00	1.260E+00	1.299E+02
α_3	3.33E-06	3.07E-03	1.13E-03	1.27E-02	0.00E+00	4.024E-01	1.308E+02
α_4	1.22E-08	1.76E-03	2.63E-04	8.74E-03	0.00E+00	2.315E-01	1.309E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9703838	0.9852615	0.9866304	0.9954751	1.0000000	2.294E+02	3.432E+00
α_2	1.41E-03	8.26E-03	6.90E-03	1.98E-02	0.00E+00	1.924E+00	2.309E+02
α_3	2.61E-04	4.50E-03	3.19E-03	1.32E-02	0.00E+00	1.049E+00	2.318E+02
α_4	1.25E-06	1.64E-03	5.66E-04	6.92E-03	0.00E+00	3.822E-01	2.325E+02
α_5	2.86E-20	3.30E-04	3.07E-07	1.91E-03	0.00E+00	7.674E-02	2.328E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9720523	0.9856721	0.9868668	0.9952199	1.0000000	2.638E+02	3.835E+00
α_2	9.11E-04	6.36E-03	5.18E-03	1.58E-02	0.00E+00	1.701E+00	2.660E+02
α_3	3.56E-04	4.51E-03	3.35E-03	1.26E-02	0.00E+00	1.207E+00	2.664E+02

α_4	2.04E-05	2.23E-03	1.17E-03	8.02E-03	0.00E+00	5.960E-01	2.671E+02
α_5	3.23E-09	8.26E-04	1.10E-04	4.14E-03	0.00E+00	2.211E-01	2.674E+02
α_6	3.23E-15	4.10E-04	4.15E-06	2.37E-03	0.00E+00	1.098E-01	2.675E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9756540	0.9861891	0.9869587	0.9940907	1.0000000	4.104E+02	5.747E+00
α_2	1.10E-03	5.39E-03	4.62E-03	1.23E-02	0.00E+00	2.243E+00	4.139E+02
α_3	5.25E-04	3.92E-03	3.16E-03	9.91E-03	0.00E+00	1.630E+00	4.145E+02
α_4	1.62E-04	2.60E-03	1.86E-03	7.57E-03	0.00E+00	1.083E+00	4.151E+02
α_5	9.82E-06	1.36E-03	6.85E-04	4.99E-03	0.00E+00	5.654E-01	4.156E+02
α_6	2.53E-10	4.60E-04	4.25E-05	2.40E-03	0.00E+00	1.916E-01	4.160E+02
α_7	5.73E-41	8.36E-05	3.11E-12	3.67E-04	0.00E+00	3.480E-02	4.161E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9767412	0.9868180	0.9875610	0.9943678	1.0000000	4.286E+02	5.726E+00
α_2	8.37E-04	4.65E-03	3.91E-03	1.10E-02	0.00E+00	2.018E+00	4.323E+02
α_3	3.31E-04	3.20E-03	2.48E-03	8.54E-03	0.00E+00	1.391E+00	4.330E+02
α_4	1.45E-04	2.45E-03	1.74E-03	7.16E-03	0.00E+00	1.062E+00	4.333E+02
α_5	2.85E-05	1.62E-03	9.45E-04	5.49E-03	0.00E+00	7.026E-01	4.336E+02
α_6	3.16E-07	8.05E-04	2.47E-04	3.50E-03	0.00E+00	3.497E-01	4.340E+02
α_7	1.21E-15	2.48E-04	2.28E-06	1.43E-03	0.00E+00	1.078E-01	4.342E+02
α_8	2.54E-17	2.18E-04	9.23E-07	1.27E-03	0.00E+00	9.469E-02	4.343E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.88E-01	9.86E-01	9.85E-01	9.86E-01	9.86E-01	9.87E-01
α_2	7.62E-03	8.71E-03	9.60E-03	8.26E-03	6.36E-03	5.39E-03	4.65E-03
α_3		2.83E-03	3.07E-03	4.50E-03	4.51E-03	3.92E-03	3.20E-03
α_4			1.76E-03	1.64E-03	2.23E-03	2.60E-03	2.45E-03
α_5				3.30E-04	8.26E-04	1.36E-03	1.62E-03
α_6					4.10E-04	4.60E-04	8.05E-04
α_7						8.36E-05	2.48E-04
α_8							2.18E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.88E-01	9.86E-01	9.85E-01	9.86E-01	9.86E-01	9.87E-01
Beta	7.62E-03	1.15E-02	1.44E-02	1.47E-02	1.43E-02	1.38E-02	1.32E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	38.60	38.60	38.60	38.60	38.60	38.60	38.60
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 16.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.415

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9754073	0.9936577	0.9971780	0.9999790	7.573E+01	4.834E-01	--
α_2	2.10E-05	6.34E-03	2.82E-03	2.46E-02	4.834E-01	7.573E+01	0.791

CCCG = 3, Gamma = 0.415

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9756744	0.9912439	0.9934465	0.9992850	1.387E+02	1.226E+00	--
α_2	3.39E-04	6.96E-03	4.80E-03	2.10E-02	9.769E-01	1.393E+02	1.047
α_3	2.87E-08	1.79E-03	3.11E-04	8.69E-03	2.487E-01	1.384E+02	1.059

CCCG = 4, Gamma = 0.415

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9719295	0.9879976	0.9898374	0.9977743	1.693E+02	2.057E+00	--
α_2	9.05E-04	8.19E-03	6.42E-03	2.15E-02	1.442E+00	1.746E+02	1.136
α_3	3.07E-06	2.45E-03	9.20E-04	1.01E-02	4.114E-01	1.678E+02	1.189
α_4	1.79E-09	1.37E-03	1.49E-04	7.01E-03	2.036E-01	1.489E+02	1.341

CCCG = 5, Gamma = 0.415

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9748904	0.9872721	0.9883770	0.9958785	2.857E+02	3.683E+00	--
α_2	1.55E-03	7.59E-03	6.52E-03	1.73E-02	2.243E+00	2.931E+02	1.254
α_3	1.82E-04	3.62E-03	2.50E-03	1.09E-02	9.912E-01	2.730E+02	1.351
α_4	8.86E-07	1.30E-03	4.39E-04	5.51E-03	3.765E-01	2.896E+02	1.277
α_5	1.88E-21	2.17E-04	1.24E-07	1.25E-03	7.237E-02	3.333E+02	1.111

CCCG = 6, Gamma = 0.415

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9758135	0.9873552	0.9883340	0.9955530	3.232E+02	4.139E+00	--
α_2	1.16E-03	6.05E-03	5.14E-03	1.40E-02	2.128E+00	3.498E+02	1.195
α_3	2.66E-04	3.85E-03	2.80E-03	1.10E-02	1.134E+00	2.938E+02	1.426
α_4	1.13E-05	1.73E-03	8.57E-04	6.39E-03	5.533E-01	3.198E+02	1.313
α_5	2.57E-09	6.60E-04	8.81E-05	3.31E-03	2.210E-01	3.346E+02	1.256
α_6	4.66E-16	3.66E-04	2.55E-06	2.12E-03	1.027E-01	2.805E+02	1.498

CCCG = 7, Gamma = 0.415

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9791997	0.9878950	0.9885019	0.9945183	5.249E+02	6.432E+00	--
α_2	1.28E-03	4.93E-03	4.37E-03	1.05E-02	2.840E+00	5.729E+02	1.222
α_3	5.28E-04	3.55E-03	2.91E-03	8.79E-03	1.746E+00	4.895E+02	1.432
α_4	1.33E-04	2.13E-03	1.52E-03	6.19E-03	1.084E+00	5.079E+02	1.382
α_5	6.12E-06	1.08E-03	5.21E-04	4.03E-03	5.376E-01	4.990E+02	1.408
α_6	3.25E-10	3.70E-04	3.74E-05	1.91E-03	1.979E-01	5.343E+02	1.316
α_7	9.36E-53	4.18E-05	4.19E-15	1.43E-04	2.656E-02	6.358E+02	1.106

CCCG = 8, Gamma = 0.415

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9800523	0.9885279	0.9891336	0.9949354	5.267E+02	6.112E+00	--
α_2	8.76E-04	4.05E-03	3.50E-03	9.10E-03	2.364E+00	5.820E+02	1.203
α_3	3.56E-04	2.99E-03	2.37E-03	7.76E-03	1.512E+00	5.038E+02	1.392
α_4	1.23E-04	2.10E-03	1.49E-03	6.17E-03	1.056E+00	5.015E+02	1.399
α_5	1.95E-05	1.29E-03	7.35E-04	4.45E-03	6.745E-01	5.222E+02	1.345
α_6	8.87E-08	6.60E-04	1.68E-04	2.99E-03	3.076E-01	4.658E+02	1.509
α_7	1.37E-15	1.95E-04	1.93E-06	1.13E-03	1.093E-01	5.594E+02	1.257
α_8	2.90E-18	1.88E-04	5.21E-07	1.09E-03	8.885E-02	4.733E+02	1.485

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.91E-01	9.88E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01
α_2	6.34E-03	6.96E-03	8.19E-03	7.59E-03	6.05E-03	4.93E-03	4.05E-03
α_3		1.79E-03	2.45E-03	3.62E-03	3.85E-03	3.55E-03	2.99E-03
α_4			1.37E-03	1.30E-03	1.73E-03	2.13E-03	2.10E-03
α_5				2.17E-04	6.60E-04	1.08E-03	1.29E-03
α_6					3.66E-04	3.70E-04	6.60E-04
α_7						4.18E-05	1.95E-04
α_8							1.88E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.91E-01	9.88E-01	9.87E-01	9.87E-01	9.88E-01	9.89E-01
Beta	6.34E-03	8.76E-03	1.20E-02	1.27E-02	1.26E-02	1.21E-02	1.15E-02
Gamma		2.05E-01	3.18E-01	4.03E-01	5.22E-01	5.93E-01	6.47E-01
Delta			3.58E-01	2.95E-01	4.17E-01	5.04E-01	5.97E-01
Epsilon				1.43E-01	3.73E-01	4.11E-01	5.26E-01
Mu					3.57E-01	2.77E-01	4.47E-01
Omega						1.01E-01	3.67E-01
Sigma							4.90E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	16.00	16.00	16.00	16.00	16.00	16.00	16.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.026

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9069646	0.9764393	0.9899700	0.9999467	1.864E+01	4.498E-01	--
α_2	5.33E-05	2.36E-02	1.00E-02	9.30E-02	4.498E-01	1.864E+01	0.791

CCCG = 3, Gamma = 0.026

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9064169	0.9663427	0.9747714	0.9974076	3.383E+01	1.178E+00	--
α_2	1.20E-03	2.68E-02	1.84E-02	8.08E-02	9.387E-01	3.415E+01	1.047
α_3	7.31E-08	6.91E-03	1.12E-03	3.39E-02	2.396E-01	3.445E+01	1.059

CCCG = 4, Gamma = 0.026

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9011362	0.9582170	0.9647691	0.9928548	4.354E+01	1.898E+00	--
α_2	2.50E-03	2.74E-02	2.10E-02	7.43E-02	1.285E+00	4.555E+01	1.136
α_3	8.16E-06	8.78E-03	3.16E-03	3.66E-02	3.927E-01	4.434E+01	1.189
α_4	2.16E-08	5.57E-03	7.51E-04	2.80E-02	2.207E-01	3.943E+01	1.341

CCCG = 5, Gamma = 0.026

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9191567	0.9591421	0.9626659	0.9870752	8.230E+01	3.506E+00	--
α_2	4.07E-03	2.27E-02	1.92E-02	5.33E-02	1.992E+00	8.583E+01	1.254
α_3	8.23E-04	1.32E-02	9.51E-03	3.83E-02	1.078E+00	8.039E+01	1.351
α_4	2.22E-06	4.21E-03	1.37E-03	1.81E-02	3.632E-01	8.586E+01	1.277
α_5	6.76E-21	7.31E-04	4.24E-07	4.23E-03	7.248E-02	9.907E+01	1.111

CCCG = 6, Gamma = 0.026

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9252731	0.9604185	0.9632825	0.9857725	1.019E+02	4.199E+00	--
α_2	2.92E-03	1.69E-02	1.42E-02	4.01E-02	1.941E+00	1.130E+02	1.195
α_3	1.33E-03	1.38E-02	1.06E-02	3.73E-02	1.332E+00	9.498E+01	1.426
α_4	6.36E-05	5.91E-03	3.19E-03	2.10E-02	6.181E-01	1.040E+02	1.313
α_5	1.45E-08	2.12E-03	3.15E-04	1.05E-02	2.313E-01	1.091E+02	1.256
α_6	7.67E-20	8.38E-04	7.92E-07	4.88E-03	7.684E-02	9.157E+01	1.498

CCCG = 7, Gamma = 0.026

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9343193	0.9617711	0.9636498	0.9828045	1.566E+02	6.223E+00	--
α_2	3.68E-03	1.50E-02	1.32E-02	3.25E-02	2.654E+00	1.741E+02	1.222
α_3	1.49E-03	1.09E-02	8.84E-03	2.74E-02	1.645E+00	1.491E+02	1.432
α_4	4.76E-04	7.14E-03	5.17E-03	2.05E-02	1.115E+00	1.551E+02	1.382
α_5	3.81E-05	3.94E-03	2.09E-03	1.41E-02	6.034E-01	1.527E+02	1.408
α_6	1.93E-10	1.09E-03	8.10E-05	5.76E-03	1.780E-01	1.639E+02	1.316
α_7	7.63E-51	1.40E-04	2.88E-14	4.95E-04	2.734E-02	1.951E+02	1.106

CCCG = 8, Gamma = 0.026

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9366810	0.9631299	0.9649403	0.9833939	1.632E+02	6.246E+00	--
α_2	3.12E-03	1.35E-02	1.18E-02	2.97E-02	2.504E+00	1.832E+02	1.203
α_3	9.50E-04	8.84E-03	6.90E-03	2.34E-02	1.419E+00	1.591E+02	1.392
α_4	3.54E-04	6.43E-03	4.52E-03	1.90E-02	1.027E+00	1.587E+02	1.399
α_5	9.12E-05	4.42E-03	2.65E-03	1.47E-02	7.337E-01	1.654E+02	1.345
α_6	2.68E-06	2.68E-03	9.71E-04	1.12E-02	3.975E-01	1.477E+02	1.509
α_7	4.34E-20	4.33E-04	4.16E-07	2.52E-03	7.703E-02	1.777E+02	1.257
α_8	5.41E-18	5.82E-04	1.46E-06	3.40E-03	8.749E-02	1.503E+02	1.485

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.76E-01	9.66E-01	9.58E-01	9.59E-01	9.60E-01	9.62E-01	9.63E-01
α_2	2.36E-02	2.68E-02	2.74E-02	2.27E-02	1.69E-02	1.50E-02	1.35E-02
α_3		6.91E-03	8.78E-03	1.32E-02	1.38E-02	1.09E-02	8.84E-03
α_4			5.57E-03	4.21E-03	5.91E-03	7.14E-03	6.43E-03
α_5				7.31E-04	2.12E-03	3.94E-03	4.42E-03
α_6					8.38E-04	1.09E-03	2.68E-03
α_7						1.40E-04	4.33E-04
α_8							5.82E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.76E-01	9.66E-01	9.58E-01	9.59E-01	9.60E-01	9.62E-01	9.63E-01
Beta	2.36E-02	3.37E-02	4.18E-02	4.09E-02	3.96E-02	3.82E-02	3.69E-02
Gamma		2.05E-01	3.43E-01	4.45E-01	5.73E-01	6.07E-01	6.34E-01
Delta			3.88E-01	2.72E-01	3.91E-01	5.30E-01	6.22E-01
Epsilon				1.48E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.84E-01	2.37E-01	4.56E-01
Omega						1.14E-01	2.74E-01
Sigma							5.73E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 17.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.453

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9653696	0.9911447	0.9961438	0.9999746	5.267E+01	4.706E-01	--
α_2	2.54E-05	8.86E-03	3.86E-03	3.46E-02	4.706E-01	5.267E+01	0.791

CCCG = 3, Gamma = 0.453

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9583282	0.9854988	0.9894829	0.9990498	7.493E+01	1.103E+00	--
α_2	3.07E-04	1.06E-02	6.76E-03	3.41E-02	8.104E-01	7.545E+01	1.047
α_3	3.26E-07	3.87E-03	9.11E-04	1.79E-02	2.921E-01	7.510E+01	1.059

CCCG = 4, Gamma = 0.453

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9589826	0.9827059	0.9854669	0.9969845	1.110E+02	1.953E+00	--
α_2	1.05E-03	1.13E-02	8.63E-03	3.06E-02	1.312E+00	1.150E+02	1.136
α_3	6.53E-06	3.88E-03	1.54E-03	1.57E-02	4.307E-01	1.106E+02	1.189
α_4	4.25E-09	2.13E-03	2.52E-04	1.09E-02	2.099E-01	9.823E+01	1.341

CCCG = 5, Gamma = 0.453

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9640790	0.9825962	0.9843656	0.9950653	1.754E+02	3.107E+00	--
α_2	1.31E-03	9.23E-03	7.51E-03	2.30E-02	1.684E+00	1.808E+02	1.254
α_3	2.47E-04	5.57E-03	3.78E-03	1.70E-02	9.426E-01	1.684E+02	1.351
α_4	1.60E-06	2.13E-03	7.33E-04	8.99E-03	3.816E-01	1.788E+02	1.277
α_5	1.91E-16	4.79E-04	2.62E-06	2.78E-03	9.865E-02	2.059E+02	1.111

CCCG = 6, Gamma = 0.453

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9675801	0.9833794	0.9847602	0.9944601	2.261E+02	3.822E+00	--
α_2	9.98E-04	6.88E-03	5.62E-03	1.71E-02	1.714E+00	2.473E+02	1.195
α_3	3.49E-04	5.31E-03	3.84E-03	1.53E-02	1.108E+00	2.075E+02	1.426
α_4	3.80E-05	2.87E-03	1.60E-03	1.00E-02	6.509E-01	2.259E+02	1.313
α_5	2.12E-08	1.07E-03	1.93E-04	5.16E-03	2.536E-01	2.366E+02	1.256
α_6	7.82E-17	4.82E-04	2.19E-06	2.81E-03	9.572E-02	1.984E+02	1.498

CCCG = 7, Gamma = 0.453

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9709079	0.9838774	0.9848680	0.9934632	3.170E+02	5.195E+00	--
α_2	1.14E-03	6.01E-03	5.10E-03	1.40E-02	2.105E+00	3.479E+02	1.222
α_3	4.15E-04	4.42E-03	3.38E-03	1.20E-02	1.320E+00	2.973E+02	1.432
α_4	1.64E-04	3.22E-03	2.23E-03	9.64E-03	9.967E-01	3.084E+02	1.382
α_5	8.75E-06	1.73E-03	8.22E-04	6.52E-03	5.249E-01	3.031E+02	1.408
α_6	4.48E-10	6.02E-04	5.89E-05	3.12E-03	1.956E-01	3.247E+02	1.316
α_7	3.91E-28	1.37E-04	3.10E-09	7.43E-04	5.291E-02	3.865E+02	1.106

CCCG = 8, Gamma = 0.453

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9729325	0.9845840	0.9854300	0.9933463	3.725E+02	5.832E+00	--
α_2	1.09E-03	5.37E-03	4.60E-03	1.23E-02	2.229E+00	4.126E+02	1.203
α_3	3.02E-04	3.51E-03	2.64E-03	9.69E-03	1.260E+00	3.575E+02	1.392
α_4	1.66E-04	2.92E-03	2.06E-03	8.61E-03	1.042E+00	3.557E+02	1.399
α_5	4.83E-05	2.05E-03	1.26E-03	6.77E-03	7.626E-01	3.704E+02	1.345
α_6	2.26E-07	9.89E-04	2.76E-04	4.40E-03	3.271E-01	3.306E+02	1.509
α_7	3.28E-13	3.38E-04	9.07E-06	1.90E-03	1.344E-01	3.971E+02	1.257
α_8	2.06E-20	2.29E-04	2.14E-07	1.33E-03	7.682E-02	3.360E+02	1.485

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.85E-01	9.83E-01	9.83E-01	9.83E-01	9.84E-01	9.85E-01
α_2	8.86E-03	1.06E-02	1.13E-02	9.23E-03	6.88E-03	6.01E-03	5.37E-03
α_3		3.87E-03	3.88E-03	5.57E-03	5.31E-03	4.42E-03	3.51E-03
α_4			2.13E-03	2.13E-03	2.87E-03	3.22E-03	2.92E-03
α_5				4.79E-04	1.07E-03	1.73E-03	2.05E-03
α_6					4.82E-04	6.02E-04	9.89E-04
α_7						1.37E-04	3.38E-04
α_8							2.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.85E-01	9.83E-01	9.83E-01	9.83E-01	9.84E-01	9.85E-01
Beta	8.86E-03	1.45E-02	1.73E-02	1.74E-02	1.66E-02	1.61E-02	1.54E-02
Gamma		2.67E-01	3.48E-01	4.70E-01	5.86E-01	6.27E-01	6.51E-01
Delta			3.55E-01	3.19E-01	4.55E-01	5.63E-01	6.50E-01
Epsilon				1.84E-01	3.51E-01	4.34E-01	5.53E-01
Mu					3.10E-01	2.99E-01	4.31E-01
Omega						1.85E-01	3.64E-01
Sigma							4.03E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	17.50	17.50	17.50	17.50	17.50	17.50	17.50
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 4.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.106

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9866956	0.9965484	0.9984419	0.9999873	1.424E+02	4.932E-01	--
α_2	1.27E-05	3.45E-03	1.56E-03	1.33E-02	4.932E-01	1.424E+02	0.791

CCCG = 3, Gamma = 0.106

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9870588	0.9955815	0.9968601	0.9997382	2.387E+02	1.059E+00	--
α_2	5.55E-05	2.97E-03	1.75E-03	1.00E-02	7.137E-01	2.400E+02	1.047
α_3	5.23E-07	1.45E-03	4.40E-04	6.34E-03	3.458E-01	2.376E+02	1.059

CCCG = 4, Gamma = 0.106

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9882146	0.9949325	0.9956982	0.9990328	4.152E+02	2.115E+00	--
α_2	4.46E-04	3.60E-03	2.86E-03	9.26E-03	1.549E+00	4.289E+02	1.136
α_3	2.01E-08	6.44E-04	1.26E-04	3.06E-03	2.646E-01	4.109E+02	1.189
α_4	9.13E-08	8.26E-04	2.03E-04	3.77E-03	3.010E-01	3.642E+02	1.341

CCCG = 5, Gamma = 0.106

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9912919	0.9951622	0.9954587	0.9980200	1.095E+03	5.325E+00	--
α_2	1.03E-03	3.24E-03	2.95E-03	6.43E-03	3.632E+00	1.119E+03	1.254
α_3	1.28E-04	1.30E-03	9.98E-04	3.50E-03	1.354E+00	1.040E+03	1.351
α_4	2.55E-08	2.69E-04	6.41E-05	1.23E-03	2.961E-01	1.102E+03	1.277
α_5	9.97E-35	3.35E-05	3.69E-11	1.66E-04	4.243E-02	1.267E+03	1.111

CCCG = 6, Gamma = 0.106

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9909225	0.9950497	0.9953766	0.9980604	9.921E+02	4.936E+00	--
α_2	7.28E-04	2.74E-03	2.43E-03	5.79E-03	2.915E+00	1.062E+03	1.195
α_3	1.20E-04	1.41E-03	1.06E-03	3.89E-03	1.257E+00	8.910E+02	1.426
α_4	2.11E-06	5.19E-04	2.38E-04	1.99E-03	5.031E-01	9.686E+02	1.313
α_5	3.30E-15	1.14E-04	1.50E-06	6.54E-04	1.155E-01	1.013E+03	1.256
α_6	7.99E-13	1.71E-04	6.26E-06	9.47E-04	1.451E-01	8.489E+02	1.498

CCCG = 7, Gamma = 0.106

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9926621	0.9953548	0.9955127	0.9975085	2.069E+03	9.654E+00	--
α_2	8.39E-04	2.17E-03	2.02E-03	3.99E-03	4.851E+00	2.234E+03	1.222
α_3	3.76E-04	1.47E-03	1.30E-03	3.14E-03	2.800E+00	1.907E+03	1.432
α_4	7.14E-05	6.99E-04	5.40E-04	1.87E-03	1.384E+00	1.978E+03	1.382
α_5	8.93E-07	2.52E-04	1.13E-04	9.76E-04	4.902E-01	1.942E+03	1.408
α_6	1.31E-15	5.51E-05	6.99E-07	3.16E-04	1.146E-01	2.078E+03	1.316
α_7	3.11E-93	5.92E-06	6.30E-25	7.03E-06	1.464E-02	2.473E+03	1.106

CCCG = 8, Gamma = 0.106

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9923605	0.9954578	0.9956659	0.9978445	1.567E+03	7.148E+00	--
α_2	4.69E-04	1.73E-03	1.54E-03	3.64E-03	2.980E+00	1.719E+03	1.203
α_3	2.28E-04	1.32E-03	1.10E-03	3.14E-03	1.960E+00	1.487E+03	1.392
α_4	5.76E-05	7.87E-04	5.77E-04	2.23E-03	1.166E+00	1.480E+03	1.399
α_5	1.98E-06	3.49E-04	1.69E-04	1.31E-03	5.375E-01	1.540E+03	1.345
α_6	2.91E-11	1.31E-04	1.02E-05	6.95E-04	1.805E-01	1.373E+03	1.509
α_7	1.30E-35	2.51E-05	1.88E-11	1.23E-04	4.139E-02	1.649E+03	1.257
α_8	1.24E-08	2.03E-04	4.47E-05	9.45E-04	2.827E-01	1.395E+03	1.485

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.96E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01
α_2	3.45E-03	2.97E-03	3.60E-03	3.24E-03	2.74E-03	2.17E-03	1.73E-03
α_3		1.45E-03	6.44E-04	1.30E-03	1.41E-03	1.47E-03	1.32E-03
α_4			8.26E-04	2.69E-04	5.19E-04	6.99E-04	7.87E-04
α_5				3.35E-05	1.14E-04	2.52E-04	3.49E-04
α_6					1.71E-04	5.51E-05	1.31E-04
α_7						5.92E-06	2.51E-05
α_8							2.03E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.96E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01	9.95E-01
Beta	3.45E-03	4.42E-03	5.07E-03	4.84E-03	4.95E-03	4.65E-03	4.54E-03
Gamma		3.29E-01	2.90E-01	3.31E-01	4.47E-01	5.34E-01	6.19E-01
Delta			5.62E-01	1.89E-01	3.63E-01	4.09E-01	5.32E-01
Epsilon				1.11E-01	3.54E-01	3.10E-01	4.73E-01
Mu					6.00E-01	1.95E-01	5.07E-01
Omega						9.70E-02	6.34E-01
Sigma							8.90E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.10	4.10	4.10	4.10	4.10	4.10	4.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.13.2 4160 V and 6.9 kV Circuit Breakers

2.13.2.1 ACP-CRB-4160-CC: AC Power 4160 V and 6.9 kV Circuit Breakers Fail to Open

Generic CCF Parameters

System Group: Electrical
System: Plant AC Power
Component Group: Electrical
Component Type: Circuit Breaker
Component Subtype: 4160 - 6900 V
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 6.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9377318	0.9840536	0.9930199	0.9999518	1.0000000	2.891E+01	4.685E-01
α_2	4.51E-05	1.59E-02	6.98E-03	6.23E-02	0.00E+00	4.685E-01	2.891E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9510473	0.9828061	0.9874090	0.9988142	1.0000000	6.448E+01	1.128E+00
α_2	4.35E-04	1.30E-02	8.47E-03	4.09E-02	0.00E+00	8.512E-01	6.476E+01
α_3	2.11E-07	4.22E-03	9.04E-04	1.98E-02	0.00E+00	2.768E-01	6.533E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9542594	0.9808860	0.9840211	0.9967962	1.0000000	9.718E+01	1.894E+00
α_2	1.10E-03	1.27E-02	9.62E-03	3.49E-02	0.00E+00	1.260E+00	9.781E+01
α_3	4.42E-06	4.06E-03	1.49E-03	1.68E-02	0.00E+00	4.024E-01	9.867E+01
α_4	1.62E-08	2.34E-03	3.48E-04	1.16E-02	0.00E+00	2.315E-01	9.884E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9656786	0.9829051	0.9844806	0.9947450	1.0000000	1.973E+02	3.432E+00
α_2	1.63E-03	9.58E-03	8.01E-03	2.29E-02	0.00E+00	1.924E+00	1.988E+02
α_3	3.03E-04	5.22E-03	3.70E-03	1.54E-02	0.00E+00	1.049E+00	1.997E+02
α_4	1.45E-06	1.90E-03	6.56E-04	8.03E-03	0.00E+00	3.822E-01	2.004E+02
α_5	3.32E-20	3.82E-04	3.56E-07	2.22E-03	0.00E+00	7.674E-02	2.007E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9682699	0.9837196	0.9850668	0.9945583	1.0000000	2.317E+02	3.835E+00

α_2	1.04E-03	7.22E-03	5.88E-03	1.80E-02	0.00E+00	1.701E+00	2.339E+02
α_3	4.04E-04	5.12E-03	3.81E-03	1.43E-02	0.00E+00	1.207E+00	2.343E+02
α_4	2.32E-05	2.53E-03	1.33E-03	9.12E-03	0.00E+00	5.960E-01	2.350E+02
α_5	3.68E-09	9.39E-04	1.26E-04	4.71E-03	0.00E+00	2.211E-01	2.353E+02
α_6	3.67E-15	4.66E-04	4.72E-06	2.69E-03	0.00E+00	1.098E-01	2.354E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9736327	0.9850348	0.9858667	0.9935893	1.0000000	3.783E+02	5.747E+00
α_2	1.19E-03	5.84E-03	5.01E-03	1.33E-02	0.00E+00	2.243E+00	3.818E+02
α_3	5.69E-04	4.24E-03	3.42E-03	1.07E-02	0.00E+00	1.630E+00	3.824E+02
α_4	1.75E-04	2.82E-03	2.02E-03	8.20E-03	0.00E+00	1.083E+00	3.830E+02
α_5	1.06E-05	1.47E-03	7.42E-04	5.41E-03	0.00E+00	5.654E-01	3.835E+02
α_6	2.74E-10	4.99E-04	4.61E-05	2.60E-03	0.00E+00	1.916E-01	3.839E+02
α_7	6.21E-41	9.06E-05	3.37E-12	3.97E-04	0.00E+00	3.480E-02	3.840E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9748888	0.9857660	0.9865615	0.9939151	1.0000000	3.965E+02	5.726E+00
α_2	9.05E-04	5.02E-03	4.22E-03	1.18E-02	0.00E+00	2.018E+00	4.002E+02
α_3	3.57E-04	3.46E-03	2.68E-03	9.22E-03	0.00E+00	1.391E+00	4.009E+02
α_4	1.57E-04	2.64E-03	1.88E-03	7.73E-03	0.00E+00	1.062E+00	4.012E+02
α_5	3.08E-05	1.75E-03	1.02E-03	5.93E-03	0.00E+00	7.026E-01	4.015E+02
α_6	3.41E-07	8.69E-04	2.67E-04	3.78E-03	0.00E+00	3.497E-01	4.019E+02
α_7	1.31E-15	2.68E-04	2.46E-06	1.55E-03	0.00E+00	1.078E-01	4.021E+02
α_8	2.74E-17	2.35E-04	9.97E-07	1.37E-03	0.00E+00	9.469E-02	4.022E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.83E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.59E-02	1.30E-02	1.27E-02	9.58E-03	7.22E-03	5.84E-03	5.02E-03
α_3		4.22E-03	4.06E-03	5.22E-03	5.12E-03	4.24E-03	3.46E-03
α_4			2.34E-03	1.90E-03	2.53E-03	2.82E-03	2.64E-03
α_5				3.82E-04	9.39E-04	1.47E-03	1.75E-03
α_6					4.66E-04	4.99E-04	8.69E-04
α_7						9.06E-05	2.68E-04
α_8							2.35E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.83E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.59E-02	1.72E-02	1.91E-02	1.71E-02	1.63E-02	1.50E-02	1.42E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.50	6.50	6.50	6.50	6.50	6.50	6.50
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 2.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9281493	0.9813678	0.9915728	0.9999371	2.546E+01	4.834E-01	--
α_2	6.29E-05	1.86E-02	8.43E-03	7.19E-02	4.834E-01	2.546E+01	1.805

CCCG = 3, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9464004	0.9806035	0.9853992	0.9984012	6.196E+01	1.226E+00	--
α_2	7.65E-04	1.56E-02	1.08E-02	4.67E-02	9.769E-01	6.172E+01	2.128
α_3	6.13E-08	3.81E-03	6.65E-04	1.85E-02	2.487E-01	6.496E+01	2.046

CCCG = 4, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9445224	0.9761541	0.9797320	0.9955433	8.421E+01	2.057E+00	--
α_2	1.77E-03	1.59E-02	1.25E-02	4.16E-02	1.442E+00	8.928E+01	2.055
α_3	6.75E-06	5.36E-03	2.02E-03	2.20E-02	4.114E-01	7.635E+01	2.429
α_4	3.42E-09	2.59E-03	2.84E-04	1.33E-02	2.036E-01	7.834E+01	2.374

CCCG = 5, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9564790	0.9778644	0.9797516	0.9927997	1.627E+02	3.683E+00	--
α_2	2.56E-03	1.25E-02	1.07E-02	2.84E-02	2.243E+00	1.776E+02	1.984
α_3	3.34E-04	6.61E-03	4.59E-03	1.98E-02	9.912E-01	1.490E+02	2.379
α_4	1.76E-06	2.58E-03	8.73E-04	1.09E-02	3.765E-01	1.457E+02	2.442
α_5	4.12E-21	4.74E-04	2.71E-07	2.74E-03	7.237E-02	1.525E+02	2.339

CCCG = 6, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9594981	0.9787626	0.9803794	0.9925021	1.908E+02	4.139E+00	--
α_2	1.82E-03	9.42E-03	8.02E-03	2.18E-02	2.128E+00	2.238E+02	1.802
α_3	4.63E-04	6.69E-03	4.88E-03	1.91E-02	1.134E+00	1.684E+02	2.400
α_4	2.12E-05	3.24E-03	1.61E-03	1.20E-02	5.533E-01	1.703E+02	2.382
α_5	5.10E-09	1.31E-03	1.75E-04	6.56E-03	2.210E-01	1.687E+02	2.408
α_6	7.42E-16	5.82E-04	4.05E-06	3.38E-03	1.027E-01	1.764E+02	2.305

CCCG = 7, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9665423	0.9804874	0.9814513	0.9911405	3.232E+02	6.432E+00	--
α_2	1.96E-03	7.54E-03	6.69E-03	1.60E-02	2.840E+00	3.739E+02	1.831
α_3	8.23E-04	5.54E-03	4.53E-03	1.37E-02	1.746E+00	3.137E+02	2.188
α_4	2.28E-04	3.66E-03	2.62E-03	1.06E-02	1.084E+00	2.952E+02	2.329
α_5	1.13E-05	1.98E-03	9.61E-04	7.41E-03	5.376E-01	2.707E+02	2.544
α_6	6.20E-10	7.05E-04	7.13E-05	3.65E-03	1.979E-01	2.804E+02	2.460
α_7	2.11E-52	9.41E-05	9.44E-15	3.22E-04	2.656E-02	2.823E+02	2.444

CCCG = 8, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9679803	0.9815474	0.9825082	0.9918329	3.251E+02	6.112E+00	--
α_2	1.38E-03	6.39E-03	5.52E-03	1.43E-02	2.364E+00	3.678E+02	1.863
α_3	5.37E-04	4.51E-03	3.57E-03	1.17E-02	1.512E+00	3.340E+02	2.056
α_4	2.01E-04	3.42E-03	2.43E-03	1.00E-02	1.056E+00	3.074E+02	2.236
α_5	3.51E-05	2.31E-03	1.32E-03	7.97E-03	6.745E-01	2.911E+02	2.364
α_6	1.65E-07	1.23E-03	3.12E-04	5.57E-03	3.076E-01	2.504E+02	2.751
α_7	2.63E-15	3.76E-04	3.72E-06	2.17E-03	1.093E-01	2.906E+02	2.372
α_8	3.42E-18	2.21E-04	6.15E-07	1.29E-03	8.885E-02	4.014E+02	1.718

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.81E-01	9.76E-01	9.78E-01	9.79E-01	9.80E-01	9.82E-01
α_2	1.86E-02	1.56E-02	1.59E-02	1.25E-02	9.42E-03	7.54E-03	6.39E-03
α_3		3.81E-03	5.36E-03	6.61E-03	6.69E-03	5.54E-03	4.51E-03
α_4			2.59E-03	2.58E-03	3.24E-03	3.66E-03	3.42E-03
α_5				4.74E-04	1.31E-03	1.98E-03	2.31E-03
α_6					5.82E-04	7.05E-04	1.23E-03
α_7						9.41E-05	3.76E-04
α_8							2.21E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.81E-01	9.76E-01	9.78E-01	9.79E-01	9.80E-01	9.82E-01
Beta	1.86E-02	1.94E-02	2.38E-02	2.21E-02	2.12E-02	1.95E-02	1.85E-02
Gamma		1.97E-01	3.33E-01	4.36E-01	5.56E-01	6.14E-01	6.54E-01
Delta			3.26E-01	3.16E-01	4.34E-01	5.38E-01	6.27E-01
Epsilon				1.55E-01	3.68E-01	4.32E-01	5.47E-01
Mu					3.08E-01	2.87E-01	4.41E-01
Omega						1.18E-01	3.27E-01
Sigma							3.71E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.50	2.50	2.50	2.50	2.50	2.50	2.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8715290	0.9667723	0.9850360	0.9999010	1.369E+01	4.706E-01	--
α_2	9.90E-05	3.32E-02	1.50E-02	1.28E-01	4.706E-01	1.369E+01	1.805

CCCG = 3, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8958844	0.9633469	0.9730607	0.9975475	2.898E+01	1.103E+00	--
α_2	8.00E-04	2.72E-02	1.76E-02	8.67E-02	8.104E-01	2.896E+01	2.128
α_3	8.04E-07	9.43E-03	2.24E-03	4.35E-02	2.921E-01	3.067E+01	2.046

CCCG = 4, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137203	0.9632990	0.9689536	0.9935151	5.125E+01	1.953E+00	--
α_2	2.20E-03	2.33E-02	1.80E-02	6.29E-02	1.312E+00	5.491E+01	2.055
α_3	1.54E-05	9.05E-03	3.61E-03	3.65E-02	4.307E-01	4.714E+01	2.429
α_4	8.66E-09	4.31E-03	5.13E-04	2.20E-02	2.099E-01	4.846E+01	2.374

CCCG = 5, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9347747	0.9682217	0.9713644	0.9909207	9.466E+01	3.107E+00	--
α_2	2.24E-03	1.57E-02	1.28E-02	3.92E-02	1.684E+00	1.053E+02	1.984
α_3	4.70E-04	1.06E-02	7.20E-03	3.21E-02	9.426E-01	8.829E+01	2.379
α_4	3.31E-06	4.39E-03	1.52E-03	1.85E-02	3.816E-01	8.655E+01	2.442
α_5	4.36E-16	1.09E-03	5.98E-06	6.33E-03	9.865E-02	9.067E+01	2.339

CCCG = 6, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9438044	0.9710631	0.9734102	0.9902987	1.283E+02	3.822E+00	--
α_2	1.60E-03	1.10E-02	8.98E-03	2.73E-02	1.714E+00	1.542E+02	1.802
α_3	6.24E-04	9.47E-03	6.86E-03	2.72E-02	1.108E+00	1.159E+02	2.400
α_4	7.32E-05	5.52E-03	3.09E-03	1.92E-02	6.509E-01	1.173E+02	2.382
α_5	4.32E-08	2.17E-03	3.93E-04	1.05E-02	2.536E-01	1.164E+02	2.408
α_6	1.28E-16	7.85E-04	3.58E-06	4.58E-03	9.572E-02	1.218E+02	2.305

CCCG = 7, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9518499	0.9732256	0.9748364	0.9890982	1.888E+02	5.195E+00	--
α_2	1.78E-03	9.38E-03	7.96E-03	2.18E-02	2.105E+00	2.224E+02	1.831
α_3	6.61E-04	7.02E-03	5.37E-03	1.90E-02	1.320E+00	1.867E+02	2.188
α_4	2.89E-04	5.65E-03	3.92E-03	1.69E-02	9.967E-01	1.756E+02	2.329
α_5	1.65E-05	3.25E-03	1.55E-03	1.22E-02	5.249E-01	1.611E+02	2.544
α_6	8.71E-10	1.17E-03	1.15E-04	6.07E-03	1.956E-01	1.670E+02	2.460
α_7	8.99E-28	3.15E-04	7.14E-09	1.71E-03	5.291E-02	1.682E+02	2.444

CCCG = 8, Gamma = 0.154

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9556606	0.9746715	0.9760344	0.9890272	2.244E+02	5.832E+00	--
α_2	1.75E-03	8.60E-03	7.38E-03	1.97E-02	2.229E+00	2.569E+02	1.863
α_3	4.62E-04	5.37E-03	4.04E-03	1.48E-02	1.260E+00	2.336E+02	2.056
α_4	2.75E-04	4.83E-03	3.41E-03	1.42E-02	1.042E+00	2.148E+02	2.236
α_5	8.79E-05	3.73E-03	2.29E-03	1.23E-02	7.626E-01	2.035E+02	2.364
α_6	4.27E-07	1.86E-03	5.22E-04	8.29E-03	3.271E-01	1.751E+02	2.751
α_7	6.41E-13	6.61E-04	1.77E-05	3.71E-03	1.344E-01	2.033E+02	2.372
α_8	2.47E-20	2.73E-04	2.57E-07	1.59E-03	7.682E-02	2.809E+02	1.718

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.67E-01	9.63E-01	9.63E-01	9.68E-01	9.71E-01	9.73E-01	9.75E-01
α_2	3.32E-02	2.72E-02	2.33E-02	1.57E-02	1.10E-02	9.38E-03	8.60E-03
α_3		9.43E-03	9.05E-03	1.06E-02	9.47E-03	7.02E-03	5.37E-03
α_4			4.31E-03	4.39E-03	5.52E-03	5.65E-03	4.83E-03
α_5				1.09E-03	2.17E-03	3.25E-03	3.73E-03
α_6					7.85E-04	1.17E-03	1.86E-03
α_7						3.15E-04	6.61E-04
α_8							2.73E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.67E-01	9.63E-01	9.63E-01	9.68E-01	9.71E-01	9.73E-01	9.75E-01
Beta	3.32E-02	3.67E-02	3.67E-02	3.18E-02	2.89E-02	2.68E-02	2.53E-02
Gamma		2.57E-01	3.64E-01	5.05E-01	6.20E-01	6.50E-01	6.60E-01
Delta			3.23E-01	3.41E-01	4.73E-01	5.96E-01	6.79E-01
Epsilon				1.98E-01	3.49E-01	4.56E-01	5.75E-01
Mu					2.65E-01	3.14E-01	4.28E-01
Omega						2.12E-01	3.34E-01
Sigma							2.93E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.462

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9694236	0.9920521	0.9963913	0.9999706	6.156E+01	4.932E-01	--
α_2	2.94E-05	7.95E-03	3.61E-03	3.06E-02	4.932E-01	6.156E+01	1.805

CCCG = 3, Gamma = 0.462

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740733	0.9911280	0.9936778	0.9994722	1.184E+02	1.059E+00	--
α_2	1.14E-04	6.05E-03	3.58E-03	2.04E-02	7.137E-01	1.172E+02	2.128
α_3	1.02E-06	2.82E-03	8.55E-04	1.23E-02	3.458E-01	1.223E+02	2.046

CCCG = 4, Gamma = 0.462

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9783914	0.9906915	0.9920876	0.9982185	2.251E+02	2.115E+00	--
α_2	8.11E-04	6.53E-03	5.20E-03	1.68E-02	1.549E+00	2.358E+02	2.055
α_3	4.12E-08	1.32E-03	2.58E-04	6.27E-03	2.646E-01	2.006E+02	2.429
α_4	1.62E-07	1.46E-03	3.60E-04	6.69E-03	3.010E-01	2.052E+02	2.374

CCCG = 5, Gamma = 0.462

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9856141	0.9920001	0.9924875	0.9967218	6.603E+02	5.325E+00	--
α_2	1.64E-03	5.12E-03	4.67E-03	1.02E-02	3.632E+00	7.051E+02	1.984
α_3	2.25E-04	2.29E-03	1.76E-03	6.17E-03	1.354E+00	5.897E+02	2.379
α_4	4.88E-08	5.14E-04	1.23E-04	2.36E-03	2.961E-01	5.756E+02	2.442
α_5	2.10E-34	7.06E-05	7.78E-11	3.50E-04	4.243E-02	6.012E+02	2.339

CCCG = 6, Gamma = 0.462

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9854712	0.9920693	0.9925901	0.9968888	6.174E+02	4.936E+00	--
α_2	1.10E-03	4.13E-03	3.67E-03	8.73E-03	2.915E+00	7.025E+02	1.802
α_3	2.03E-04	2.37E-03	1.78E-03	6.56E-03	1.257E+00	5.283E+02	2.400
α_4	3.84E-06	9.43E-04	4.32E-04	3.61E-03	5.031E-01	5.330E+02	2.382
α_5	6.34E-15	2.19E-04	2.89E-06	1.26E-03	1.155E-01	5.276E+02	2.408
α_6	1.23E-12	2.63E-04	9.64E-06	1.46E-03	1.451E-01	5.512E+02	2.305

CCCG = 7, Gamma = 0.462

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9885713	0.9927607	0.9930055	0.9961142	1.324E+03	9.654E+00	--
α_2	1.26E-03	3.25E-03	3.03E-03	5.99E-03	4.851E+00	1.488E+03	1.831
α_3	5.74E-04	2.24E-03	1.98E-03	4.79E-03	2.800E+00	1.247E+03	2.188
α_4	1.20E-04	1.18E-03	9.11E-04	3.15E-03	1.384E+00	1.173E+03	2.329
α_5	1.61E-06	4.56E-04	2.04E-04	1.76E-03	4.902E-01	1.075E+03	2.544
α_6	2.45E-15	1.03E-04	1.31E-06	5.92E-04	1.146E-01	1.112E+03	2.460
α_7	6.88E-93	1.31E-05	1.39E-24	1.56E-05	1.464E-02	1.119E+03	2.444

CCCG = 8, Gamma = 0.462

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9882007	0.9929797	0.9932998	0.9966658	1.011E+03	7.148E+00	--
α_2	7.27E-04	2.68E-03	2.39E-03	5.63E-03	2.980E+00	1.109E+03	1.863
α_3	3.37E-04	1.95E-03	1.63E-03	4.64E-03	1.960E+00	1.005E+03	2.056
α_4	9.21E-05	1.26E-03	9.23E-04	3.57E-03	1.166E+00	9.250E+02	2.236
α_5	3.48E-06	6.13E-04	2.97E-04	2.30E-03	5.375E-01	8.757E+02	2.364
α_6	5.30E-11	2.40E-04	1.86E-05	1.27E-03	1.805E-01	7.526E+02	2.751
α_7	2.45E-35	4.74E-05	3.55E-11	2.32E-04	4.139E-02	8.730E+02	2.372
α_8	1.43E-08	2.34E-04	5.17E-05	1.09E-03	2.827E-01	1.205E+03	1.718

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01	9.93E-01	9.93E-01
α_2	7.95E-03	6.05E-03	6.53E-03	5.12E-03	4.13E-03	3.25E-03	2.68E-03
α_3		2.82E-03	1.32E-03	2.29E-03	2.37E-03	2.24E-03	1.95E-03
α_4			1.46E-03	5.14E-04	9.43E-04	1.18E-03	1.26E-03
α_5				7.06E-05	2.19E-04	4.56E-04	6.13E-04
α_6					2.63E-04	1.03E-04	2.40E-04
α_7						1.31E-05	4.74E-05
α_8							2.34E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01	9.93E-01	9.93E-01
Beta	7.95E-03	8.87E-03	9.31E-03	8.00E-03	7.93E-03	7.24E-03	7.02E-03
Gamma		3.18E-01	2.99E-01	3.59E-01	4.79E-01	5.51E-01	6.18E-01
Delta			5.26E-01	2.03E-01	3.75E-01	4.39E-01	5.52E-01
Epsilon				1.21E-01	3.38E-01	3.27E-01	4.74E-01
Mu					5.46E-01	2.03E-01	4.60E-01
Omega						1.13E-01	5.40E-01
Sigma							8.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.13.2.2 ACP-CRB-4160-OO: AC Power 4160 V and 6.9 kV Circuit Breakers Fail to Close

Generic CCF Parameters

System Group: Electrical
System: Plant AC Power
Component Group: Electrical
Component Type: Circuit Breaker
Component Subtype: 4160 - 6900 V
Failure Mode: Fail to Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 57.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9770006	0.9941347	0.9974700	0.9999820	1.0000000	7.941E+01	4.685E-01
α_2	1.63E-05	5.87E-03	2.53E-03	2.30E-02	0.00E+00	4.685E-01	7.941E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9722379	0.9902845	0.9929156	0.9993303	1.0000000	1.150E+02	1.128E+00
α_2	2.45E-04	7.33E-03	4.76E-03	2.32E-02	0.00E+00	8.512E-01	1.153E+02
α_3	1.19E-07	2.38E-03	5.09E-04	1.12E-02	0.00E+00	2.768E-01	1.158E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9696138	0.9873395	0.9894362	0.9978821	1.0000000	1.477E+02	1.894E+00
α_2	7.26E-04	8.42E-03	6.36E-03	2.32E-02	0.00E+00	1.260E+00	1.483E+02
α_3	2.92E-06	2.69E-03	9.87E-04	1.11E-02	0.00E+00	4.024E-01	1.492E+02
α_4	1.07E-08	1.55E-03	2.30E-04	7.66E-03	0.00E+00	2.315E-01	1.493E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9725370	0.9863408	0.9876117	0.9958037	1.0000000	2.478E+02	3.432E+00
α_2	1.30E-03	7.66E-03	6.40E-03	1.83E-02	0.00E+00	1.924E+00	2.493E+02
α_3	2.42E-04	4.17E-03	2.96E-03	1.23E-02	0.00E+00	1.049E+00	2.502E+02
α_4	1.16E-06	1.52E-03	5.24E-04	6.42E-03	0.00E+00	3.822E-01	2.509E+02
α_5	2.65E-20	3.05E-04	2.84E-07	1.77E-03	0.00E+00	7.674E-02	2.512E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9738410	0.9865937	0.9877133	0.9955251	1.0000000	2.822E+02	3.835E+00
α_2	8.52E-04	5.95E-03	4.84E-03	1.48E-02	0.00E+00	1.701E+00	2.844E+02

α_3	3.33E-04	4.22E-03	3.14E-03	1.18E-02	0.00E+00	1.207E+00	2.848E+02
α_4	1.91E-05	2.08E-03	1.09E-03	7.51E-03	0.00E+00	5.960E-01	2.855E+02
α_5	3.03E-09	7.73E-04	1.03E-04	3.88E-03	0.00E+00	2.211E-01	2.858E+02
α_6	3.02E-15	3.84E-04	3.88E-06	2.21E-03	0.00E+00	1.098E-01	2.859E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9766861	0.9867739	0.9875166	0.9943377	1.0000000	4.288E+02	5.747E+00
α_2	1.06E-03	5.16E-03	4.43E-03	1.18E-02	0.00E+00	2.243E+00	4.323E+02
α_3	5.03E-04	3.75E-03	3.02E-03	9.49E-03	0.00E+00	1.630E+00	4.329E+02
α_4	1.55E-04	2.49E-03	1.78E-03	7.25E-03	0.00E+00	1.083E+00	4.335E+02
α_5	9.40E-06	1.30E-03	6.56E-04	4.78E-03	0.00E+00	5.654E-01	4.340E+02
α_6	2.42E-10	4.41E-04	4.07E-05	2.30E-03	0.00E+00	1.916E-01	4.344E+02
α_7	5.49E-41	8.01E-05	2.98E-12	3.51E-04	0.00E+00	3.480E-02	4.345E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9776776	0.9873537	0.9880669	0.9945975	1.0000000	4.470E+02	5.726E+00
α_2	8.03E-04	4.46E-03	3.75E-03	1.05E-02	0.00E+00	2.018E+00	4.507E+02
α_3	3.17E-04	3.07E-03	2.38E-03	8.20E-03	0.00E+00	1.391E+00	4.514E+02
α_4	1.40E-04	2.35E-03	1.67E-03	6.87E-03	0.00E+00	1.062E+00	4.517E+02
α_5	2.74E-05	1.55E-03	9.07E-04	5.27E-03	0.00E+00	7.026E-01	4.520E+02
α_6	3.03E-07	7.72E-04	2.37E-04	3.36E-03	0.00E+00	3.497E-01	4.524E+02
α_7	1.16E-15	2.38E-04	2.19E-06	1.38E-03	0.00E+00	1.078E-01	4.526E+02
α_8	2.43E-17	2.09E-04	8.86E-07	1.22E-03	0.00E+00	9.469E-02	4.527E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.90E-01	9.87E-01	9.86E-01	9.87E-01	9.87E-01	9.87E-01
α_2	5.87E-03	7.33E-03	8.42E-03	7.66E-03	5.95E-03	5.16E-03	4.46E-03
α_3		2.38E-03	2.69E-03	4.17E-03	4.22E-03	3.75E-03	3.07E-03
α_4			1.55E-03	1.52E-03	2.08E-03	2.49E-03	2.35E-03
α_5				3.05E-04	7.73E-04	1.30E-03	1.55E-03
α_6					3.84E-04	4.41E-04	7.72E-04
α_7						8.01E-05	2.38E-04
α_8							2.09E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.90E-01	9.87E-01	9.86E-01	9.87E-01	9.87E-01	9.87E-01
Beta	5.87E-03	9.72E-03	1.27E-02	1.37E-02	1.34E-02	1.32E-02	1.26E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	57.00	57.00	57.00	57.00	57.00	57.00	57.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 28.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9842972	0.9959543	0.9982053	0.9999866	1.190E+02	4.834E-01	--
α_2	1.34E-05	4.05E-03	1.79E-03	1.57E-02	4.834E-01	1.190E+02	0.609

CCCG = 3, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9814110	0.9933157	0.9950027	0.9994551	1.821E+02	1.226E+00	--
α_2	2.58E-04	5.31E-03	3.66E-03	1.60E-02	9.769E-01	1.830E+02	0.867
α_3	2.20E-08	1.37E-03	2.38E-04	6.67E-03	2.487E-01	1.807E+02	0.881

CCCG = 4, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9774891	0.9903848	0.9918650	0.9982198	2.119E+02	2.057E+00	--
α_2	7.27E-04	6.59E-03	5.16E-03	1.73E-02	1.442E+00	2.175E+02	0.971
α_3	2.48E-06	1.98E-03	7.42E-04	8.13E-03	4.114E-01	2.078E+02	1.021
α_4	1.38E-09	1.05E-03	1.15E-04	5.39E-03	2.036E-01	1.934E+02	1.097

CCCG = 5, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9782269	0.9889701	0.9899306	0.9964313	3.302E+02	3.683E+00	--
α_2	1.34E-03	6.54E-03	5.61E-03	1.49E-02	2.243E+00	3.406E+02	1.116
α_3	1.57E-04	3.12E-03	2.16E-03	9.36E-03	9.912E-01	3.168E+02	1.204
α_4	7.89E-07	1.16E-03	3.91E-04	4.91E-03	3.765E-01	3.251E+02	1.176
α_5	1.85E-21	2.13E-04	1.21E-07	1.23E-03	7.237E-02	3.398E+02	1.126

CCCG = 6, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787658	0.9889046	0.9897660	0.9961006	3.689E+02	4.139E+00	--
α_2	1.03E-03	5.34E-03	4.54E-03	1.24E-02	2.128E+00	3.965E+02	1.086
α_3	2.26E-04	3.27E-03	2.38E-03	9.37E-03	1.134E+00	3.452E+02	1.250
α_4	1.01E-05	1.55E-03	7.68E-04	5.73E-03	5.533E-01	3.569E+02	1.211
α_5	2.34E-09	6.02E-04	8.03E-05	3.02E-03	2.210E-01	3.670E+02	1.179
α_6	4.25E-16	3.34E-04	2.32E-06	1.94E-03	1.027E-01	3.076E+02	1.407

CCCG = 7, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9810906	0.9889989	0.9895516	0.9950201	5.782E+02	6.432E+00	--
α_2	1.18E-03	4.55E-03	4.04E-03	9.69E-03	2.840E+00	6.209E+02	1.148
α_3	4.64E-04	3.13E-03	2.56E-03	7.74E-03	1.746E+00	5.566E+02	1.282
α_4	1.21E-04	1.94E-03	1.39E-03	5.65E-03	1.084E+00	5.571E+02	1.283
α_5	5.60E-06	9.84E-04	4.77E-04	3.68E-03	5.376E-01	5.458E+02	1.311
α_6	3.06E-10	3.48E-04	3.52E-05	1.80E-03	1.979E-01	5.677E+02	1.261
α_7	1.04E-52	4.65E-05	4.66E-15	1.59E-04	2.656E-02	5.706E+02	1.255

CCCG = 8, Gamma = 0.500

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9817637	0.9895151	0.9900697	0.9953729	5.768E+02	6.112E+00	--
α_2	8.22E-04	3.80E-03	3.28E-03	8.54E-03	2.364E+00	6.202E+02	1.150
α_3	3.15E-04	2.65E-03	2.09E-03	6.86E-03	1.512E+00	5.700E+02	1.252
α_4	1.11E-04	1.89E-03	1.34E-03	5.56E-03	1.056E+00	5.569E+02	1.283
α_5	1.82E-05	1.20E-03	6.83E-04	4.13E-03	6.745E-01	5.620E+02	1.272
α_6	7.88E-08	5.86E-04	1.49E-04	2.66E-03	3.076E-01	5.246E+02	1.363
α_7	1.32E-15	1.89E-04	1.86E-06	1.09E-03	1.093E-01	5.785E+02	1.237
α_8	2.72E-18	1.76E-04	4.89E-07	1.03E-03	8.885E-02	5.045E+02	1.418

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.93E-01	9.90E-01	9.89E-01	9.89E-01	9.89E-01	9.90E-01
α_2	4.05E-03	5.31E-03	6.59E-03	6.54E-03	5.34E-03	4.55E-03	3.80E-03
α_3		1.37E-03	1.98E-03	3.12E-03	3.27E-03	3.13E-03	2.65E-03
α_4			1.05E-03	1.16E-03	1.55E-03	1.94E-03	1.89E-03
α_5				2.13E-04	6.02E-04	9.84E-04	1.20E-03
α_6					3.34E-04	3.48E-04	5.86E-04
α_7						4.65E-05	1.89E-04
α_8							1.76E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.93E-01	9.90E-01	9.89E-01	9.89E-01	9.89E-01	9.90E-01
Beta	4.05E-03	6.68E-03	9.62E-03	1.10E-02	1.11E-02	1.10E-02	1.05E-02
Gamma		2.06E-01	3.15E-01	4.07E-01	5.19E-01	5.86E-01	6.38E-01
Delta			3.47E-01	3.05E-01	4.31E-01	5.15E-01	6.04E-01
Epsilon				1.55E-01	3.77E-01	4.15E-01	5.32E-01
Mu					3.57E-01	2.86E-01	4.42E-01
Omega						1.18E-01	3.84E-01
Sigma							4.82E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	28.50	28.50	28.50	28.50	28.50	28.50	28.50
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.053

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9365159	0.9839773	0.9932525	0.9999642	2.762E+01	4.498E-01	--
α_2	3.58E-05	1.60E-02	6.75E-03	6.35E-02	4.498E-01	2.762E+01	0.609

CCCG = 3, Gamma = 0.053

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9262052	0.9735594	0.9802614	0.9979768	4.339E+01	1.178E+00	--
α_2	9.34E-04	2.10E-02	1.44E-02	6.36E-02	9.387E-01	4.378E+01	0.867
α_3	5.74E-08	5.45E-03	8.83E-04	2.67E-02	2.396E-01	4.373E+01	0.881

CCCG = 4, Gamma = 0.053

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9186790	0.9657518	0.9711988	0.9941741	5.353E+01	1.898E+00	--
α_2	2.05E-03	2.26E-02	1.73E-02	6.13E-02	1.285E+00	5.558E+01	0.971
α_3	6.73E-06	7.26E-03	2.61E-03	3.03E-02	3.927E-01	5.368E+01	1.021
α_4	1.70E-08	4.39E-03	5.90E-04	2.20E-02	2.207E-01	5.008E+01	1.097

CCCG = 5, Gamma = 0.053

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9287244	0.9640438	0.9671755	0.9886536	9.399E+01	3.506E+00	--
α_2	3.55E-03	1.98E-02	1.67E-02	4.67E-02	1.992E+00	9.843E+01	1.116
α_3	7.19E-04	1.16E-02	8.32E-03	3.36E-02	1.078E+00	9.200E+01	1.204
α_4	2.01E-06	3.81E-03	1.24E-03	1.63E-02	3.632E-01	9.497E+01	1.176
α_5	6.74E-21	7.28E-04	4.22E-07	4.22E-03	7.248E-02	9.946E+01	1.126

CCCG = 6, Gamma = 0.053

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9334575	0.9648076	0.9673768	0.9873753	1.151E+02	4.199E+00	--
α_2	2.61E-03	1.51E-02	1.27E-02	3.60E-02	1.941E+00	1.263E+02	1.086
α_3	1.15E-03	1.20E-02	9.18E-03	3.22E-02	1.332E+00	1.101E+02	1.250
α_4	5.78E-05	5.37E-03	2.90E-03	1.91E-02	6.181E-01	1.144E+02	1.211
α_5	1.35E-08	1.96E-03	2.91E-04	9.70E-03	2.313E-01	1.179E+02	1.179
α_6	7.09E-20	7.76E-04	7.33E-07	4.52E-03	7.684E-02	9.892E+01	1.407

CCCG = 7, Gamma = 0.053

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9397416	0.9649602	0.9666936	0.9842574	1.714E+02	6.223E+00	--
α_2	3.43E-03	1.40E-02	1.23E-02	3.02E-02	2.654E+00	1.872E+02	1.148
α_3	1.32E-03	9.68E-03	7.84E-03	2.43E-02	1.645E+00	1.683E+02	1.282
α_4	4.38E-04	6.56E-03	4.76E-03	1.89E-02	1.115E+00	1.688E+02	1.283
α_5	3.51E-05	3.63E-03	1.92E-03	1.30E-02	6.034E-01	1.657E+02	1.311
α_6	1.83E-10	1.03E-03	7.68E-05	5.47E-03	1.780E-01	1.727E+02	1.261
α_7	8.58E-51	1.57E-04	3.24E-14	5.56E-04	2.734E-02	1.737E+02	1.255

CCCG = 8, Gamma = 0.053

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9415431	0.9659898	0.9676696	0.9846980	1.774E+02	6.246E+00	--
α_2	2.95E-03	1.28E-02	1.12E-02	2.81E-02	2.504E+00	1.936E+02	1.150
α_3	8.47E-04	7.88E-03	6.15E-03	2.08E-02	1.419E+00	1.786E+02	1.252
α_4	3.22E-04	5.84E-03	4.11E-03	1.73E-02	1.027E+00	1.747E+02	1.283
α_5	8.55E-05	4.14E-03	2.49E-03	1.38E-02	7.337E-01	1.765E+02	1.272
α_6	2.40E-06	2.40E-03	8.69E-04	1.00E-02	3.975E-01	1.650E+02	1.363
α_7	4.23E-20	4.23E-04	4.06E-07	2.46E-03	7.703E-02	1.822E+02	1.237
α_8	5.12E-18	5.50E-04	1.38E-06	3.21E-03	8.749E-02	1.589E+02	1.418

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.74E-01	9.66E-01	9.64E-01	9.65E-01	9.65E-01	9.66E-01
α_2	1.60E-02	2.10E-02	2.26E-02	1.98E-02	1.51E-02	1.40E-02	1.28E-02
α_3		5.45E-03	7.26E-03	1.16E-02	1.20E-02	9.68E-03	7.88E-03
α_4			4.39E-03	3.81E-03	5.37E-03	6.56E-03	5.84E-03
α_5				7.28E-04	1.96E-03	3.63E-03	4.14E-03
α_6					7.76E-04	1.03E-03	2.40E-03
α_7						1.57E-04	4.23E-04
α_8							5.50E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.74E-01	9.66E-01	9.64E-01	9.65E-01	9.65E-01	9.66E-01
Beta	1.60E-02	2.64E-02	3.42E-02	3.60E-02	3.52E-02	3.50E-02	3.40E-02
Gamma		2.06E-01	3.40E-01	4.48E-01	5.70E-01	6.01E-01	6.25E-01
Delta			3.77E-01	2.82E-01	4.04E-01	5.40E-01	6.29E-01
Epsilon				1.60E-01	3.37E-01	4.23E-01	5.63E-01
Mu					2.84E-01	2.47E-01	4.49E-01
Omega						1.33E-01	2.88E-01
Sigma							5.66E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.018

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8495580	0.9639383	0.9869222	0.9999719	1.016E+01	3.801E-01	--
α_2	2.81E-05	3.61E-02	1.31E-02	1.50E-01	3.801E-01	1.016E+01	0.609

CCCG = 3, Gamma = 0.018

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8307648	0.9425718	0.9592635	0.9971841	1.576E+01	9.600E-01	--
α_2	6.07E-04	3.97E-02	2.33E-02	1.35E-01	6.673E-01	1.614E+01	0.867
α_3	1.57E-06	1.77E-02	4.30E-03	8.15E-02	2.927E-01	1.623E+01	0.881

CCCG = 4, Gamma = 0.018

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8287612	0.9295345	0.9413712	0.9896955	2.202E+01	1.669E+00	--
α_2	2.50E-03	4.26E-02	3.08E-02	1.23E-01	1.039E+00	2.338E+01	0.971
α_3	1.47E-05	1.67E-02	6.03E-03	6.98E-02	3.887E-01	2.283E+01	1.021
α_4	1.30E-07	1.12E-02	1.87E-03	5.47E-02	2.414E-01	2.136E+01	1.097

CCCG = 5, Gamma = 0.018

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8664724	0.9319081	0.9374860	0.9782501	4.772E+01	3.487E+00	--
α_2	5.32E-03	3.38E-02	2.81E-02	8.18E-02	1.791E+00	5.117E+01	1.116
α_3	1.97E-03	2.46E-02	1.85E-02	6.81E-02	1.207E+00	4.787E+01	1.204
α_4	1.54E-05	8.63E-03	3.47E-03	3.48E-02	4.340E-01	4.984E+01	1.176
α_5	2.33E-26	1.05E-03	3.74E-08	5.78E-03	5.493E-02	5.243E+01	1.126

CCCG = 6, Gamma = 0.018

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8800230	0.9371026	0.9417607	0.9782443	5.817E+01	3.905E+00	--
α_2	1.92E-03	1.97E-02	1.52E-02	5.29E-02	1.335E+00	6.641E+01	1.086
α_3	3.22E-03	2.60E-02	2.08E-02	6.65E-02	1.531E+00	5.733E+01	1.250
α_4	2.30E-04	1.18E-02	7.07E-03	3.97E-02	7.191E-01	6.003E+01	1.211
α_5	5.80E-08	3.95E-03	6.79E-04	1.92E-02	2.467E-01	6.215E+01	1.179
α_6	1.54E-20	1.39E-03	8.41E-07	8.09E-03	7.279E-02	5.222E+01	1.407

CCCG = 7, Gamma = 0.018

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.8975591	0.9410193	0.9440091	0.9742601	9.206E+01	5.770E+00	--
α_2	1.82E-03	1.46E-02	1.16E-02	3.73E-02	1.549E+00	1.049E+02	1.148
α_3	3.74E-03	2.09E-02	1.76E-02	4.92E-02	1.989E+00	9.327E+01	1.282
α_4	1.22E-03	1.35E-02	1.03E-02	3.68E-02	1.287E+00	9.396E+01	1.283
α_5	1.24E-04	7.42E-03	4.31E-03	2.53E-02	6.913E-01	9.253E+01	1.311
α_6	1.78E-08	2.40E-03	3.62E-04	1.19E-02	2.327E-01	9.666E+01	1.261
α_7	1.48E-64	2.17E-04	3.29E-17	5.47E-04	2.112E-02	9.735E+01	1.255

CCCG = 8, Gamma = 0.018

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9105186	0.9462796	0.9485472	0.9742931	1.236E+02	7.016E+00	--
α_2	1.44E-03	1.12E-02	8.96E-03	2.84E-02	1.583E+00	1.402E+02	1.150
α_3	2.71E-03	1.53E-02	1.29E-02	3.60E-02	1.986E+00	1.282E+02	1.252
α_4	1.85E-03	1.32E-02	1.07E-02	3.29E-02	1.672E+00	1.254E+02	1.283
α_5	4.19E-04	7.89E-03	5.52E-03	2.34E-02	1.011E+00	1.271E+02	1.272
α_6	3.63E-05	4.77E-03	2.44E-03	1.75E-02	5.709E-01	1.190E+02	1.363
α_7	3.15E-10	1.37E-03	1.08E-04	7.26E-03	1.809E-01	1.316E+02	1.237
α_8	1.57E-107	1.08E-04	3.28E-27	8.13E-05	1.245E-02	1.149E+02	1.418

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.64E-01	9.43E-01	9.30E-01	9.32E-01	9.37E-01	9.41E-01	9.46E-01
α_2	3.61E-02	3.97E-02	4.26E-02	3.38E-02	1.97E-02	1.46E-02	1.12E-02
α_3		1.77E-02	1.67E-02	2.46E-02	2.60E-02	2.09E-02	1.53E-02
α_4			1.12E-02	8.63E-03	1.18E-02	1.35E-02	1.32E-02
α_5				1.05E-03	3.95E-03	7.42E-03	7.89E-03
α_6					1.39E-03	2.40E-03	4.77E-03
α_7						2.17E-04	1.37E-03
α_8							1.08E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.64E-01	9.43E-01	9.30E-01	9.32E-01	9.37E-01	9.41E-01	9.46E-01
Beta	3.61E-02	5.74E-02	7.05E-02	6.81E-02	6.29E-02	5.90E-02	5.37E-02
Gamma		3.08E-01	3.96E-01	5.03E-01	6.87E-01	7.53E-01	7.92E-01
Delta			4.00E-01	2.82E-01	3.98E-01	5.30E-01	6.42E-01
Epsilon				1.08E-01	3.11E-01	4.26E-01	5.18E-01
Mu					2.60E-01	2.61E-01	4.42E-01
Omega						8.28E-02	2.37E-01
Sigma							7.31E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 16.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.281

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9723248	0.9929286	0.9969280	0.9999798	6.608E+01	4.706E-01	--
α_2	2.02E-05	7.07E-03	3.07E-03	2.77E-02	4.706E-01	6.608E+01	0.609

CCCG = 3, Gamma = 0.281

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9647688	0.9877541	0.9911305	0.9991993	8.893E+01	1.103E+00	--
α_2	2.58E-04	8.96E-03	5.69E-03	2.88E-02	8.104E-01	8.962E+01	0.867
α_3	2.76E-07	3.28E-03	7.71E-04	1.51E-02	2.921E-01	8.863E+01	0.881

CCCG = 4, Gamma = 0.281

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9646588	0.9851153	0.9875018	0.9974089	1.292E+02	1.953E+00	--
α_2	9.10E-04	9.75E-03	7.45E-03	2.65E-02	1.312E+00	1.332E+02	0.971
α_3	5.66E-06	3.37E-03	1.33E-03	1.36E-02	4.307E-01	1.275E+02	1.021
α_4	3.51E-09	1.76E-03	2.08E-04	8.98E-03	2.099E-01	1.188E+02	1.097

CCCG = 5, Gamma = 0.281

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9675167	0.9842719	0.9858760	0.9955443	1.944E+02	3.107E+00	--
α_2	1.17E-03	8.27E-03	6.73E-03	2.07E-02	1.684E+00	2.019E+02	1.116
α_3	2.21E-04	4.99E-03	3.39E-03	1.52E-02	9.426E-01	1.878E+02	1.204
α_4	1.48E-06	1.97E-03	6.79E-04	8.33E-03	3.816E-01	1.929E+02	1.176
α_5	1.95E-16	4.89E-04	2.68E-06	2.84E-03	9.865E-02	2.017E+02	1.126

CCCG = 6, Gamma = 0.281

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9705308	0.9849003	0.9861584	0.9949707	2.493E+02	3.822E+00	--
α_2	9.11E-04	6.29E-03	5.13E-03	1.56E-02	1.714E+00	2.708E+02	1.086
α_3	3.07E-04	4.68E-03	3.38E-03	1.35E-02	1.108E+00	2.356E+02	1.250
α_4	3.52E-05	2.66E-03	1.49E-03	9.30E-03	6.509E-01	2.437E+02	1.211
α_5	2.00E-08	1.01E-03	1.82E-04	4.87E-03	2.536E-01	2.507E+02	1.179
α_6	7.38E-17	4.55E-04	2.07E-06	2.65E-03	9.572E-02	2.102E+02	1.407

CCCG = 7, Gamma = 0.281

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9729422	0.9850101	0.9859332	0.9939252	3.414E+02	5.195E+00	--
α_2	1.08E-03	5.67E-03	4.81E-03	1.32E-02	2.105E+00	3.692E+02	1.148
α_3	3.73E-04	3.97E-03	3.03E-03	1.08E-02	1.320E+00	3.310E+02	1.282
α_4	1.53E-04	3.00E-03	2.08E-03	8.98E-03	9.967E-01	3.313E+02	1.283
α_5	8.17E-06	1.61E-03	7.67E-04	6.09E-03	5.249E-01	3.247E+02	1.311
α_6	4.30E-10	5.79E-04	5.66E-05	3.00E-03	1.956E-01	3.378E+02	1.261
α_7	4.44E-28	1.56E-04	3.53E-09	8.45E-04	5.291E-02	3.396E+02	1.255

CCCG = 8, Gamma = 0.281

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9747062	0.9855985	0.9863905	0.9937865	3.991E+02	5.832E+00	--
α_2	1.04E-03	5.15E-03	4.41E-03	1.18E-02	2.229E+00	4.307E+02	1.150
α_3	2.72E-04	3.17E-03	2.39E-03	8.75E-03	1.260E+00	3.962E+02	1.252
α_4	1.53E-04	2.69E-03	1.89E-03	7.92E-03	1.042E+00	3.870E+02	1.283
α_5	4.58E-05	1.95E-03	1.19E-03	6.43E-03	7.626E-01	3.905E+02	1.272
α_6	2.05E-07	8.96E-04	2.50E-04	3.98E-03	3.271E-01	3.647E+02	1.363
α_7	3.24E-13	3.34E-04	8.95E-06	1.88E-03	1.344E-01	4.023E+02	1.237
α_8	1.97E-20	2.19E-04	2.05E-07	1.27E-03	7.682E-02	3.509E+02	1.418

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.88E-01	9.85E-01	9.84E-01	9.85E-01	9.85E-01	9.86E-01
α_2	7.07E-03	8.96E-03	9.75E-03	8.27E-03	6.29E-03	5.67E-03	5.15E-03
α_3		3.28E-03	3.37E-03	4.99E-03	4.68E-03	3.97E-03	3.17E-03
α_4			1.76E-03	1.97E-03	2.66E-03	3.00E-03	2.69E-03
α_5				4.89E-04	1.01E-03	1.61E-03	1.95E-03
α_6					4.55E-04	5.79E-04	8.96E-04
α_7						1.56E-04	3.34E-04
α_8							2.19E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.88E-01	9.85E-01	9.84E-01	9.85E-01	9.85E-01	9.86E-01
Beta	7.07E-03	1.22E-02	1.49E-02	1.57E-02	1.51E-02	1.50E-02	1.44E-02
Gamma		2.68E-01	3.45E-01	4.74E-01	5.83E-01	6.22E-01	6.43E-01
Delta			3.44E-01	3.30E-01	4.69E-01	5.74E-01	6.57E-01
Epsilon				1.98E-01	3.55E-01	4.39E-01	5.59E-01
Mu					3.11E-01	3.13E-01	4.26E-01
Omega						2.12E-01	3.82E-01
Sigma							3.96E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	16.00	16.00	16.00	16.00	16.00	16.00	16.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 8.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9901345	0.9974416	0.9988464	0.9999906	1.923E+02	4.932E-01	--
α_2	9.39E-06	2.56E-03	1.15E-03	9.87E-03	4.932E-01	1.923E+02	0.609

CCCG = 3, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9894529	0.9964004	0.9974433	0.9997869	2.933E+02	1.059E+00	--
α_2	4.51E-05	2.41E-03	1.42E-03	8.14E-03	7.137E-01	2.953E+02	0.867
α_3	4.27E-07	1.19E-03	3.59E-04	5.19E-03	3.458E-01	2.907E+02	0.881

CCCG = 4, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9900790	0.9957356	0.9963809	0.9991865	4.938E+02	2.115E+00	--
α_2	3.77E-04	3.05E-03	2.43E-03	7.84E-03	1.549E+00	5.067E+02	0.971
α_3	1.71E-08	5.47E-04	1.07E-04	2.60E-03	2.646E-01	4.831E+02	1.021
α_4	7.40E-08	6.69E-04	1.64E-04	3.06E-03	3.010E-01	4.493E+02	1.097

CCCG = 5, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9922452	0.9956925	0.9959568	0.9982375	1.231E+03	5.325E+00	--
α_2	9.16E-04	2.87E-03	2.61E-03	5.71E-03	3.632E+00	1.261E+03	1.116
α_3	1.13E-04	1.16E-03	8.87E-04	3.11E-03	1.354E+00	1.171E+03	1.204
α_4	2.34E-08	2.47E-04	5.89E-05	1.13E-03	2.961E-01	1.200E+03	1.176
α_5	1.01E-34	3.38E-05	3.73E-11	1.68E-04	4.243E-02	1.253E+03	1.126

CCCG = 6, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9918295	0.9955450	0.9958395	0.9982548	1.103E+03	4.936E+00	--
α_2	6.60E-04	2.48E-03	2.20E-03	5.24E-03	2.915E+00	1.172E+03	1.086
α_3	1.05E-04	1.23E-03	9.25E-04	3.40E-03	1.257E+00	1.020E+03	1.250
α_4	1.94E-06	4.77E-04	2.18E-04	1.83E-03	5.031E-01	1.053E+03	1.211
α_5	3.09E-15	1.07E-04	1.41E-06	6.12E-04	1.155E-01	1.082E+03	1.179
α_6	7.48E-13	1.60E-04	5.86E-06	8.86E-04	1.451E-01	9.070E+02	1.407

CCCG = 7, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9932314	0.9957156	0.9958613	0.9977022	2.244E+03	9.654E+00	--
α_2	7.87E-04	2.03E-03	1.89E-03	3.75E-03	4.851E+00	2.382E+03	1.148
α_3	3.36E-04	1.31E-03	1.16E-03	2.80E-03	2.800E+00	2.134E+03	1.282
α_4	6.62E-05	6.48E-04	5.00E-04	1.73E-03	1.384E+00	2.135E+03	1.283
α_5	8.30E-07	2.34E-04	1.05E-04	9.07E-04	4.902E-01	2.090E+03	1.311
α_6	1.25E-15	5.27E-05	6.68E-07	3.03E-04	1.146E-01	2.173E+03	1.261
α_7	3.53E-93	6.70E-06	7.13E-25	7.96E-06	1.464E-02	2.184E+03	1.255

CCCG = 8, Gamma = 0.149

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9929064	0.9957827	0.9959761	0.9979989	1.688E+03	7.148E+00	--
α_2	4.47E-04	1.65E-03	1.47E-03	3.47E-03	2.980E+00	1.803E+03	1.150
α_3	2.05E-04	1.18E-03	9.88E-04	2.82E-03	1.960E+00	1.656E+03	1.252
α_4	5.27E-05	7.20E-04	5.28E-04	2.04E-03	1.166E+00	1.618E+03	1.283
α_5	1.87E-06	3.29E-04	1.59E-04	1.23E-03	5.375E-01	1.632E+03	1.272
α_6	2.62E-11	1.19E-04	9.20E-06	6.27E-04	1.805E-01	1.523E+03	1.363
α_7	1.27E-35	2.47E-05	1.84E-11	1.21E-04	4.139E-02	1.679E+03	1.237
α_8	1.18E-08	1.93E-04	4.26E-05	9.00E-04	2.827E-01	1.464E+03	1.418

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	2.56E-03	2.41E-03	3.05E-03	2.87E-03	2.48E-03	2.03E-03	1.65E-03
α_3		1.19E-03	5.47E-04	1.16E-03	1.23E-03	1.31E-03	1.18E-03
α_4			6.69E-04	2.47E-04	4.77E-04	6.48E-04	7.20E-04
α_5				3.38E-05	1.07E-04	2.34E-04	3.29E-04
α_6					1.60E-04	5.27E-05	1.19E-04
α_7						6.70E-06	2.47E-05
α_8							1.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	2.56E-03	3.60E-03	4.26E-03	4.31E-03	4.46E-03	4.28E-03	4.22E-03
Gamma		3.30E-01	2.85E-01	3.33E-01	4.43E-01	5.26E-01	6.09E-01
Delta			5.50E-01	1.95E-01	3.77E-01	4.18E-01	5.40E-01
Epsilon				1.21E-01	3.58E-01	3.12E-01	4.80E-01
Mu					6.00E-01	2.02E-01	5.05E-01
Omega						1.13E-01	6.48E-01
Sigma							8.87E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	8.50	8.50	8.50	8.50	8.50	8.50	8.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.13.2.3 ACP-CRB-4160-SA: AC Power 4160 V and 6.9 kV Circuit Breakers Spurious Operation

Generic CCF Parameters

System Group: Electrical
System: Plant AC Power
Component Group: Electrical
Component Type: Circuit Breaker
Component Subtype: 4160 - 6900 V
Failure Mode: Spurious Closing, Spurious Opening, Spurious Operation
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 23.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9600232	0.9897883	0.9955650	0.9999689	1.0000000	4.541E+01	4.685E-01
α_2	2.86E-05	1.02E-02	4.44E-03	4.00E-02	0.00E+00	4.685E-01	4.541E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9608201	0.9862613	0.9899600	0.9990512	1.0000000	8.098E+01	1.128E+00
α_2	3.47E-04	1.04E-02	6.75E-03	3.27E-02	0.00E+00	8.512E-01	8.126E+01
α_3	1.68E-07	3.37E-03	7.21E-04	1.58E-02	0.00E+00	2.768E-01	8.183E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9607461	0.9836149	0.9863155	0.9972587	1.0000000	1.137E+02	1.894E+00
α_2	9.42E-04	1.09E-02	8.24E-03	3.00E-02	0.00E+00	1.260E+00	1.143E+02
α_3	3.78E-06	3.48E-03	1.28E-03	1.44E-02	0.00E+00	4.024E-01	1.152E+02
α_4	1.39E-08	2.00E-03	2.98E-04	9.92E-03	0.00E+00	2.315E-01	1.153E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9682701	0.9842033	0.9856676	0.9951477	1.0000000	2.138E+02	3.432E+00
α_2	1.51E-03	8.86E-03	7.40E-03	2.12E-02	0.00E+00	1.924E+00	2.153E+02
α_3	2.79E-04	4.83E-03	3.42E-03	1.42E-02	0.00E+00	1.049E+00	2.162E+02
α_4	1.34E-06	1.76E-03	6.06E-04	7.42E-03	0.00E+00	3.822E-01	2.169E+02
α_5	3.07E-20	3.53E-04	3.29E-07	2.05E-03	0.00E+00	7.674E-02	2.172E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9703359	0.9847853	0.9860470	0.9949220	1.0000000	2.482E+02	3.835E+00
α_2	9.67E-04	6.75E-03	5.50E-03	1.68E-02	0.00E+00	1.701E+00	2.504E+02

α_3	3.78E-04	4.79E-03	3.56E-03	1.34E-02	0.00E+00	1.207E+00	2.508E+02
α_4	2.17E-05	2.36E-03	1.24E-03	8.52E-03	0.00E+00	5.960E-01	2.515E+02
α_5	3.43E-09	8.77E-04	1.17E-04	4.40E-03	0.00E+00	2.211E-01	2.518E+02
α_6	3.43E-15	4.36E-04	4.41E-06	2.51E-03	0.00E+00	1.098E-01	2.519E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9747100	0.9856512	0.9864499	0.9938586	1.0000000	3.948E+02	5.747E+00
α_2	1.15E-03	5.60E-03	4.80E-03	1.28E-02	0.00E+00	2.243E+00	3.983E+02
α_3	5.46E-04	4.07E-03	3.28E-03	1.03E-02	0.00E+00	1.630E+00	3.989E+02
α_4	1.68E-04	2.70E-03	1.93E-03	7.86E-03	0.00E+00	1.083E+00	3.995E+02
α_5	1.02E-05	1.41E-03	7.12E-04	5.19E-03	0.00E+00	5.654E-01	4.000E+02
α_6	2.63E-10	4.78E-04	4.42E-05	2.49E-03	0.00E+00	1.916E-01	4.004E+02
α_7	5.95E-41	8.69E-05	3.23E-12	3.81E-04	0.00E+00	3.480E-02	4.005E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9758792	0.9863269	0.9870919	0.9941562	1.0000000	4.130E+02	5.726E+00
α_2	8.69E-04	4.82E-03	4.06E-03	1.14E-02	0.00E+00	2.018E+00	4.167E+02
α_3	3.43E-04	3.32E-03	2.57E-03	8.86E-03	0.00E+00	1.391E+00	4.174E+02
α_4	1.51E-04	2.54E-03	1.80E-03	7.43E-03	0.00E+00	1.062E+00	4.177E+02
α_5	2.96E-05	1.68E-03	9.80E-04	5.70E-03	0.00E+00	7.026E-01	4.180E+02
α_6	3.28E-07	8.35E-04	2.56E-04	3.63E-03	0.00E+00	3.497E-01	4.184E+02
α_7	1.26E-15	2.58E-04	2.36E-06	1.49E-03	0.00E+00	1.078E-01	4.186E+02
α_8	2.63E-17	2.26E-04	9.58E-07	1.32E-03	0.00E+00	9.469E-02	4.187E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.90E-01	9.86E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
α_2	1.02E-02	1.04E-02	1.09E-02	8.86E-03	6.75E-03	5.60E-03	4.82E-03
α_3		3.37E-03	3.48E-03	4.83E-03	4.79E-03	4.07E-03	3.32E-03
α_4			2.00E-03	1.76E-03	2.36E-03	2.70E-03	2.54E-03
α_5				3.53E-04	8.77E-04	1.41E-03	1.68E-03
α_6					4.36E-04	4.78E-04	8.35E-04
α_7						8.69E-05	2.58E-04
α_8							2.26E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.90E-01	9.86E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01	9.86E-01
Beta	1.02E-02	1.37E-02	1.64E-02	1.58E-02	1.52E-02	1.43E-02	1.37E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	23.00	23.00	23.00	23.00	23.00	23.00	23.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 6.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.261

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9770476	0.9940818	0.9973681	0.9999804	8.120E+01	4.834E-01	--
α_2	1.96E-05	5.92E-03	2.63E-03	2.30E-02	4.834E-01	8.120E+01	0.616

CCCG = 3, Gamma = 0.261

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9813958	0.9933102	0.9949985	0.9994547	1.820E+02	1.226E+00	--
α_2	2.62E-04	5.38E-03	3.71E-03	1.62E-02	9.769E-01	1.806E+02	0.754
α_3	2.09E-08	1.31E-03	2.27E-04	6.35E-03	2.487E-01	1.898E+02	0.721

CCCG = 4, Gamma = 0.261

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794503	0.9912257	0.9925784	0.9983763	2.324E+02	2.057E+00	--
α_2	6.78E-04	6.15E-03	4.82E-03	1.62E-02	1.442E+00	2.330E+02	0.810
α_3	2.19E-06	1.75E-03	6.55E-04	7.18E-03	4.114E-01	2.353E+02	0.806
α_4	1.15E-09	8.78E-04	9.57E-05	4.50E-03	2.036E-01	2.317E+02	0.819

CCCG = 5, Gamma = 0.261

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9823503	0.9910656	0.9918468	0.9971122	4.086E+02	3.683E+00	--
α_2	1.12E-03	5.47E-03	4.69E-03	1.25E-02	2.243E+00	4.076E+02	0.879
α_3	1.19E-04	2.37E-03	1.64E-03	7.12E-03	9.912E-01	4.171E+02	0.862
α_4	6.18E-07	9.07E-04	3.06E-04	3.85E-03	3.765E-01	4.148E+02	0.868
α_5	1.59E-21	1.84E-04	1.05E-07	1.06E-03	7.237E-02	3.937E+02	0.915

CCCG = 6, Gamma = 0.261

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9827774	0.9910072	0.9917082	0.9968425	4.561E+02	4.139E+00	--
α_2	8.93E-04	4.65E-03	3.95E-03	1.08E-02	2.128E+00	4.559E+02	0.896
α_3	1.66E-04	2.40E-03	1.75E-03	6.88E-03	1.134E+00	4.706E+02	0.870
α_4	7.67E-06	1.17E-03	5.82E-04	4.35E-03	5.533E-01	4.708E+02	0.871
α_5	1.84E-09	4.72E-04	6.30E-05	2.37E-03	2.210E-01	4.675E+02	0.877
α_6	3.79E-16	2.97E-04	2.07E-06	1.72E-03	1.027E-01	3.455E+02	1.187

CCCG = 7, Gamma = 0.261

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9855337	0.9915901	0.9920147	0.9961966	7.584E+02	6.432E+00	--
α_2	9.75E-04	3.75E-03	3.32E-03	7.99E-03	2.840E+00	7.543E+02	0.916
α_3	3.37E-04	2.27E-03	1.86E-03	5.62E-03	1.746E+00	7.669E+02	0.902
α_4	8.72E-05	1.40E-03	1.00E-03	4.08E-03	1.084E+00	7.729E+02	0.896
α_5	3.93E-06	6.91E-04	3.35E-04	2.59E-03	5.376E-01	7.776E+02	0.891
α_6	2.26E-10	2.57E-04	2.60E-05	1.33E-03	1.979E-01	7.684E+02	0.902
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.876E+02	1.009

CCCG = 8, Gamma = 0.261

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9860308	0.9919743	0.9924008	0.9964613	7.555E+02	6.112E+00	--
α_2	6.72E-04	3.11E-03	2.68E-03	6.99E-03	2.364E+00	7.586E+02	0.911
α_3	2.35E-04	1.98E-03	1.56E-03	5.14E-03	1.512E+00	7.627E+02	0.907
α_4	8.03E-05	1.37E-03	9.71E-04	4.02E-03	1.056E+00	7.695E+02	0.900
α_5	1.32E-05	8.71E-04	4.96E-04	3.00E-03	6.745E-01	7.733E+02	0.896
α_6	5.28E-08	3.93E-04	9.99E-05	1.78E-03	3.076E-01	7.820E+02	0.886
α_7	1.00E-15	1.43E-04	1.41E-06	8.26E-04	1.093E-01	7.627E+02	0.909
α_8	2.50E-18	1.62E-04	4.50E-07	9.45E-04	8.885E-02	5.480E+02	1.265

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01
α_2	5.92E-03	5.38E-03	6.15E-03	5.47E-03	4.65E-03	3.75E-03	3.11E-03
α_3		1.31E-03	1.75E-03	2.37E-03	2.40E-03	2.27E-03	1.98E-03
α_4			8.78E-04	9.07E-04	1.17E-03	1.40E-03	1.37E-03
α_5				1.84E-04	4.72E-04	6.91E-04	8.71E-04
α_6					2.97E-04	2.57E-04	3.93E-04
α_7						3.86E-05	1.43E-04
α_8							1.62E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.93E-01	9.91E-01	9.91E-01	9.91E-01	9.92E-01	9.92E-01
Beta	5.92E-03	6.69E-03	8.77E-03	8.93E-03	8.99E-03	8.41E-03	8.03E-03
Gamma		1.96E-01	2.99E-01	3.87E-01	4.83E-01	5.54E-01	6.13E-01
Delta			3.35E-01	3.15E-01	4.47E-01	5.12E-01	5.98E-01
Epsilon				1.69E-01	3.96E-01	4.13E-01	5.34E-01
Mu					3.86E-01	3.00E-01	4.45E-01
Omega						1.30E-01	4.37E-01
Sigma							5.31E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	6.00	6.00	6.00	6.00	6.00	6.00	6.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.174

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9393507	0.9846976	0.9935625	0.9999659	2.894E+01	4.498E-01	--
α_2	3.41E-05	1.53E-02	6.44E-03	6.06E-02	4.498E-01	2.894E+01	0.616

CCCG = 3, Gamma = 0.174

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9380286	0.9778447	0.9835003	0.9983113	5.201E+01	1.178E+00	--
α_2	7.90E-04	1.78E-02	1.22E-02	5.41E-02	9.387E-01	5.176E+01	0.754
α_3	4.57E-08	4.34E-03	7.02E-04	2.13E-02	2.396E-01	5.492E+01	0.721

CCCG = 4, Gamma = 0.174

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9347801	0.9726197	0.9770298	0.9953647	6.744E+01	1.898E+00	--
α_2	1.68E-03	1.85E-02	1.41E-02	5.04E-02	1.285E+00	6.806E+01	0.810
α_3	5.20E-06	5.63E-03	2.02E-03	2.35E-02	3.927E-01	6.934E+01	0.806
α_4	1.24E-08	3.22E-03	4.31E-04	1.62E-02	2.207E-01	6.838E+01	0.819

CCCG = 5, Gamma = 0.174

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9461642	0.9729314	0.9753308	0.9914959	1.260E+02	3.506E+00	--
α_2	2.77E-03	1.55E-02	1.30E-02	3.65E-02	1.992E+00	1.267E+02	0.879
α_3	5.08E-04	8.21E-03	5.89E-03	2.39E-02	1.078E+00	1.302E+02	0.862
α_4	1.46E-06	2.79E-03	9.02E-04	1.20E-02	3.632E-01	1.300E+02	0.868
α_5	5.42E-21	5.86E-04	3.39E-07	3.39E-03	7.248E-02	1.236E+02	0.915

CCCG = 6, Gamma = 0.174

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9495744	0.9734109	0.9753857	0.9904986	1.537E+02	4.199E+00	--
α_2	2.14E-03	1.24E-02	1.04E-02	2.95E-02	1.941E+00	1.546E+02	0.896
α_3	7.92E-04	8.26E-03	6.33E-03	2.23E-02	1.332E+00	1.599E+02	0.870
α_4	4.12E-05	3.84E-03	2.07E-03	1.36E-02	6.181E-01	1.605E+02	0.871
α_5	9.93E-09	1.45E-03	2.15E-04	7.16E-03	2.313E-01	1.597E+02	0.877
α_6	5.94E-20	6.50E-04	6.13E-07	3.78E-03	7.684E-02	1.181E+02	1.187

CCCG = 7, Gamma = 0.174

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9555721	0.9742361	0.9755350	0.9884640	2.353E+02	6.223E+00	--
α_2	2.72E-03	1.11E-02	9.77E-03	2.40E-02	2.654E+00	2.364E+02	0.916
α_3	9.25E-04	6.78E-03	5.48E-03	1.71E-02	1.645E+00	2.410E+02	0.902
α_4	3.04E-04	4.56E-03	3.30E-03	1.31E-02	1.115E+00	2.432E+02	0.896
α_5	2.38E-05	2.46E-03	1.30E-03	8.81E-03	6.034E-01	2.450E+02	0.891
α_6	1.30E-10	7.34E-04	5.47E-05	3.89E-03	1.780E-01	2.424E+02	0.902
α_7	6.86E-51	1.26E-04	2.59E-14	4.45E-04	2.734E-02	2.170E+02	1.009

CCCG = 8, Gamma = 0.174

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9567563	0.9749068	0.9761689	0.9887466	2.427E+02	6.246E+00	--
α_2	2.33E-03	1.01E-02	8.79E-03	2.22E-02	2.504E+00	2.461E+02	0.911
α_3	6.09E-04	5.68E-03	4.43E-03	1.50E-02	1.419E+00	2.482E+02	0.907
α_4	2.24E-04	4.08E-03	2.87E-03	1.21E-02	1.027E+00	2.507E+02	0.900
α_5	5.98E-05	2.90E-03	1.74E-03	9.70E-03	7.337E-01	2.521E+02	0.896
α_6	1.55E-06	1.56E-03	5.61E-04	6.47E-03	3.975E-01	2.552E+02	0.886
α_7	3.09E-20	3.09E-04	2.97E-07	1.80E-03	7.703E-02	2.491E+02	0.909
α_8	4.54E-18	4.89E-04	1.22E-06	2.85E-03	8.749E-02	1.790E+02	1.265

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.78E-01	9.73E-01	9.73E-01	9.73E-01	9.74E-01	9.75E-01
α_2	1.53E-02	1.78E-02	1.85E-02	1.55E-02	1.24E-02	1.11E-02	1.01E-02
α_3		4.34E-03	5.63E-03	8.21E-03	8.26E-03	6.78E-03	5.68E-03
α_4			3.22E-03	2.79E-03	3.84E-03	4.56E-03	4.08E-03
α_5				5.86E-04	1.45E-03	2.46E-03	2.90E-03
α_6					6.50E-04	7.34E-04	1.56E-03
α_7						1.26E-04	3.09E-04
α_8							4.89E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.78E-01	9.73E-01	9.73E-01	9.73E-01	9.74E-01	9.75E-01
Beta	1.53E-02	2.22E-02	2.74E-02	2.71E-02	2.66E-02	2.58E-02	2.51E-02
Gamma		1.96E-01	3.23E-01	4.28E-01	5.34E-01	5.69E-01	5.99E-01
Delta			3.64E-01	2.91E-01	4.18E-01	5.38E-01	6.22E-01
Epsilon				1.74E-01	3.53E-01	4.21E-01	5.63E-01
Mu					3.10E-01	2.59E-01	4.48E-01
Omega						1.47E-01	3.39E-01
Sigma							6.12E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 2.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.087

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8681435	0.9684566	0.9886493	0.9999756	1.167E+01	3.801E-01	--
α_2	2.44E-05	3.15E-02	1.14E-02	1.32E-01	3.801E-01	1.167E+01	0.616

CCCG = 3, Gamma = 0.087

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8638433	0.9540993	0.9677020	0.9977765	1.995E+01	9.600E-01	--
α_2	4.89E-04	3.23E-02	1.89E-02	1.10E-01	6.673E-01	1.996E+01	0.754
α_3	1.19E-06	1.36E-02	3.26E-03	6.24E-02	2.927E-01	2.130E+01	0.721

CCCG = 4, Gamma = 0.087

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8658376	0.9452267	0.9547148	0.9920863	2.880E+01	1.669E+00	--
α_2	1.98E-03	3.41E-02	2.45E-02	9.90E-02	1.039E+00	2.944E+01	0.810
α_3	1.11E-05	1.27E-02	4.54E-03	5.30E-02	3.887E-01	3.026E+01	0.806
α_4	9.27E-08	8.01E-03	1.33E-03	3.92E-02	2.414E-01	2.991E+01	0.819

CCCG = 5, Gamma = 0.087

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9001199	0.9494076	0.9537079	0.9839830	6.544E+01	3.487E+00	--
α_2	4.10E-03	2.62E-02	2.17E-02	6.36E-02	1.791E+00	6.659E+01	0.879
α_3	1.38E-03	1.73E-02	1.29E-02	4.81E-02	1.207E+00	6.855E+01	0.862
α_4	1.11E-05	6.26E-03	2.51E-03	2.52E-02	4.340E-01	6.885E+01	0.868
α_5	1.86E-26	8.36E-04	2.98E-08	4.61E-03	5.493E-02	6.566E+01	0.915

CCCG = 6, Gamma = 0.087

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9110344	0.9536411	0.9571959	0.9840908	8.032E+01	3.905E+00	--
α_2	1.55E-03	1.60E-02	1.24E-02	4.31E-02	1.335E+00	8.189E+01	0.896
α_3	2.20E-03	1.79E-02	1.43E-02	4.58E-02	1.531E+00	8.419E+01	0.870
α_4	1.62E-04	8.40E-03	5.00E-03	2.82E-02	7.191E-01	8.493E+01	0.871
α_5	4.25E-08	2.90E-03	4.97E-04	1.41E-02	2.467E-01	8.474E+01	0.877
α_6	1.28E-20	1.16E-03	6.99E-07	6.73E-03	7.279E-02	6.273E+01	1.187

CCCG = 7, Gamma = 0.087

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9260946	0.9576675	0.9598907	0.9816436	1.305E+02	5.770E+00	--
α_2	1.44E-03	1.15E-02	9.20E-03	2.95E-02	1.549E+00	1.329E+02	0.916
α_3	2.60E-03	1.46E-02	1.23E-02	3.44E-02	1.989E+00	1.345E+02	0.902
α_4	8.42E-04	9.36E-03	7.11E-03	2.56E-02	1.287E+00	1.362E+02	0.896
α_5	8.35E-05	5.00E-03	2.90E-03	1.71E-02	6.913E-01	1.375E+02	0.891
α_6	1.26E-08	1.70E-03	2.57E-04	8.43E-03	2.327E-01	1.363E+02	0.902
α_7	1.17E-64	1.73E-04	2.62E-17	4.36E-04	2.112E-02	1.221E+02	1.009

CCCG = 8, Gamma = 0.087

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9353447	0.9613496	0.9630341	0.9816006	1.745E+02	7.016E+00	--
α_2	1.13E-03	8.79E-03	7.05E-03	2.24E-02	1.583E+00	1.785E+02	0.911
α_3	1.95E-03	1.10E-02	9.24E-03	2.60E-02	1.986E+00	1.788E+02	0.907
α_4	1.28E-03	9.17E-03	7.45E-03	2.29E-02	1.672E+00	1.806E+02	0.900
α_5	2.93E-04	5.52E-03	3.86E-03	1.64E-02	1.011E+00	1.821E+02	0.896
α_6	2.34E-05	3.08E-03	1.57E-03	1.13E-02	5.709E-01	1.845E+02	0.886
α_7	2.30E-10	1.00E-03	7.85E-05	5.30E-03	1.809E-01	1.803E+02	0.909
α_8	1.39E-107	9.60E-05	2.91E-27	7.20E-05	1.245E-02	1.297E+02	1.265

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.54E-01	9.45E-01	9.49E-01	9.54E-01	9.58E-01	9.61E-01
α_2	3.15E-02	3.23E-02	3.41E-02	2.62E-02	1.60E-02	1.15E-02	8.79E-03
α_3		1.36E-02	1.27E-02	1.73E-02	1.79E-02	1.46E-02	1.10E-02
α_4			8.01E-03	6.26E-03	8.40E-03	9.36E-03	9.17E-03
α_5				8.36E-04	2.90E-03	5.00E-03	5.52E-03
α_6					1.16E-03	1.70E-03	3.08E-03
α_7						1.73E-04	1.00E-03
α_8							9.60E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.54E-01	9.45E-01	9.49E-01	9.54E-01	9.58E-01	9.61E-01
Beta	3.15E-02	4.59E-02	5.48E-02	5.06E-02	4.64E-02	4.23E-02	3.87E-02
Gamma		2.95E-01	3.78E-01	4.82E-01	6.54E-01	7.28E-01	7.73E-01
Delta			3.87E-01	2.91E-01	4.11E-01	5.27E-01	6.32E-01
Epsilon				1.18E-01	3.26E-01	4.24E-01	5.14E-01
Mu					2.85E-01	2.73E-01	4.31E-01
Omega						9.21E-02	2.63E-01
Sigma							8.74E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	2.00	2.00	2.00	2.00	2.00	2.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 7.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.304

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9640787	0.9908133	0.9959976	0.9999737	5.076E+01	4.706E-01	--
α_2	2.63E-05	9.19E-03	4.00E-03	3.59E-02	4.706E-01	5.076E+01	0.616

CCCG = 3, Gamma = 0.304

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9659108	0.9881534	0.9914218	0.9992257	9.196E+01	1.103E+00	--
α_2	2.54E-04	8.81E-03	5.60E-03	2.83E-02	8.104E-01	9.116E+01	0.754
α_3	2.55E-07	3.03E-03	7.12E-04	1.40E-02	2.921E-01	9.596E+01	0.721

CCCG = 4, Gamma = 0.304

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9690704	0.9869842	0.9890780	0.9977371	1.481E+02	1.953E+00	--
α_2	8.16E-04	8.75E-03	6.68E-03	2.37E-02	1.312E+00	1.487E+02	0.810
α_3	4.80E-06	2.86E-03	1.13E-03	1.15E-02	4.307E-01	1.504E+02	0.806
α_4	2.82E-09	1.41E-03	1.67E-04	7.20E-03	2.099E-01	1.482E+02	0.819

CCCG = 5, Gamma = 0.304

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9742908	0.9875676	0.9888434	0.9964841	2.468E+02	3.107E+00	--
α_2	9.58E-04	6.78E-03	5.51E-03	1.69E-02	1.684E+00	2.466E+02	0.879
α_3	1.65E-04	3.72E-03	2.52E-03	1.14E-02	9.426E-01	2.524E+02	0.862
α_4	1.14E-06	1.52E-03	5.21E-04	6.40E-03	3.816E-01	2.512E+02	0.868
α_5	1.65E-16	4.13E-04	2.26E-06	2.40E-03	9.865E-02	2.385E+02	0.915

CCCG = 6, Gamma = 0.304

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9768284	0.9881407	0.9891350	0.9960560	3.185E+02	3.822E+00	--
α_2	7.75E-04	5.35E-03	4.36E-03	1.33E-02	1.714E+00	3.185E+02	0.896
α_3	2.20E-04	3.36E-03	2.42E-03	9.69E-03	1.108E+00	3.287E+02	0.870
α_4	2.61E-05	1.98E-03	1.10E-03	6.90E-03	6.509E-01	3.289E+02	0.871
α_5	1.54E-08	7.76E-04	1.40E-04	3.74E-03	2.536E-01	3.267E+02	0.877
α_6	6.42E-17	3.96E-04	1.80E-06	2.31E-03	9.572E-02	2.415E+02	1.187

CCCG = 7, Gamma = 0.304

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9795981	0.9887106	0.9894108	0.9954316	4.550E+02	5.195E+00	--
α_2	8.77E-04	4.62E-03	3.92E-03	1.08E-02	2.105E+00	4.534E+02	0.916
α_3	2.68E-04	2.85E-03	2.18E-03	7.75E-03	1.320E+00	4.611E+02	0.902
α_4	1.09E-04	2.14E-03	1.48E-03	6.41E-03	9.967E-01	4.646E+02	0.896
α_5	5.67E-06	1.12E-03	5.33E-04	4.23E-03	5.249E-01	4.676E+02	0.891
α_6	3.14E-10	4.23E-04	4.14E-05	2.19E-03	1.956E-01	4.622E+02	0.902
α_7	3.65E-28	1.28E-04	2.90E-09	6.94E-04	5.291E-02	4.136E+02	1.009

CCCG = 8, Gamma = 0.304

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9809220	0.9891492	0.9897500	0.9953247	5.316E+02	5.832E+00	--
α_2	8.43E-04	4.15E-03	3.56E-03	9.51E-03	2.229E+00	5.342E+02	0.911
α_3	2.01E-04	2.34E-03	1.76E-03	6.46E-03	1.260E+00	5.375E+02	0.907
α_4	1.09E-04	1.92E-03	1.35E-03	5.66E-03	1.042E+00	5.422E+02	0.900
α_5	3.28E-05	1.40E-03	8.55E-04	4.61E-03	7.626E-01	5.449E+02	0.896
α_6	1.36E-07	5.93E-04	1.66E-04	2.64E-03	3.271E-01	5.512E+02	0.886
α_7	2.42E-13	2.50E-04	6.70E-06	1.40E-03	1.344E-01	5.376E+02	0.909
α_8	1.79E-20	1.99E-04	1.87E-07	1.15E-03	7.682E-02	3.864E+02	1.265

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.91E-01	9.88E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01
α_2	9.19E-03	8.81E-03	8.75E-03	6.78E-03	5.35E-03	4.62E-03	4.15E-03
α_3		3.03E-03	2.86E-03	3.72E-03	3.36E-03	2.85E-03	2.34E-03
α_4			1.41E-03	1.52E-03	1.98E-03	2.14E-03	1.92E-03
α_5				4.13E-04	7.76E-04	1.12E-03	1.40E-03
α_6					3.96E-04	4.23E-04	5.93E-04
α_7						1.28E-04	2.50E-04
α_8							1.99E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.91E-01	9.88E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01
Beta	9.19E-03	1.18E-02	1.30E-02	1.24E-02	1.19E-02	1.13E-02	1.09E-02
Gamma		2.56E-01	3.28E-01	4.55E-01	5.49E-01	5.91E-01	6.17E-01
Delta			3.31E-01	3.42E-01	4.84E-01	5.72E-01	6.51E-01
Epsilon				2.14E-01	3.72E-01	4.39E-01	5.60E-01
Mu					3.38E-01	3.29E-01	4.27E-01
Omega						2.32E-01	4.31E-01
Sigma							4.43E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.00	7.00	7.00	7.00	7.00	7.00	7.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.174

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9896307	0.9973108	0.9987873	0.9999901	1.829E+02	4.932E-01	--
α_2	9.87E-06	2.69E-03	1.21E-03	1.04E-02	4.932E-01	1.829E+02	0.616

CCCG = 3, Gamma = 0.174

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9908402	0.9968746	0.9977807	0.9998151	3.379E+02	1.059E+00	--
α_2	3.99E-05	2.14E-03	1.26E-03	7.21E-03	7.137E-01	3.334E+02	0.754
α_3	3.55E-07	9.89E-04	2.99E-04	4.32E-03	3.458E-01	3.493E+02	0.721

CCCG = 4, Gamma = 0.174

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9918353	0.9964917	0.9970233	0.9993311	6.006E+02	2.115E+00	--
α_2	3.18E-04	2.57E-03	2.04E-03	6.61E-03	1.549E+00	6.017E+02	0.810
α_3	1.36E-08	4.36E-04	8.53E-05	2.08E-03	2.646E-01	6.064E+02	0.806
α_4	5.57E-08	5.04E-04	1.24E-04	2.30E-03	3.010E-01	5.965E+02	0.819

CCCG = 5, Gamma = 0.174

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940427	0.9966920	0.9968953	0.9986469	1.604E+03	5.325E+00	--
α_2	7.23E-04	2.27E-03	2.07E-03	4.51E-03	3.632E+00	1.597E+03	0.879
α_3	8.14E-05	8.29E-04	6.37E-04	2.23E-03	1.354E+00	1.632E+03	0.862
α_4	1.73E-08	1.83E-04	4.36E-05	8.39E-04	2.961E-01	1.622E+03	0.868
α_5	8.21E-35	2.76E-05	3.04E-11	1.37E-04	4.243E-02	1.538E+03	0.915

CCCG = 6, Gamma = 0.174

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9936288	0.9965271	0.9967571	0.9986401	1.416E+03	4.936E+00	--
α_2	5.46E-04	2.05E-03	1.82E-03	4.34E-03	2.915E+00	1.417E+03	0.896
α_3	7.33E-05	8.60E-04	6.46E-04	2.38E-03	1.257E+00	1.461E+03	0.870
α_4	1.40E-06	3.44E-04	1.58E-04	1.32E-03	5.031E-01	1.460E+03	0.871
α_5	2.31E-15	7.97E-05	1.05E-06	4.57E-04	1.155E-01	1.449E+03	0.877
α_6	6.34E-13	1.35E-04	4.96E-06	7.50E-04	1.451E-01	1.071E+03	1.187

CCCG = 7, Gamma = 0.174

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9949370	0.9967960	0.9969053	0.9982822	3.004E+03	9.654E+00	--
α_2	6.29E-04	1.62E-03	1.51E-03	2.99E-03	4.851E+00	2.982E+03	0.916
α_3	2.37E-04	9.24E-04	8.16E-04	1.98E-03	2.800E+00	3.029E+03	0.902
α_4	4.63E-05	4.53E-04	3.50E-04	1.21E-03	1.384E+00	3.052E+03	0.896
α_5	5.65E-07	1.60E-04	7.14E-05	6.18E-04	4.902E-01	3.069E+03	0.891
α_6	8.99E-16	3.78E-05	4.79E-07	2.17E-04	1.146E-01	3.032E+03	0.902
α_7	2.84E-93	5.40E-06	5.74E-25	6.41E-06	1.464E-02	2.713E+03	1.009

CCCG = 8, Gamma = 0.174

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9946588	0.9968254	0.9969713	0.9984942	2.245E+03	7.148E+00	--
α_2	3.55E-04	1.31E-03	1.17E-03	2.75E-03	2.980E+00	2.272E+03	0.911
α_3	1.49E-04	8.58E-04	7.17E-04	2.05E-03	1.960E+00	2.282E+03	0.907
α_4	3.70E-05	5.06E-04	3.71E-04	1.44E-03	1.166E+00	2.302E+03	0.900
α_5	1.32E-06	2.32E-04	1.12E-04	8.70E-04	5.375E-01	2.313E+03	0.896
α_6	1.71E-11	7.72E-05	5.99E-06	4.08E-04	1.805E-01	2.338E+03	0.886
α_7	9.39E-36	1.82E-05	1.36E-11	8.88E-05	4.139E-02	2.280E+03	0.909
α_8	1.05E-08	1.73E-04	3.80E-05	8.04E-04	2.827E-01	1.638E+03	1.265

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	2.69E-03	2.14E-03	2.57E-03	2.27E-03	2.05E-03	1.62E-03	1.31E-03
α_3		9.89E-04	4.36E-04	8.29E-04	8.60E-04	9.24E-04	8.58E-04
α_4			5.04E-04	1.83E-04	3.44E-04	4.53E-04	5.06E-04
α_5				2.76E-05	7.97E-05	1.60E-04	2.32E-04
α_6					1.35E-04	3.78E-05	7.72E-05
α_7						5.40E-06	1.82E-05
α_8							1.73E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	2.69E-03	3.13E-03	3.51E-03	3.31E-03	3.47E-03	3.20E-03	3.17E-03
Gamma		3.16E-01	2.68E-01	3.14E-01	4.09E-01	4.93E-01	5.87E-01
Delta			5.36E-01	2.02E-01	3.94E-01	4.15E-01	5.40E-01
Epsilon				1.31E-01	3.85E-01	3.09E-01	4.97E-01
Mu					6.30E-01	2.13E-01	5.36E-01
Omega						1.25E-01	7.12E-01
Sigma							9.05E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.00	4.00	4.00	4.00	4.00	4.00	4.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.13.2.4 ACP-CRB-4160-FTOC: AC Power 4160 V and 6.9 kV Circuit Breakers Fail to Open/Close

Generic CCF Parameters

System Group: Electrical
System: Plant AC Power
Component Group: Electrical
Component Type: Circuit Breaker
Component Subtype: 4160 - 6900 V
Failure Mode: Fail to Close, Fail to Open, Fail to Open or Close
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 70.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9802074	0.9949556	0.9978268	0.9999845	1.0000000	9.241E+01	4.685E-01
α_2	1.40E-05	5.04E-03	2.18E-03	1.98E-02	0.00E+00	4.685E-01	9.241E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9750172	0.9912628	0.9936331	0.9993980	1.0000000	1.280E+02	1.128E+00
α_2	2.20E-04	6.59E-03	4.28E-03	2.08E-02	0.00E+00	8.512E-01	1.283E+02
α_3	1.07E-07	2.14E-03	4.57E-04	1.01E-02	0.00E+00	2.768E-01	1.288E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9720346	0.9883519	0.9902889	0.9980531	1.0000000	1.607E+02	1.894E+00
α_2	6.68E-04	7.75E-03	5.85E-03	2.13E-02	0.00E+00	1.260E+00	1.613E+02
α_3	2.68E-06	2.48E-03	9.08E-04	1.03E-02	0.00E+00	4.024E-01	1.622E+02
α_4	9.86E-09	1.42E-03	2.12E-04	7.05E-03	0.00E+00	2.315E-01	1.623E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9738815	0.9870127	0.9882224	0.9960120	1.0000000	2.608E+02	3.432E+00
α_2	1.24E-03	7.28E-03	6.08E-03	1.74E-02	0.00E+00	1.924E+00	2.623E+02
α_3	2.30E-04	3.97E-03	2.81E-03	1.17E-02	0.00E+00	1.049E+00	2.632E+02
α_4	1.10E-06	1.45E-03	4.98E-04	6.10E-03	0.00E+00	3.822E-01	2.639E+02
α_5	2.52E-20	2.90E-04	2.70E-07	1.69E-03	0.00E+00	7.674E-02	2.642E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9749725	0.9871765	0.9882483	0.9957264	1.0000000	2.952E+02	3.835E+00
α_2	8.15E-04	5.69E-03	4.63E-03	1.42E-02	0.00E+00	1.701E+00	2.974E+02

α_3	3.18E-04	4.04E-03	3.00E-03	1.13E-02	0.00E+00	1.207E+00	2.978E+02
α_4	1.83E-05	1.99E-03	1.05E-03	7.18E-03	0.00E+00	5.960E-01	2.985E+02
α_5	2.89E-09	7.39E-04	9.88E-05	3.71E-03	0.00E+00	2.211E-01	2.988E+02
α_6	2.89E-15	3.67E-04	3.71E-06	2.12E-03	0.00E+00	1.098E-01	2.989E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9773604	0.9871581	0.9878795	0.9945025	1.0000000	4.418E+02	5.747E+00
α_2	1.02E-03	5.01E-03	4.30E-03	1.14E-02	0.00E+00	2.243E+00	4.453E+02
α_3	4.88E-04	3.64E-03	2.93E-03	9.21E-03	0.00E+00	1.630E+00	4.459E+02
α_4	1.51E-04	2.42E-03	1.73E-03	7.04E-03	0.00E+00	1.083E+00	4.465E+02
α_5	9.13E-06	1.26E-03	6.37E-04	4.64E-03	0.00E+00	5.654E-01	4.470E+02
α_6	2.35E-10	4.28E-04	3.95E-05	2.23E-03	0.00E+00	1.916E-01	4.474E+02
α_7	5.33E-41	7.78E-05	2.89E-12	3.41E-04	0.00E+00	3.480E-02	4.475E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9783039	0.9877067	0.9884002	0.9947545	1.0000000	4.600E+02	5.726E+00
α_2	7.81E-04	4.33E-03	3.65E-03	1.02E-02	0.00E+00	2.018E+00	4.637E+02
α_3	3.08E-04	2.99E-03	2.31E-03	7.97E-03	0.00E+00	1.391E+00	4.644E+02
α_4	1.36E-04	2.28E-03	1.62E-03	6.68E-03	0.00E+00	1.062E+00	4.647E+02
α_5	2.66E-05	1.51E-03	8.81E-04	5.12E-03	0.00E+00	7.026E-01	4.650E+02
α_6	2.95E-07	7.51E-04	2.30E-04	3.27E-03	0.00E+00	3.497E-01	4.654E+02
α_7	1.13E-15	2.32E-04	2.12E-06	1.34E-03	0.00E+00	1.078E-01	4.656E+02
α_8	2.37E-17	2.03E-04	8.61E-07	1.18E-03	0.00E+00	9.469E-02	4.657E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.91E-01	9.88E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01
α_2	5.04E-03	6.59E-03	7.75E-03	7.28E-03	5.69E-03	5.01E-03	4.33E-03
α_3		2.14E-03	2.48E-03	3.97E-03	4.04E-03	3.64E-03	2.99E-03
α_4			1.42E-03	1.45E-03	1.99E-03	2.42E-03	2.28E-03
α_5				2.90E-04	7.39E-04	1.26E-03	1.51E-03
α_6					3.67E-04	4.28E-04	7.51E-04
α_7						7.78E-05	2.32E-04
α_8							2.03E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.91E-01	9.88E-01	9.87E-01	9.87E-01	9.87E-01	9.88E-01
Beta	5.04E-03	8.74E-03	1.16E-02	1.30E-02	1.28E-02	1.28E-02	1.23E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	70.00	70.00	70.00	70.00	70.00	70.00	70.00
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 33.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.471

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9858814	0.9963631	0.9983875	0.9999880	1.324E+02	4.834E-01	--
α_2	1.20E-05	3.64E-03	1.61E-03	1.41E-02	4.834E-01	1.324E+02	0.582

CCCG = 3, Gamma = 0.471

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9823692	0.9936613	0.9952619	0.9994835	1.921E+02	1.226E+00	--
α_2	2.45E-04	5.05E-03	3.48E-03	1.52E-02	9.769E-01	1.926E+02	0.847
α_3	2.06E-08	1.29E-03	2.24E-04	6.27E-03	2.487E-01	1.921E+02	0.852

CCCG = 4, Gamma = 0.471

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9781752	0.9906791	0.9921147	0.9982746	2.186E+02	2.057E+00	--
α_2	7.03E-04	6.37E-03	4.99E-03	1.68E-02	1.442E+00	2.249E+02	0.959
α_3	2.42E-06	1.93E-03	7.25E-04	7.94E-03	4.114E-01	2.126E+02	1.018
α_4	1.34E-09	1.02E-03	1.11E-04	5.23E-03	2.036E-01	1.997E+02	1.085

CCCG = 5, Gamma = 0.471

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9781639	0.9889380	0.9899013	0.9964208	3.293E+02	3.683E+00	--
α_2	1.34E-03	6.54E-03	5.61E-03	1.49E-02	2.243E+00	3.409E+02	1.129
α_3	1.58E-04	3.14E-03	2.18E-03	9.43E-03	9.912E-01	3.144E+02	1.228
α_4	7.97E-07	1.17E-03	3.95E-04	4.96E-03	3.765E-01	3.217E+02	1.202
α_5	1.85E-21	2.14E-04	1.22E-07	1.23E-03	7.237E-02	3.386E+02	1.144

CCCG = 6, Gamma = 0.471

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9786171	0.9888266	0.9896939	0.9960730	3.663E+02	4.139E+00	--
α_2	1.03E-03	5.34E-03	4.54E-03	1.24E-02	2.128E+00	3.965E+02	1.097
α_3	2.29E-04	3.32E-03	2.42E-03	9.51E-03	1.134E+00	3.402E+02	1.282
α_4	1.03E-05	1.57E-03	7.78E-04	5.81E-03	5.533E-01	3.523E+02	1.240
α_5	2.38E-09	6.12E-04	8.17E-05	3.07E-03	2.210E-01	3.610E+02	1.211
α_6	4.23E-16	3.32E-04	2.31E-06	1.93E-03	1.027E-01	3.089E+02	1.415

CCCG = 7, Gamma = 0.471

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9806466	0.9887398	0.9893052	0.9949024	5.648E+02	6.432E+00	--
α_2	1.20E-03	4.63E-03	4.10E-03	9.85E-03	2.840E+00	6.105E+02	1.175
α_3	4.76E-04	3.21E-03	2.62E-03	7.93E-03	1.746E+00	5.427E+02	1.324
α_4	1.24E-04	2.00E-03	1.43E-03	5.81E-03	1.084E+00	5.416E+02	1.328
α_5	5.79E-06	1.02E-03	4.93E-04	3.81E-03	5.376E-01	5.276E+02	1.364
α_6	3.16E-10	3.60E-04	3.63E-05	1.86E-03	1.979E-01	5.494E+02	1.311
α_7	1.06E-52	4.73E-05	4.74E-15	1.62E-04	2.656E-02	5.611E+02	1.284

CCCG = 8, Gamma = 0.471

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9813337	0.9892671	0.9898346	0.9952630	5.634E+02	6.112E+00	--
α_2	8.37E-04	3.87E-03	3.34E-03	8.70E-03	2.364E+00	6.088E+02	1.178
α_3	3.22E-04	2.71E-03	2.14E-03	7.02E-03	1.512E+00	5.570E+02	1.289
α_4	1.14E-04	1.94E-03	1.38E-03	5.71E-03	1.056E+00	5.422E+02	1.326
α_5	1.87E-05	1.24E-03	7.04E-04	4.26E-03	6.745E-01	5.451E+02	1.320
α_6	8.20E-08	6.10E-04	1.55E-04	2.77E-03	3.076E-01	5.037E+02	1.429
α_7	1.36E-15	1.95E-04	1.92E-06	1.12E-03	1.093E-01	5.616E+02	1.282
α_8	2.67E-18	1.73E-04	4.81E-07	1.01E-03	8.885E-02	5.127E+02	1.404

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.94E-01	9.91E-01	9.89E-01	9.89E-01	9.89E-01	9.89E-01
α_2	3.64E-03	5.05E-03	6.37E-03	6.54E-03	5.34E-03	4.63E-03	3.87E-03
α_3		1.29E-03	1.93E-03	3.14E-03	3.32E-03	3.21E-03	2.71E-03
α_4			1.02E-03	1.17E-03	1.57E-03	2.00E-03	1.94E-03
α_5				2.14E-04	6.12E-04	1.02E-03	1.24E-03
α_6					3.32E-04	3.60E-04	6.10E-04
α_7						4.73E-05	1.95E-04
α_8							1.73E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.94E-01	9.91E-01	9.89E-01	9.89E-01	9.89E-01	9.89E-01
Beta	3.64E-03	6.34E-03	9.32E-03	1.11E-02	1.12E-02	1.13E-02	1.07E-02
Gamma		2.04E-01	3.16E-01	4.09E-01	5.22E-01	5.89E-01	6.40E-01
Delta			3.45E-01	3.06E-01	4.31E-01	5.16E-01	6.06E-01
Epsilon				1.55E-01	3.76E-01	4.16E-01	5.32E-01
Mu					3.52E-01	2.86E-01	4.42E-01
Omega						1.16E-01	3.76E-01
Sigma							4.71E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	33.00	33.00	33.00	33.00	33.00	33.00	33.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.043

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9393849	0.9847063	0.9935662	0.9999659	2.896E+01	4.498E-01	--
α_2	3.41E-05	1.53E-02	6.43E-03	6.06E-02	4.498E-01	2.896E+01	0.582

CCCG = 3, Gamma = 0.043

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9280215	0.9742189	0.9807609	0.9980284	4.453E+01	1.178E+00	--
α_2	9.13E-04	2.05E-02	1.41E-02	6.22E-02	9.387E-01	4.482E+01	0.847
α_3	5.55E-08	5.27E-03	8.53E-04	2.58E-02	2.396E-01	4.524E+01	0.852

CCCG = 4, Gamma = 0.043

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9194773	0.9660934	0.9714894	0.9942336	5.409E+01	1.898E+00	--
α_2	2.02E-03	2.23E-02	1.71E-02	6.06E-02	1.285E+00	5.629E+01	0.959
α_3	6.71E-06	7.25E-03	2.60E-03	3.02E-02	3.927E-01	5.380E+01	1.018
α_4	1.68E-08	4.34E-03	5.83E-04	2.18E-02	2.207E-01	5.063E+01	1.085

CCCG = 5, Gamma = 0.043

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276662	0.9635025	0.9666780	0.9884797	9.255E+01	3.506E+00	--
α_2	3.59E-03	2.01E-02	1.69E-02	4.72E-02	1.992E+00	9.734E+01	1.129
α_3	7.33E-04	1.18E-02	8.48E-03	3.42E-02	1.078E+00	9.021E+01	1.228
α_4	2.05E-06	3.90E-03	1.26E-03	1.67E-02	3.632E-01	9.287E+01	1.202
α_5	6.84E-21	7.39E-04	4.29E-07	4.28E-03	7.248E-02	9.795E+01	1.144

CCCG = 6, Gamma = 0.043

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9322491	0.9641604	0.9667734	0.9871394	1.130E+02	4.199E+00	--
α_2	2.64E-03	1.53E-02	1.28E-02	3.64E-02	1.941E+00	1.250E+02	1.097
α_3	1.18E-03	1.23E-02	9.42E-03	3.30E-02	1.332E+00	1.074E+02	1.282
α_4	5.92E-05	5.50E-03	2.97E-03	1.95E-02	6.181E-01	1.117E+02	1.240
α_5	1.38E-08	2.01E-03	2.99E-04	9.96E-03	2.313E-01	1.148E+02	1.211
α_6	7.14E-20	7.81E-04	7.37E-07	4.54E-03	7.684E-02	9.834E+01	1.415

CCCG = 7, Gamma = 0.043

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9379379	0.9639001	0.9656820	0.9837748	1.662E+02	6.223E+00	--
α_2	3.51E-03	1.43E-02	1.26E-02	3.09E-02	2.654E+00	1.829E+02	1.175
α_3	1.37E-03	9.99E-03	8.09E-03	2.51E-02	1.645E+00	1.630E+02	1.324
α_4	4.53E-04	6.79E-03	4.92E-03	1.95E-02	1.115E+00	1.630E+02	1.328
α_5	3.66E-05	3.78E-03	2.00E-03	1.35E-02	6.034E-01	1.591E+02	1.364
α_6	1.90E-10	1.07E-03	7.99E-05	5.68E-03	1.780E-01	1.661E+02	1.311
α_7	8.78E-51	1.61E-04	3.31E-14	5.69E-04	2.734E-02	1.697E+02	1.284

CCCG = 8, Gamma = 0.043

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9397897	0.9649590	0.9666861	0.9842283	1.720E+02	6.246E+00	--
α_2	3.03E-03	1.31E-02	1.14E-02	2.88E-02	2.504E+00	1.888E+02	1.178
α_3	8.72E-04	8.12E-03	6.33E-03	2.15E-02	1.419E+00	1.734E+02	1.289
α_4	3.33E-04	6.04E-03	4.25E-03	1.79E-02	1.027E+00	1.690E+02	1.326
α_5	8.87E-05	4.29E-03	2.58E-03	1.43E-02	7.337E-01	1.701E+02	1.320
α_6	2.51E-06	2.52E-03	9.11E-04	1.05E-02	3.975E-01	1.574E+02	1.429
α_7	4.39E-20	4.38E-04	4.21E-07	2.55E-03	7.703E-02	1.757E+02	1.282
α_8	5.07E-18	5.45E-04	1.36E-06	3.18E-03	8.749E-02	1.604E+02	1.404

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.85E-01	9.74E-01	9.66E-01	9.64E-01	9.64E-01	9.64E-01	9.65E-01
α_2	1.53E-02	2.05E-02	2.23E-02	2.01E-02	1.53E-02	1.43E-02	1.31E-02
α_3		5.27E-03	7.25E-03	1.18E-02	1.23E-02	9.99E-03	8.12E-03
α_4			4.34E-03	3.90E-03	5.50E-03	6.79E-03	6.04E-03
α_5				7.39E-04	2.01E-03	3.78E-03	4.29E-03
α_6					7.81E-04	1.07E-03	2.52E-03
α_7						1.61E-04	4.38E-04
α_8							5.45E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.85E-01	9.74E-01	9.66E-01	9.64E-01	9.64E-01	9.64E-01	9.65E-01
Beta	1.53E-02	2.58E-02	3.39E-02	3.65E-02	3.58E-02	3.61E-02	3.50E-02
Gamma		2.04E-01	3.42E-01	4.51E-01	5.73E-01	6.04E-01	6.26E-01
Delta			3.75E-01	2.82E-01	4.04E-01	5.42E-01	6.30E-01
Epsilon				1.60E-01	3.37E-01	4.24E-01	5.64E-01
Mu					2.80E-01	2.46E-01	4.49E-01
Omega						1.31E-01	2.81E-01
Sigma							5.54E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 1.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.014

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8562964	0.9655789	0.9875524	0.9999733	1.066E+01	3.801E-01	--
α_2	2.67E-05	3.44E-02	1.24E-02	1.44E-01	3.801E-01	1.066E+01	0.582

CCCG = 3, Gamma = 0.014

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8350230	0.9440651	0.9603643	0.9972617	1.620E+01	9.600E-01	--
α_2	5.92E-04	3.88E-02	2.28E-02	1.32E-01	6.673E-01	1.653E+01	0.847
α_3	1.52E-06	1.71E-02	4.16E-03	7.88E-02	2.927E-01	1.680E+01	0.852

CCCG = 4, Gamma = 0.014

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8303570	0.9302154	0.9419537	0.9898004	2.225E+01	1.669E+00	--
α_2	2.47E-03	4.20E-02	3.04E-02	1.22E-01	1.039E+00	2.368E+01	0.959
α_3	1.47E-05	1.67E-02	6.02E-03	6.97E-02	3.887E-01	2.288E+01	1.018
α_4	1.29E-07	1.11E-02	1.85E-03	5.41E-02	2.414E-01	2.160E+01	1.085

CCCG = 5, Gamma = 0.014

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8644443	0.9308455	0.9364974	0.9778986	4.694E+01	3.487E+00	--
α_2	5.38E-03	3.42E-02	2.84E-02	8.27E-02	1.791E+00	5.059E+01	1.129
α_3	2.01E-03	2.51E-02	1.88E-02	6.94E-02	1.207E+00	4.693E+01	1.228
α_4	1.57E-05	8.83E-03	3.55E-03	3.55E-02	4.340E-01	4.873E+01	1.202
α_5	2.37E-26	1.06E-03	3.80E-08	5.87E-03	5.493E-02	5.164E+01	1.144

CCCG = 6, Gamma = 0.014

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8776717	0.9358401	0.9405789	0.9777942	5.695E+01	3.905E+00	--
α_2	1.94E-03	1.99E-02	1.54E-02	5.34E-02	1.335E+00	6.571E+01	1.097
α_3	3.30E-03	2.67E-02	2.14E-02	6.81E-02	1.531E+00	5.588E+01	1.282
α_4	2.35E-04	1.21E-02	7.24E-03	4.06E-02	7.191E-01	5.863E+01	1.240
α_5	5.96E-08	4.06E-03	6.97E-04	1.97E-02	2.467E-01	6.052E+01	1.211
α_6	1.55E-20	1.40E-03	8.46E-07	8.14E-03	7.279E-02	5.191E+01	1.415

CCCG = 7, Gamma = 0.014

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.8943437	0.9391322	0.9422050	0.9734171	8.903E+01	5.770E+00	--
α_2	1.86E-03	1.49E-02	1.19E-02	3.81E-02	1.549E+00	1.024E+02	1.175
α_3	3.86E-03	2.15E-02	1.82E-02	5.07E-02	1.989E+00	9.032E+01	1.324
α_4	1.26E-03	1.40E-02	1.07E-02	3.81E-02	1.287E+00	9.073E+01	1.328
α_5	1.29E-04	7.72E-03	4.49E-03	2.63E-02	6.913E-01	8.886E+01	1.364
α_6	1.85E-08	2.50E-03	3.77E-04	1.23E-02	2.327E-01	9.296E+01	1.311
α_7	1.51E-64	2.22E-04	3.37E-17	5.60E-04	2.112E-02	9.512E+01	1.284

CCCG = 8, Gamma = 0.014

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9076528	0.9445314	0.9468640	0.9734404	1.195E+02	7.016E+00	--
α_2	1.48E-03	1.14E-02	9.19E-03	2.91E-02	1.583E+00	1.368E+02	1.178
α_3	2.80E-03	1.57E-02	1.32E-02	3.71E-02	1.986E+00	1.244E+02	1.289
α_4	1.91E-03	1.36E-02	1.11E-02	3.40E-02	1.672E+00	1.213E+02	1.326
α_5	4.35E-04	8.18E-03	5.73E-03	2.43E-02	1.011E+00	1.225E+02	1.320
α_6	3.80E-05	5.00E-03	2.55E-03	1.83E-02	5.709E-01	1.135E+02	1.429
α_7	3.27E-10	1.42E-03	1.12E-04	7.53E-03	1.809E-01	1.269E+02	1.282
α_8	1.55E-107	1.07E-04	3.25E-27	8.05E-05	1.245E-02	1.161E+02	1.404

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.66E-01	9.44E-01	9.30E-01	9.31E-01	9.36E-01	9.39E-01	9.45E-01
α_2	3.44E-02	3.88E-02	4.20E-02	3.42E-02	1.99E-02	1.49E-02	1.14E-02
α_3		1.71E-02	1.67E-02	2.51E-02	2.67E-02	2.15E-02	1.57E-02
α_4			1.11E-02	8.83E-03	1.21E-02	1.40E-02	1.36E-02
α_5				1.06E-03	4.06E-03	7.72E-03	8.18E-03
α_6					1.40E-03	2.50E-03	5.00E-03
α_7						2.22E-04	1.42E-03
α_8							1.07E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.66E-01	9.44E-01	9.30E-01	9.31E-01	9.36E-01	9.39E-01	9.45E-01
Beta	3.44E-02	5.59E-02	6.98E-02	6.92E-02	6.42E-02	6.09E-02	5.55E-02
Gamma		3.06E-01	3.98E-01	5.06E-01	6.90E-01	7.55E-01	7.94E-01
Delta			3.98E-01	2.83E-01	3.97E-01	5.31E-01	6.43E-01
Epsilon				1.07E-01	3.11E-01	4.27E-01	5.20E-01
Mu					2.56E-01	2.60E-01	4.44E-01
Omega						8.16E-02	2.34E-01
Sigma							7.01E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.00	1.00	1.00	1.00	1.00	1.00	1.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 19.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.279

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9756735	0.9937864	0.9973039	0.9999823	7.527E+01	4.706E-01	--
α_2	1.77E-05	6.21E-03	2.70E-03	2.43E-02	4.706E-01	7.527E+01	0.582

CCCG = 3, Gamma = 0.279

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9671243	0.9885776	0.9917311	0.9992537	9.542E+01	1.103E+00	--
α_2	2.41E-04	8.38E-03	5.32E-03	2.70E-02	8.104E-01	9.587E+01	0.847
α_3	2.56E-07	3.04E-03	7.14E-04	1.40E-02	2.921E-01	9.579E+01	0.852

CCCG = 4, Gamma = 0.279

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9659122	0.9856466	0.9879501	0.9975023	1.341E+02	1.953E+00	--
α_2	8.75E-04	9.38E-03	7.17E-03	2.55E-02	1.312E+00	1.385E+02	0.959
α_3	5.50E-06	3.27E-03	1.29E-03	1.32E-02	4.307E-01	1.312E+02	1.018
α_4	3.39E-09	1.70E-03	2.01E-04	8.65E-03	2.099E-01	1.233E+02	1.085

CCCG = 5, Gamma = 0.279

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9675203	0.9842737	0.9858775	0.9955448	1.945E+02	3.107E+00	--
α_2	1.16E-03	8.23E-03	6.70E-03	2.06E-02	1.684E+00	2.028E+02	1.129
α_3	2.22E-04	5.02E-03	3.40E-03	1.53E-02	9.426E-01	1.870E+02	1.228
α_4	1.49E-06	1.99E-03	6.84E-04	8.39E-03	3.816E-01	1.916E+02	1.202
α_5	1.95E-16	4.89E-04	2.68E-06	2.84E-03	9.865E-02	2.017E+02	1.144

CCCG = 6, Gamma = 0.279

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9703401	0.9848020	0.9860681	0.9949377	2.477E+02	3.822E+00	--
α_2	9.10E-04	6.28E-03	5.12E-03	1.56E-02	1.714E+00	2.711E+02	1.097
α_3	3.11E-04	4.74E-03	3.43E-03	1.37E-02	1.108E+00	2.325E+02	1.282
α_4	3.56E-05	2.70E-03	1.50E-03	9.41E-03	6.509E-01	2.409E+02	1.240
α_5	2.03E-08	1.03E-03	1.85E-04	4.94E-03	2.536E-01	2.470E+02	1.211
α_6	7.34E-17	4.52E-04	2.06E-06	2.64E-03	9.572E-02	2.114E+02	1.415

CCCG = 7, Gamma = 0.279

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9723461	0.9846783	0.9856212	0.9937899	3.339E+02	5.195E+00	--
α_2	1.09E-03	5.75E-03	4.88E-03	1.34E-02	2.105E+00	3.637E+02	1.175
α_3	3.82E-04	4.07E-03	3.10E-03	1.10E-02	1.320E+00	3.233E+02	1.324
α_4	1.57E-04	3.08E-03	2.14E-03	9.22E-03	9.967E-01	3.226E+02	1.328
α_5	8.43E-06	1.67E-03	7.92E-04	6.29E-03	5.249E-01	3.144E+02	1.364
α_6	4.44E-10	5.97E-04	5.84E-05	3.09E-03	1.956E-01	3.276E+02	1.311
α_7	4.51E-28	1.58E-04	3.58E-09	8.58E-04	5.291E-02	3.346E+02	1.284

CCCG = 8, Gamma = 0.279

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9741191	0.9852628	0.9860726	0.9936409	3.899E+02	5.832E+00	--
α_2	1.06E-03	5.24E-03	4.49E-03	1.20E-02	2.229E+00	4.231E+02	1.178
α_3	2.78E-04	3.24E-03	2.44E-03	8.94E-03	1.260E+00	3.875E+02	1.289
α_4	1.57E-04	2.76E-03	1.94E-03	8.13E-03	1.042E+00	3.770E+02	1.326
α_5	4.71E-05	2.01E-03	1.23E-03	6.62E-03	7.626E-01	3.791E+02	1.320
α_6	2.13E-07	9.33E-04	2.60E-04	4.15E-03	3.271E-01	3.504E+02	1.429
α_7	3.33E-13	3.44E-04	9.22E-06	1.93E-03	1.344E-01	3.908E+02	1.282
α_8	1.94E-20	2.15E-04	2.02E-07	1.25E-03	7.682E-02	3.568E+02	1.404

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.94E-01	9.89E-01	9.86E-01	9.84E-01	9.85E-01	9.85E-01	9.85E-01
α_2	6.21E-03	8.38E-03	9.38E-03	8.23E-03	6.28E-03	5.75E-03	5.24E-03
α_3		3.04E-03	3.27E-03	5.02E-03	4.74E-03	4.07E-03	3.24E-03
α_4			1.70E-03	1.99E-03	2.70E-03	3.08E-03	2.76E-03
α_5				4.89E-04	1.03E-03	1.67E-03	2.01E-03
α_6					4.52E-04	5.97E-04	9.33E-04
α_7						1.58E-04	3.44E-04
α_8							2.15E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.94E-01	9.89E-01	9.86E-01	9.84E-01	9.85E-01	9.85E-01	9.85E-01
Beta	6.21E-03	1.14E-02	1.44E-02	1.57E-02	1.52E-02	1.53E-02	1.47E-02
Gamma		2.66E-01	3.46E-01	4.76E-01	5.87E-01	6.24E-01	6.44E-01
Delta			3.42E-01	3.31E-01	4.68E-01	5.75E-01	6.59E-01
Epsilon				1.97E-01	3.54E-01	4.40E-01	5.59E-01
Mu					3.06E-01	3.12E-01	4.26E-01
Omega						2.09E-01	3.75E-01
Sigma							3.85E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	19.50	19.50	19.50	19.50	19.50	19.50	19.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 13.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.193

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9909669	0.9976577	0.9989442	0.9999914	2.101E+02	4.932E-01	--
α_2	8.59E-06	2.34E-03	1.06E-03	9.03E-03	4.932E-01	2.101E+02	0.582

CCCG = 3, Gamma = 0.193

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9899251	0.9965618	0.9975582	0.9997965	3.071E+02	1.060E+00	--
α_2	4.32E-05	2.31E-03	1.36E-03	7.80E-03	7.137E-01	3.081E+02	0.847
α_3	4.05E-07	1.13E-03	3.41E-04	4.92E-03	3.458E-01	3.065E+02	0.852

CCCG = 4, Gamma = 0.193

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9902841	0.9958239	0.9964559	0.9992034	5.042E+02	2.115E+00	--
α_2	3.69E-04	2.98E-03	2.37E-03	7.67E-03	1.549E+00	5.183E+02	0.959
α_3	1.69E-08	5.41E-04	1.06E-04	2.57E-03	2.646E-01	4.890E+02	1.018
α_4	7.24E-08	6.56E-04	1.61E-04	3.00E-03	3.010E-01	4.589E+02	1.085

CCCG = 5, Gamma = 0.193

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9921647	0.9956478	0.9959148	0.9982191	1.218E+03	5.325E+00	--
α_2	9.23E-04	2.89E-03	2.63E-03	5.75E-03	3.632E+00	1.252E+03	1.129
α_3	1.15E-04	1.17E-03	9.01E-04	3.16E-03	1.354E+00	1.152E+03	1.228
α_4	2.38E-08	2.51E-04	6.00E-05	1.15E-03	2.961E-01	1.178E+03	1.202
α_5	1.02E-34	3.42E-05	3.77E-11	1.70E-04	4.243E-02	1.239E+03	1.144

CCCG = 6, Gamma = 0.193

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9917291	0.9954902	0.9957883	0.9982333	1.089E+03	4.936E+00	--
α_2	6.64E-04	2.50E-03	2.22E-03	5.28E-03	2.915E+00	1.165E+03	1.097
α_3	1.07E-04	1.26E-03	9.45E-04	3.48E-03	1.257E+00	9.986E+02	1.282
α_4	1.98E-06	4.87E-04	2.23E-04	1.87E-03	5.031E-01	1.033E+03	1.240
α_5	3.16E-15	1.09E-04	1.44E-06	6.26E-04	1.155E-01	1.058E+03	1.211
α_6	7.50E-13	1.60E-04	5.87E-06	8.88E-04	1.451E-01	9.052E+02	1.415

CCCG = 7, Gamma = 0.193

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9930484	0.9955996	0.9957492	0.9976399	2.184E+03	9.654E+00	--
α_2	8.04E-04	2.08E-03	1.94E-03	3.83E-03	4.851E+00	2.332E+03	1.175
α_3	3.46E-04	1.35E-03	1.19E-03	2.89E-03	2.800E+00	2.071E+03	1.324
α_4	6.84E-05	6.69E-04	5.17E-04	1.79E-03	1.384E+00	2.066E+03	1.328
α_5	8.62E-07	2.44E-04	1.09E-04	9.42E-04	4.902E-01	2.012E+03	1.364
α_6	1.30E-15	5.47E-05	6.93E-07	3.14E-04	1.146E-01	2.094E+03	1.311
α_7	3.60E-93	6.85E-06	7.29E-25	8.14E-06	1.464E-02	2.138E+03	1.284

CCCG = 8, Gamma = 0.193

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9927263	0.9956755	0.9958737	0.9979480	1.646E+03	7.148E+00	--
α_2	4.58E-04	1.69E-03	1.50E-03	3.54E-03	2.980E+00	1.764E+03	1.178
α_3	2.10E-04	1.21E-03	1.02E-03	2.90E-03	1.960E+00	1.612E+03	1.289
α_4	5.43E-05	7.43E-04	5.45E-04	2.11E-03	1.166E+00	1.569E+03	1.326
α_5	1.93E-06	3.41E-04	1.65E-04	1.28E-03	5.375E-01	1.577E+03	1.320
α_6	2.74E-11	1.24E-04	9.61E-06	6.55E-04	1.805E-01	1.456E+03	1.429
α_7	1.32E-35	2.55E-05	1.91E-11	1.25E-04	4.139E-02	1.623E+03	1.282
α_8	1.16E-08	1.91E-04	4.21E-05	8.89E-04	2.827E-01	1.482E+03	1.404

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.97E-01	9.96E-01	9.96E-01	9.95E-01	9.96E-01	9.96E-01
α_2	2.34E-03	2.31E-03	2.98E-03	2.89E-03	2.50E-03	2.08E-03	1.69E-03
α_3		1.13E-03	5.41E-04	1.17E-03	1.26E-03	1.35E-03	1.21E-03
α_4			6.56E-04	2.51E-04	4.87E-04	6.69E-04	7.43E-04
α_5				3.42E-05	1.09E-04	2.44E-04	3.41E-04
α_6					1.60E-04	5.47E-05	1.24E-04
α_7						6.85E-06	2.55E-05
α_8							1.91E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.97E-01	9.96E-01	9.96E-01	9.95E-01	9.96E-01	9.96E-01
Beta	2.34E-03	3.44E-03	4.18E-03	4.35E-03	4.51E-03	4.40E-03	4.32E-03
Gamma		3.28E-01	2.86E-01	3.35E-01	4.46E-01	5.28E-01	6.10E-01
Delta			5.48E-01	1.96E-01	3.76E-01	4.19E-01	5.40E-01
Epsilon				1.20E-01	3.56E-01	3.13E-01	4.78E-01
Mu					5.95E-01	2.02E-01	5.00E-01
Omega						1.11E-01	6.36E-01
Sigma							8.82E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	13.50	13.50	13.50	13.50	13.50	13.50	13.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.14 DC Power System – Batteries, Chargers, and Breakers

2.14.1 Batteries

2.14.1.1 DCP-BAT-LP: DC Power Batteries Fail to Operate

Generic CCF Parameters

System Group: Electrical
System: DC Power
Component Group: Electrical
Component Type: Battery
Failure Mode: Fail to Operate
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 25.8

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9466411	0.9859217	0.9933673	0.9999347	0.9968808	3.573E+01	5.102E-01
α_2	6.28E-05	1.41E-02	6.64E-03	5.34E-02	3.12E-03	5.102E-01	3.573E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9564705	0.9841552	0.9880124	0.9986364	0.9937422	7.783E+01	1.253E+00
α_2	6.03E-04	1.23E-02	8.54E-03	3.71E-02	6.26E-03	9.762E-01	7.811E+01
α_3	1.75E-07	3.50E-03	7.49E-04	1.64E-02	0.00E+00	2.768E-01	7.881E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9585570	0.9820045	0.9846296	0.9964833	0.9905838	1.170E+02	2.144E+00
α_2	1.52E-03	1.27E-02	1.01E-02	3.27E-02	9.42E-03	1.510E+00	1.176E+02
α_3	3.67E-06	3.38E-03	1.24E-03	1.40E-02	0.00E+00	4.024E-01	1.187E+02
α_4	1.35E-08	1.94E-03	2.90E-04	9.62E-03	0.00E+00	2.315E-01	1.189E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9675691	0.9834393	0.9848339	0.9945365	0.9899308	2.236E+02	3.766E+00
α_2	1.97E-03	9.75E-03	8.35E-03	2.23E-02	8.81E-03	2.216E+00	2.252E+02
α_3	3.04E-04	4.80E-03	3.45E-03	1.39E-02	1.26E-03	1.091E+00	2.263E+02
α_4	1.28E-06	1.68E-03	5.79E-04	7.09E-03	0.00E+00	3.822E-01	2.270E+02
α_5	2.93E-20	3.38E-04	3.14E-07	1.96E-03	0.00E+00	7.674E-02	2.273E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9699607	0.9841640	0.9853477	0.9943169	0.9894014	2.644E+02	4.255E+00

α_2	1.38E-03	7.56E-03	6.38E-03	1.78E-02	8.32E-03	2.031E+00	2.667E+02
α_3	4.32E-04	4.80E-03	3.64E-03	1.31E-02	2.10E-03	1.290E+00	2.674E+02
α_4	2.16E-05	2.24E-03	1.19E-03	8.05E-03	1.75E-04	6.029E-01	2.681E+02
α_5	3.22E-09	8.23E-04	1.10E-04	4.13E-03	0.00E+00	2.211E-01	2.685E+02
α_6	3.21E-15	4.09E-04	4.14E-06	2.36E-03	0.00E+00	1.098E-01	2.686E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9744951	0.9852392	0.9859939	0.9933986	0.9890185	4.175E+02	6.254E+00
α_2	1.47E-03	6.15E-03	5.39E-03	1.34E-02	7.84E-03	2.605E+00	4.211E+02
α_3	6.19E-04	4.14E-03	3.39E-03	1.02E-02	2.70E-03	1.754E+00	4.220E+02
α_4	1.69E-04	2.60E-03	1.87E-03	7.52E-03	4.26E-04	1.103E+00	4.226E+02
α_5	9.75E-06	1.34E-03	6.75E-04	4.91E-03	2.51E-05	5.665E-01	4.231E+02
α_6	2.48E-10	4.52E-04	4.18E-05	2.36E-03	0.00E+00	1.916E-01	4.235E+02
α_7	5.63E-41	8.21E-05	3.05E-12	3.60E-04	0.00E+00	3.480E-02	4.237E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9757064	0.9859130	0.9866272	0.9936755	0.9887735	4.421E+02	6.317E+00
α_2	1.18E-03	5.36E-03	4.65E-03	1.20E-02	7.32E-03	2.404E+00	4.460E+02
α_3	4.32E-04	3.47E-03	2.76E-03	8.91E-03	3.11E-03	1.554E+00	4.469E+02
α_4	1.58E-04	2.45E-03	1.76E-03	7.09E-03	7.05E-04	1.099E+00	4.473E+02
α_5	2.84E-05	1.58E-03	9.24E-04	5.34E-03	8.06E-05	7.068E-01	4.477E+02
α_6	3.08E-07	7.80E-04	2.40E-04	3.39E-03	3.66E-06	3.499E-01	4.481E+02
α_7	1.18E-15	2.40E-04	2.21E-06	1.39E-03	0.00E+00	1.078E-01	4.483E+02
α_8	2.46E-17	2.11E-04	8.94E-07	1.23E-03	0.00E+00	9.469E-02	4.483E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.84E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.41E-02	1.23E-02	1.27E-02	9.75E-03	7.56E-03	6.15E-03	5.36E-03
α_3		3.50E-03	3.38E-03	4.80E-03	4.80E-03	4.14E-03	3.47E-03
α_4			1.94E-03	1.68E-03	2.24E-03	2.60E-03	2.45E-03
α_5				3.38E-04	8.23E-04	1.34E-03	1.58E-03
α_6					4.09E-04	4.52E-04	7.80E-04
α_7						8.21E-05	2.40E-04
α_8							2.11E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.84E-01	9.82E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.41E-02	1.58E-02	1.80E-02	1.66E-02	1.58E-02	1.48E-02	1.41E-02
Gamma		2.21E-01	2.96E-01	4.12E-01	5.23E-01	5.84E-01	6.19E-01
Delta			3.65E-01	2.96E-01	4.20E-01	5.19E-01	6.03E-01
Epsilon				1.67E-01	3.54E-01	4.18E-01	5.34E-01
Mu					3.32E-01	2.86E-01	4.39E-01
Omega						1.54E-01	3.67E-01

Sigma							4.68E-01
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Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	12.90	19.35	25.80	32.25	38.70	45.15	51.60
N₁	0.4167	0.5000	0.5000	0.5208	0.5208	0.5064	0.4823
N₂	0.0417	0.1250	0.2500	0.2917	0.3299	0.3617	0.3858
N₃		0.0000	0.0000	0.0417	0.0833	0.1244	0.1640
N₄			0.0000	0.0000	0.0069	0.0197	0.0371
N₅				0.0000	0.0000	0.0012	0.0042
N₆					0.0000	0.0000	0.0002
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 10.9

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.408

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9681233	0.9917725	0.9963300	0.9999727	5.827E+01	4.834E-01	--
α_2	2.73E-05	8.23E-03	3.67E-03	3.19E-02	4.834E-01	5.827E+01	0.847

CCCG = 3, Gamma = 0.409

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9765963	0.9915772	0.9936970	0.9993124	1.443E+02	1.226E+00	--
α_2	3.33E-04	6.83E-03	4.71E-03	2.06E-02	9.769E-01	1.420E+02	0.973
α_3	2.54E-08	1.59E-03	2.76E-04	7.71E-03	2.487E-01	1.562E+02	0.889

CCCG = 4, Gamma = 0.411

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9751524	0.9893821	0.9910137	0.9980328	1.917E+02	2.057E+00	--
α_2	8.47E-04	7.67E-03	6.01E-03	2.02E-02	1.442E+00	1.866E+02	1.036
α_3	2.44E-06	1.95E-03	7.32E-04	8.02E-03	4.114E-01	2.106E+02	0.923
α_4	1.31E-09	1.00E-03	1.09E-04	5.13E-03	2.036E-01	2.032E+02	0.958

CCCG = 5, Gamma = 0.412

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9792349	0.9894827	0.9903995	0.9965979	3.465E+02	3.683E+00	--
α_2	1.34E-03	6.56E-03	5.63E-03	1.50E-02	2.243E+00	3.397E+02	1.076
α_3	1.38E-04	2.74E-03	1.90E-03	8.23E-03	9.912E-01	3.603E+02	1.018
α_4	6.92E-07	1.01E-03	3.43E-04	4.30E-03	3.765E-01	3.706E+02	0.992
α_5	1.73E-21	1.99E-04	1.14E-07	1.15E-03	7.237E-02	3.632E+02	1.013

CCCG = 6, Gamma = 0.412

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9800114	0.9895578	0.9903695	0.9963312	3.922E+02	4.139E+00	--
α_2	1.06E-03	5.48E-03	4.66E-03	1.27E-02	2.128E+00	3.859E+02	1.085
α_3	1.95E-04	2.82E-03	2.05E-03	8.07E-03	1.134E+00	4.012E+02	1.046
α_4	8.59E-06	1.32E-03	6.52E-04	4.87E-03	5.533E-01	4.202E+02	1.000
α_5	2.01E-09	5.16E-04	6.88E-05	2.59E-03	2.210E-01	4.284E+02	0.982
α_6	3.92E-16	3.08E-04	2.14E-06	1.79E-03	1.027E-01	3.333E+02	1.262

CCCG = 7, Gamma = 0.413

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9832346	0.9902498	0.9907408	0.9955883	6.533E+02	6.432E+00	--
α_2	1.13E-03	4.36E-03	3.87E-03	9.28E-03	2.840E+00	6.484E+02	1.085
α_3	3.98E-04	2.69E-03	2.20E-03	6.64E-03	1.746E+00	6.485E+02	1.087
α_4	9.91E-05	1.59E-03	1.14E-03	4.63E-03	1.084E+00	6.804E+02	1.037
α_5	4.44E-06	7.81E-04	3.78E-04	2.92E-03	5.376E-01	6.877E+02	1.027
α_6	2.54E-10	2.90E-04	2.92E-05	1.50E-03	1.979E-01	6.832E+02	1.034
α_7	9.54E-53	4.26E-05	4.27E-15	1.46E-04	2.656E-02	6.234E+02	1.133

CCCG = 8, Gamma = 0.414

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9838002	0.9906892	0.9911828	0.9958928	6.504E+02	6.112E+00	--
α_2	7.92E-04	3.66E-03	3.16E-03	8.23E-03	2.364E+00	6.437E+02	1.097
α_3	2.81E-04	2.36E-03	1.87E-03	6.12E-03	1.512E+00	6.398E+02	1.106
α_4	9.20E-05	1.57E-03	1.11E-03	4.61E-03	1.056E+00	6.717E+02	1.054
α_5	1.46E-05	9.66E-04	5.50E-04	3.33E-03	6.745E-01	6.977E+02	1.015
α_6	5.95E-08	4.43E-04	1.13E-04	2.01E-03	3.076E-01	6.939E+02	1.021
α_7	1.14E-15	1.63E-04	1.61E-06	9.39E-04	1.093E-01	6.712E+02	1.056
α_8	2.36E-18	1.53E-04	4.24E-07	8.90E-04	8.885E-02	5.821E+02	1.218

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.92E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01
α_2	8.23E-03	6.83E-03	7.67E-03	6.56E-03	5.48E-03	4.36E-03	3.66E-03
α_3		1.59E-03	1.95E-03	2.74E-03	2.82E-03	2.69E-03	2.36E-03
α_4			1.00E-03	1.01E-03	1.32E-03	1.59E-03	1.57E-03
α_5				1.99E-04	5.16E-04	7.81E-04	9.66E-04
α_6					3.08E-04	2.90E-04	4.43E-04
α_7						4.26E-05	1.63E-04
α_8							1.53E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.92E-01	9.89E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01
Beta	8.23E-03	8.42E-03	1.06E-02	1.05E-02	1.04E-02	9.75E-03	9.31E-03
Gamma		1.89E-01	2.78E-01	3.76E-01	4.75E-01	5.53E-01	6.07E-01
Delta			3.39E-01	3.07E-01	4.31E-01	5.02E-01	5.83E-01
Epsilon				1.64E-01	3.85E-01	4.12E-01	5.23E-01
Mu					3.74E-01	2.98E-01	4.40E-01
Omega						1.28E-01	4.16E-01
Sigma							4.84E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	5.45	8.17	10.90	13.62	16.35	19.07	21.80
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 4.3

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.161

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9074558	0.9765650	0.9900254	0.9999470	1.874E+01	4.498E-01	--
α_2	5.30E-05	2.34E-02	9.97E-03	9.25E-02	4.498E-01	1.874E+01	0.847

CCCG = 3, Gamma = 0.161

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9194417	0.9710991	0.9783948	0.9977836	3.959E+01	1.178E+00	--
α_2	1.05E-03	2.34E-02	1.61E-02	7.09E-02	9.387E-01	3.912E+01	0.973
α_3	5.76E-08	5.47E-03	8.86E-04	2.68E-02	2.396E-01	4.360E+01	0.889

CCCG = 4, Gamma = 0.162

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9198876	0.9662689	0.9716388	0.9942642	5.438E+01	1.898E+00	--
α_2	2.14E-03	2.36E-02	1.80E-02	6.39E-02	1.285E+00	5.324E+01	1.036
α_3	5.94E-06	6.42E-03	2.30E-03	2.68E-02	3.927E-01	6.078E+01	0.923
α_4	1.44E-08	3.74E-03	5.02E-04	1.88E-02	2.207E-01	5.875E+01	0.958

CCCG = 5, Gamma = 0.162

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362799	0.9679016	0.9707188	0.9898905	1.057E+02	3.506E+00	--
α_2	3.35E-03	1.87E-02	1.58E-02	4.41E-02	1.992E+00	1.044E+02	1.076
α_3	5.94E-04	9.59E-03	6.88E-03	2.78E-02	1.078E+00	1.114E+02	1.018
α_4	1.65E-06	3.15E-03	1.02E-03	1.35E-02	3.632E-01	1.151E+02	0.992
α_5	5.93E-21	6.41E-04	3.71E-07	3.71E-03	7.248E-02	1.130E+02	1.013

CCCG = 6, Gamma = 0.163

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9410979	0.9688926	0.9711823	0.9888613	1.308E+02	4.199E+00	--
α_2	2.55E-03	1.47E-02	1.24E-02	3.51E-02	1.941E+00	1.297E+02	1.085
α_3	9.37E-04	9.76E-03	7.49E-03	2.63E-02	1.332E+00	1.351E+02	1.046
α_4	4.65E-05	4.33E-03	2.34E-03	1.54E-02	6.181E-01	1.421E+02	1.000
α_5	1.09E-08	1.59E-03	2.36E-04	7.88E-03	2.313E-01	1.452E+02	0.982
α_6	6.20E-20	6.79E-04	6.41E-07	3.95E-03	7.684E-02	1.130E+02	1.262

CCCG = 7, Gamma = 0.163

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9484499	0.9700693	0.9715655	0.9865779	2.017E+02	6.223E+00	--
α_2	3.17E-03	1.29E-02	1.14E-02	2.80E-02	2.654E+00	2.024E+02	1.085
α_3	1.10E-03	8.04E-03	6.50E-03	2.02E-02	1.645E+00	2.031E+02	1.087
α_4	3.46E-04	5.20E-03	3.76E-03	1.49E-02	1.115E+00	2.134E+02	1.037
α_5	2.69E-05	2.79E-03	1.48E-03	9.99E-03	6.034E-01	2.161E+02	1.027
α_6	1.47E-10	8.27E-04	6.17E-05	4.39E-03	1.780E-01	2.150E+02	1.034
α_7	7.59E-51	1.39E-04	2.86E-14	4.92E-04	2.734E-02	1.962E+02	1.133

CCCG = 8, Gamma = 0.163

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9498036	0.9708375	0.9722922	0.9869022	2.079E+02	6.246E+00	--
α_2	2.75E-03	1.19E-02	1.04E-02	2.62E-02	2.504E+00	2.080E+02	1.097
α_3	7.29E-04	6.79E-03	5.30E-03	1.80E-02	1.419E+00	2.076E+02	1.106
α_4	2.58E-04	4.68E-03	3.29E-03	1.39E-02	1.027E+00	2.182E+02	1.054
α_5	6.65E-05	3.22E-03	1.93E-03	1.08E-02	7.337E-01	2.269E+02	1.015
α_6	1.75E-06	1.76E-03	6.34E-04	7.31E-03	3.975E-01	2.258E+02	1.021
α_7	3.52E-20	3.52E-04	3.38E-07	2.05E-03	7.703E-02	2.187E+02	1.056
α_8	4.28E-18	4.61E-04	1.15E-06	2.69E-03	8.749E-02	1.896E+02	1.218

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.77E-01	9.71E-01	9.66E-01	9.68E-01	9.69E-01	9.70E-01	9.71E-01
α_2	2.34E-02	2.34E-02	2.36E-02	1.87E-02	1.47E-02	1.29E-02	1.19E-02
α_3		5.47E-03	6.42E-03	9.59E-03	9.76E-03	8.04E-03	6.79E-03
α_4			3.74E-03	3.15E-03	4.33E-03	5.20E-03	4.68E-03
α_5				6.41E-04	1.59E-03	2.79E-03	3.22E-03
α_6					6.79E-04	8.27E-04	1.76E-03
α_7						1.39E-04	3.52E-04
α_8							4.61E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.77E-01	9.71E-01	9.66E-01	9.68E-01	9.69E-01	9.70E-01	9.71E-01
Beta	2.34E-02	2.89E-02	3.37E-02	3.21E-02	3.11E-02	2.99E-02	2.92E-02
Gamma		1.89E-01	3.01E-01	4.17E-01	5.26E-01	5.67E-01	5.92E-01
Delta			3.68E-01	2.83E-01	4.03E-01	5.27E-01	6.07E-01
Epsilon				1.69E-01	3.44E-01	4.19E-01	5.53E-01
Mu					2.99E-01	2.58E-01	4.44E-01
Omega						1.44E-01	3.16E-01
Sigma							5.67E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.15	3.23	4.30	5.38	6.45	7.53	8.60
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.5

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.053

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7686775	0.9417361	0.9754614	0.9999054	6.817E+00	4.218E-01	--
α_2	9.46E-05	5.83E-02	2.45E-02	2.31E-01	4.218E-01	6.817E+00	0.847

CCCG = 3, Gamma = 0.050

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8015388	0.9291807	0.9471213	0.9952737	1.424E+01	1.085E+00	--
α_2	1.49E-03	5.29E-02	3.45E-02	1.67E-01	7.923E-01	1.417E+01	0.973
α_3	1.58E-06	1.79E-02	4.34E-03	8.22E-02	2.927E-01	1.608E+01	0.889

CCCG = 4, Gamma = 0.047

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8138768	0.9195921	0.9311447	0.9856671	2.195E+01	1.919E+00	--
α_2	5.24E-03	5.58E-02	4.34E-02	1.49E-01	1.289E+00	2.183E+01	1.036
α_3	1.31E-05	1.50E-02	5.39E-03	6.26E-02	3.887E-01	2.555E+01	0.923
α_4	1.12E-07	9.65E-03	1.61E-03	4.73E-02	2.414E-01	2.476E+01	0.958

CCCG = 5, Gamma = 0.045

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8714973	0.9329078	0.9379396	0.9770991	5.312E+01	3.820E+00	--
α_2	7.20E-03	3.76E-02	3.22E-02	8.66E-02	2.083E+00	5.330E+01	1.076
α_3	1.83E-03	2.13E-02	1.62E-02	5.85E-02	1.249E+00	5.728E+01	1.018
α_4	1.28E-05	7.22E-03	2.90E-03	2.91E-02	4.340E-01	5.965E+01	0.992
α_5	2.08E-26	9.33E-04	3.33E-08	5.15E-03	5.493E-02	5.879E+01	1.013

CCCG = 6, Gamma = 0.043

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8859561	0.9386747	0.9427928	0.9773073	6.620E+01	4.325E+00	--
α_2	3.42E-03	2.43E-02	1.98E-02	6.05E-02	1.665E+00	6.681E+01	1.085
α_3	3.05E-03	2.27E-02	1.84E-02	5.72E-02	1.614E+00	6.939E+01	1.046
α_4	1.96E-04	9.78E-03	5.87E-03	3.27E-02	7.260E-01	7.353E+01	1.000
α_5	4.78E-08	3.26E-03	5.59E-04	1.59E-02	2.467E-01	7.541E+01	0.982
α_6	1.36E-20	1.24E-03	7.47E-07	7.18E-03	7.279E-02	5.877E+01	1.262

CCCG = 7, Gamma = 0.041

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9070876	0.9455527	0.9481160	0.9752581	1.090E+02	6.277E+00	--
α_2	2.86E-03	1.68E-02	1.41E-02	4.02E-02	1.911E+00	1.115E+02	1.085
α_3	3.59E-03	1.87E-02	1.59E-02	4.32E-02	2.113E+00	1.111E+02	1.087
α_4	1.02E-03	1.10E-02	8.41E-03	2.99E-02	1.307E+00	1.174E+02	1.037
α_5	9.71E-05	5.78E-03	3.36E-03	1.97E-02	6.925E-01	1.192E+02	1.027
α_6	1.45E-08	1.96E-03	2.95E-04	9.67E-03	2.327E-01	1.188E+02	1.034
α_7	1.32E-64	1.95E-04	2.95E-17	4.90E-04	2.112E-02	1.086E+02	1.133

CCCG = 8, Gamma = 0.039

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9184972	0.9502771	0.9522303	0.9753846	1.454E+02	7.608E+00	--
α_2	2.31E-03	1.32E-02	1.11E-02	3.12E-02	1.969E+00	1.476E+02	1.097
α_3	2.84E-03	1.45E-02	1.24E-02	3.34E-02	2.150E+00	1.463E+02	1.106
α_4	1.59E-03	1.10E-02	8.96E-03	2.72E-02	1.709E+00	1.540E+02	1.054
α_5	3.37E-04	6.28E-03	4.40E-03	1.87E-02	1.015E+00	1.606E+02	1.015
α_6	2.70E-05	3.55E-03	1.81E-03	1.30E-02	5.711E-01	1.601E+02	1.021
α_7	2.67E-10	1.16E-03	9.13E-05	6.16E-03	1.809E-01	1.552E+02	1.056
α_8	1.34E-107	9.24E-05	2.80E-27	6.93E-05	1.245E-02	1.347E+02	1.218

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.42E-01	9.29E-01	9.20E-01	9.33E-01	9.39E-01	9.46E-01	9.50E-01
α_2	5.83E-02	5.29E-02	5.58E-02	3.76E-02	2.43E-02	1.68E-02	1.32E-02
α_3		1.79E-02	1.50E-02	2.13E-02	2.27E-02	1.87E-02	1.45E-02
α_4			9.65E-03	7.22E-03	9.78E-03	1.10E-02	1.10E-02
α_5				9.33E-04	3.26E-03	5.78E-03	6.28E-03
α_6					1.24E-03	1.96E-03	3.55E-03
α_7						1.95E-04	1.16E-03
α_8							9.24E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.42E-01	9.29E-01	9.20E-01	9.33E-01	9.39E-01	9.46E-01	9.50E-01
Beta	5.83E-02	7.08E-02	8.04E-02	6.71E-02	6.13E-02	5.44E-02	4.97E-02
Gamma		2.52E-01	3.06E-01	4.40E-01	6.04E-01	6.91E-01	7.35E-01
Delta			3.92E-01	2.77E-01	3.86E-01	5.04E-01	6.04E-01
Epsilon				1.14E-01	3.15E-01	4.19E-01	5.03E-01
Mu					2.75E-01	2.71E-01	4.34E-01
Omega						9.05E-02	2.61E-01
Sigma							7.35E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.25	0.38	0.50	0.63	0.75	0.88	1.00
N_1	0.4167	0.5000	0.5000	0.5208	0.5208	0.5064	0.4823
N_2	0.0417	0.1250	0.2500	0.2917	0.3299	0.3617	0.3858
N_3		0.0000	0.0000	0.0417	0.0833	0.1244	0.1640

N₄			0.0000	0.0000	0.0069	0.0197	0.0371
N₅				0.0000	0.0000	0.0012	0.0042
N₆					0.0000	0.0000	0.0002
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 6.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.228

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9436712	0.9855610	0.9936642	0.9999583	3.212E+01	4.706E-01	--
α_2	4.17E-05	1.44E-02	6.34E-03	5.63E-02	4.706E-01	3.212E+01	0.847

CCCG = 3, Gamma = 0.229

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9550264	0.9843405	0.9886350	0.9989728	6.930E+01	1.103E+00	--
α_2	3.40E-04	1.18E-02	7.50E-03	3.78E-02	8.104E-01	6.799E+01	0.973
α_3	3.27E-07	3.88E-03	9.12E-04	1.79E-02	2.921E-01	7.500E+01	0.889

CCCG = 4, Gamma = 0.230

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9614890	0.9837704	0.9863664	0.9971722	1.184E+02	1.953E+00	--
α_2	1.05E-03	1.13E-02	8.62E-03	3.05E-02	1.312E+00	1.151E+02	1.036
α_3	5.54E-06	3.30E-03	1.30E-03	1.33E-02	4.307E-01	1.302E+02	0.923
α_4	3.32E-09	1.67E-03	1.97E-04	8.48E-03	2.099E-01	1.258E+02	0.958

CCCG = 5, Gamma = 0.230

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9693293	0.9851546	0.9866712	0.9957963	2.062E+02	3.107E+00	--
α_2	1.17E-03	8.28E-03	6.73E-03	2.07E-02	1.684E+00	2.018E+02	1.076
α_3	1.94E-04	4.38E-03	2.97E-03	1.34E-02	9.426E-01	2.141E+02	1.018
α_4	1.30E-06	1.73E-03	5.95E-04	7.30E-03	3.816E-01	2.204E+02	0.992
α_5	1.82E-16	4.56E-04	2.50E-06	2.65E-03	9.865E-02	2.161E+02	1.013

CCCG = 6, Gamma = 0.231

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9727230	0.9860291	0.9871957	0.9953491	2.698E+02	3.822E+00	--
α_2	9.32E-04	6.43E-03	5.25E-03	1.60E-02	1.714E+00	2.648E+02	1.085
α_3	2.63E-04	4.01E-03	2.89E-03	1.16E-02	1.108E+00	2.753E+02	1.046
α_4	2.98E-05	2.25E-03	1.26E-03	7.86E-03	6.509E-01	2.884E+02	1.000
α_5	1.71E-08	8.61E-04	1.55E-04	4.15E-03	2.536E-01	2.942E+02	0.982
α_6	6.78E-17	4.18E-04	1.90E-06	2.43E-03	9.572E-02	2.290E+02	1.262

CCCG = 7, Gamma = 0.231

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9761700	0.9868057	0.9876211	0.9946567	3.885E+02	5.195E+00	--
α_2	1.03E-03	5.43E-03	4.60E-03	1.26E-02	2.105E+00	3.858E+02	1.085
α_3	3.20E-04	3.41E-03	2.60E-03	9.25E-03	1.320E+00	3.860E+02	1.087
α_4	1.25E-04	2.46E-03	1.70E-03	7.36E-03	9.967E-01	4.049E+02	1.037
α_5	6.48E-06	1.28E-03	6.08E-04	4.83E-03	5.249E-01	4.094E+02	1.027
α_6	3.57E-10	4.81E-04	4.70E-05	2.49E-03	1.956E-01	4.069E+02	1.034
α_7	4.07E-28	1.42E-04	3.23E-09	7.73E-04	5.291E-02	3.713E+02	1.133

CCCG = 8, Gamma = 0.232

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9776541	0.9872834	0.9879850	0.9945169	4.528E+02	5.832E+00	--
α_2	1.01E-03	4.95E-03	4.24E-03	1.13E-02	2.229E+00	4.479E+02	1.097
α_3	2.42E-04	2.82E-03	2.12E-03	7.78E-03	1.260E+00	4.455E+02	1.106
α_4	1.26E-04	2.22E-03	1.57E-03	6.56E-03	1.042E+00	4.677E+02	1.054
α_5	3.68E-05	1.57E-03	9.59E-04	5.17E-03	7.626E-01	4.858E+02	1.015
α_6	1.55E-07	6.76E-04	1.89E-04	3.01E-03	3.271E-01	4.833E+02	1.021
α_7	2.78E-13	2.87E-04	7.70E-06	1.61E-03	1.344E-01	4.675E+02	1.056
α_8	1.71E-20	1.89E-04	1.78E-07	1.10E-03	7.682E-02	4.055E+02	1.218

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01	9.87E-01	9.87E-01
α_2	1.44E-02	1.18E-02	1.13E-02	8.28E-03	6.43E-03	5.43E-03	4.95E-03
α_3		3.88E-03	3.30E-03	4.38E-03	4.01E-03	3.41E-03	2.82E-03
α_4			1.67E-03	1.73E-03	2.25E-03	2.46E-03	2.22E-03
α_5				4.56E-04	8.61E-04	1.28E-03	1.57E-03
α_6					4.18E-04	4.81E-04	6.76E-04
α_7						1.42E-04	2.87E-04
α_8							1.89E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.84E-01	9.84E-01	9.85E-01	9.86E-01	9.87E-01	9.87E-01
Beta	1.44E-02	1.57E-02	1.62E-02	1.48E-02	1.40E-02	1.32E-02	1.27E-02
Gamma		2.48E-01	3.06E-01	4.42E-01	5.40E-01	5.89E-01	6.11E-01
Delta			3.36E-01	3.33E-01	4.68E-01	5.61E-01	6.37E-01
Epsilon				2.09E-01	3.62E-01	4.37E-01	5.50E-01
Mu					3.27E-01	3.27E-01	4.24E-01
Omega						2.29E-01	4.13E-01
Sigma							3.97E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.05	4.57	6.10	7.62	9.15	10.67	12.20
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.150

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9854919	0.9962357	0.9983001	0.9999862	1.305E+02	4.932E-01	--
α_2	1.38E-05	3.76E-03	1.70E-03	1.45E-02	4.932E-01	1.305E+02	0.847

CCCG = 3, Gamma = 0.150

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9883051	0.9960079	0.9971638	0.9997636	2.643E+02	1.059E+00	--
α_2	5.17E-05	2.77E-03	1.63E-03	9.34E-03	7.137E-01	2.572E+02	0.973
α_3	4.40E-07	1.23E-03	3.70E-04	5.35E-03	3.458E-01	2.819E+02	0.889

CCCG = 4, Gamma = 0.151

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898269	0.9956270	0.9962886	0.9991657	4.814E+02	2.115E+00	--
α_2	4.07E-04	3.28E-03	2.61E-03	8.45E-03	1.549E+00	4.702E+02	1.036
α_3	1.56E-08	5.00E-04	9.78E-05	2.38E-03	2.646E-01	5.291E+02	0.923
α_4	6.52E-08	5.90E-04	1.45E-04	2.70E-03	3.010E-01	5.100E+02	0.958

CCCG = 5, Gamma = 0.151

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928108	0.9960071	0.9962522	0.9983664	1.328E+03	5.325E+00	--
α_2	8.85E-04	2.77E-03	2.53E-03	5.51E-03	3.632E+00	1.305E+03	1.076
α_3	9.62E-05	9.79E-04	7.52E-04	2.64E-03	1.354E+00	1.382E+03	1.018
α_4	1.98E-08	2.09E-04	4.98E-05	9.58E-04	2.961E-01	1.420E+03	0.992
α_5	9.08E-35	3.05E-05	3.36E-11	1.51E-04	4.243E-02	1.391E+03	1.013

CCCG = 6, Gamma = 0.151

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9924039	0.9958586	0.9961325	0.9983778	1.187E+03	4.936E+00	--
α_2	6.60E-04	2.48E-03	2.21E-03	5.25E-03	2.915E+00	1.172E+03	1.085
α_3	8.81E-05	1.03E-03	7.75E-04	2.85E-03	1.257E+00	1.217E+03	1.046
α_4	1.61E-06	3.95E-04	1.81E-04	1.51E-03	5.031E-01	1.273E+03	1.000
α_5	2.58E-15	8.90E-05	1.17E-06	5.10E-04	1.155E-01	1.298E+03	0.982
α_6	6.72E-13	1.44E-04	5.26E-06	7.96E-04	1.451E-01	1.009E+03	1.262

CCCG = 7, Gamma = 0.152

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9940117	0.9962099	0.9963390	0.9979676	2.538E+03	9.654E+00	--
α_2	7.44E-04	1.92E-03	1.79E-03	3.54E-03	4.851E+00	2.519E+03	1.085
α_3	2.85E-04	1.11E-03	9.82E-04	2.38E-03	2.800E+00	2.517E+03	1.087
α_4	5.35E-05	5.24E-04	4.05E-04	1.40E-03	1.384E+00	2.640E+03	1.037
α_5	6.50E-07	1.84E-04	8.22E-05	7.11E-04	4.902E-01	2.667E+03	1.027
α_6	1.03E-15	4.33E-05	5.48E-07	2.48E-04	1.146E-01	2.649E+03	1.034
α_7	3.19E-93	6.06E-06	6.45E-25	7.20E-06	1.464E-02	2.416E+03	1.133

CCCG = 8, Gamma = 0.152

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9936927	0.9962507	0.9964227	0.9982212	1.899E+03	7.148E+00	--
α_2	4.27E-04	1.58E-03	1.40E-03	3.31E-03	2.980E+00	1.889E+03	1.097
α_3	1.81E-04	1.04E-03	8.73E-04	2.49E-03	1.960E+00	1.876E+03	1.106
α_4	4.33E-05	5.92E-04	4.34E-04	1.68E-03	1.166E+00	1.969E+03	1.054
α_5	1.49E-06	2.63E-04	1.27E-04	9.84E-04	5.375E-01	2.045E+03	1.015
α_6	1.96E-11	8.88E-05	6.89E-06	4.69E-04	1.805E-01	2.033E+03	1.021
α_7	1.09E-35	2.11E-05	1.58E-11	1.03E-04	4.139E-02	1.966E+03	1.056
α_8	1.01E-08	1.66E-04	3.66E-05	7.73E-04	2.827E-01	1.704E+03	1.218

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	3.76E-03	2.77E-03	3.28E-03	2.77E-03	2.48E-03	1.92E-03	1.58E-03
α_3		1.23E-03	5.00E-04	9.79E-04	1.03E-03	1.11E-03	1.04E-03
α_4			5.90E-04	2.09E-04	3.95E-04	5.24E-04	5.92E-04
α_5				3.05E-05	8.90E-05	1.84E-04	2.63E-04
α_6					1.44E-04	4.33E-05	8.88E-05
α_7						6.06E-06	2.11E-05
α_8							1.66E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	3.76E-03	3.99E-03	4.37E-03	3.99E-03	4.14E-03	3.79E-03	3.75E-03
Gamma		3.07E-01	2.49E-01	3.05E-01	4.01E-01	4.93E-01	5.80E-01
Delta			5.41E-01	1.96E-01	3.78E-01	4.05E-01	5.20E-01
Epsilon				1.28E-01	3.71E-01	3.08E-01	4.76E-01
Mu					6.18E-01	2.12E-01	5.12E-01
Omega						1.23E-01	6.78E-01
Sigma							8.87E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	2.00	3.00	4.00	5.00	6.00	7.00	8.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.14.2 Battery Chargers

2.14.2.1 DCP-BCH-LP: DC Power Battery Chargers Loss of Function

Generic CCF Parameters

System Group: Electrical
System: DC Power
Component Group: Electrical
Component Type: Battery Charger
Failure Mode: Fail to Operate
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 164.6

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9733688	0.9917241	0.9947523	0.9997666	0.9954555	9.689E+01	8.085E-01
α_2	2.36E-04	8.28E-03	5.25E-03	2.66E-02	4.54E-03	8.085E-01	9.689E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9709901	0.9874252	0.9892697	0.9975451	0.9908695	1.687E+02	2.148E+00
α_2	1.80E-03	1.10E-02	9.11E-03	2.64E-02	9.13E-03	1.871E+00	1.689E+02
α_3	8.06E-08	1.62E-03	3.45E-04	7.60E-03	0.00E+00	2.768E-01	1.705E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9744258	0.9878361	0.9891545	0.9967256	0.9930016	2.382E+02	2.934E+00
α_2	1.16E-03	7.46E-03	6.15E-03	1.82E-02	3.63E-03	1.800E+00	2.394E+02
α_3	1.47E-04	3.74E-03	2.49E-03	1.16E-02	3.36E-03	9.024E-01	2.403E+02
α_4	6.64E-09	9.60E-04	1.43E-04	4.75E-03	0.00E+00	2.315E-01	2.409E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9778176	0.9881535	0.9889966	0.9955989	0.9942494	3.753E+02	4.499E+00
α_2	1.21E-03	5.90E-03	5.06E-03	1.35E-02	1.71E-03	2.241E+00	3.775E+02
α_3	5.06E-04	4.08E-03	3.25E-03	1.05E-02	2.70E-03	1.549E+00	3.782E+02
α_4	1.96E-05	1.66E-03	9.10E-04	5.87E-03	1.35E-03	6.322E-01	3.791E+02
α_5	1.75E-20	2.02E-04	1.88E-07	1.17E-03	0.00E+00	7.674E-02	3.797E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9799896	0.9890680	0.9897792	0.9957044	0.9950532	4.465E+02	4.935E+00
α_2	7.25E-04	4.27E-03	3.56E-03	1.02E-02	1.01E-03	1.926E+00	4.495E+02

α_3	4.49E-04	3.50E-03	2.80E-03	8.95E-03	1.69E-03	1.582E+00	4.498E+02
α_4	1.03E-04	2.15E-03	1.48E-03	6.50E-03	1.69E-03	9.710E-01	4.505E+02
α_5	2.77E-07	7.67E-04	2.32E-04	3.35E-03	5.62E-04	3.461E-01	4.511E+02
α_6	1.91E-15	2.43E-04	2.46E-06	1.40E-03	0.00E+00	1.098E-01	4.513E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9817013	0.9891905	0.9896964	0.9949506	0.9956179	6.299E+02	6.883E+00
α_2	8.58E-04	3.83E-03	3.33E-03	8.53E-03	7.58E-04	2.440E+00	6.343E+02
α_3	4.86E-04	2.95E-03	2.45E-03	7.14E-03	9.72E-04	1.882E+00	6.349E+02
α_4	2.56E-04	2.29E-03	1.79E-03	6.01E-03	1.45E-03	1.458E+00	6.353E+02
α_5	3.73E-05	1.28E-03	8.11E-04	4.12E-03	9.64E-04	8.154E-01	6.360E+02
α_6	8.06E-09	3.99E-04	7.21E-05	1.92E-03	2.41E-04	2.541E-01	6.365E+02
α_7	3.74E-41	5.47E-05	2.03E-12	2.40E-04	0.00E+00	3.480E-02	6.368E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9831134	0.9900228	0.9904936	0.9953337	0.9960245	6.849E+02	6.903E+00
α_2	6.49E-04	3.21E-03	2.75E-03	7.36E-03	6.88E-04	2.222E+00	6.896E+02
α_3	2.78E-04	2.24E-03	1.78E-03	5.77E-03	5.43E-04	1.551E+00	6.903E+02
α_4	2.01E-04	1.99E-03	1.53E-03	5.33E-03	1.06E-03	1.375E+00	6.905E+02
α_5	7.82E-05	1.47E-03	1.02E-03	4.37E-03	1.06E-03	1.015E+00	6.908E+02
α_6	3.06E-06	7.31E-04	3.37E-04	2.80E-03	5.28E-04	5.060E-01	6.913E+02
α_7	4.00E-13	2.01E-04	6.22E-06	1.12E-03	1.06E-04	1.391E-01	6.917E+02
α_8	1.59E-17	1.37E-04	5.79E-07	7.97E-04	0.00E+00	9.469E-02	6.918E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.92E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01
α_2	8.28E-03	1.10E-02	7.46E-03	5.90E-03	4.27E-03	3.83E-03	3.21E-03
α_3		1.62E-03	3.74E-03	4.08E-03	3.50E-03	2.95E-03	2.24E-03
α_4			9.60E-04	1.66E-03	2.15E-03	2.29E-03	1.99E-03
α_5				2.02E-04	7.67E-04	1.28E-03	1.47E-03
α_6					2.43E-04	3.99E-04	7.31E-04
α_7						5.47E-05	2.01E-04
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.92E-01	9.87E-01	9.88E-01	9.88E-01	9.89E-01	9.89E-01	9.90E-01
Beta	8.28E-03	1.26E-02	1.22E-02	1.18E-02	1.09E-02	1.08E-02	9.98E-03
Gamma		1.29E-01	3.87E-01	5.02E-01	6.10E-01	6.46E-01	6.78E-01
Delta			2.04E-01	3.14E-01	4.74E-01	5.77E-01	6.69E-01
Epsilon				1.08E-01	3.19E-01	4.31E-01	5.61E-01
Mu					2.41E-01	2.62E-01	4.22E-01
Omega						1.20E-01	3.16E-01
Sigma							4.05E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	73.16	109.73	146.31	182.89	219.47	256.04	292.62
N₁	1.3200	0.9600	1.2533	1.5333	1.8000	2.0580	2.3050
N₂	0.3400	1.0200	0.5400	0.3167	0.2250	0.1965	0.2037
N₃		0.0000	0.5000	0.5000	0.3750	0.2520	0.1609
N₄			0.0000	0.2500	0.3750	0.3750	0.3125
N₅				0.0000	0.1250	0.2500	0.3125
N₆					0.0000	0.0625	0.1563
N₇						0.0000	0.0313
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 81.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.481

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9824594	0.9954799	0.9979936	0.9999851	1.065E+02	4.834E-01	--
α_2	1.49E-05	4.52E-03	2.01E-03	1.75E-02	4.834E-01	1.065E+02	0.751

CCCG = 3, Gamma = 0.483

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9819813	0.9935214	0.9951570	0.9994720	1.880E+02	1.226E+00	--
α_2	2.72E-04	5.59E-03	3.86E-03	1.69E-02	9.769E-01	1.736E+02	1.059
α_3	1.41E-08	8.84E-04	1.53E-04	4.29E-03	2.487E-01	2.811E+02	0.657

CCCG = 4, Gamma = 0.485

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9824912	0.9925284	0.9936829	0.9986186	2.733E+02	2.057E+00	--
α_2	5.45E-04	4.95E-03	3.87E-03	1.30E-02	1.442E+00	2.901E+02	0.878
α_3	2.42E-06	1.93E-03	7.24E-04	7.93E-03	4.114E-01	2.130E+02	1.199
α_4	7.83E-10	5.98E-04	6.51E-05	3.07E-03	2.036E-01	3.405E+02	0.751

CCCG = 5, Gamma = 0.485

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9837187	0.9917604	0.9924818	0.9973376	4.433E+02	3.683E+00	--
α_2	9.37E-04	4.59E-03	3.93E-03	1.05E-02	2.243E+00	4.869E+02	0.908
α_3	1.26E-04	2.50E-03	1.73E-03	7.51E-03	9.912E-01	3.949E+02	1.122
α_4	6.89E-07	1.01E-03	3.41E-04	4.28E-03	3.765E-01	3.723E+02	1.192
α_5	1.21E-21	1.40E-04	7.95E-08	8.07E-04	7.237E-02	5.182E+02	0.857

CCCG = 6, Gamma = 0.486

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9850148	0.9921786	0.9927897	0.9972553	5.251E+02	4.139E+00	--
α_2	6.78E-04	3.53E-03	3.00E-03	8.20E-03	2.128E+00	6.010E+02	0.850
α_3	1.60E-04	2.32E-03	1.68E-03	6.63E-03	1.134E+00	4.885E+02	1.047
α_4	8.37E-06	1.28E-03	6.35E-04	4.74E-03	5.533E-01	4.312E+02	1.187
α_5	1.92E-09	4.93E-04	6.58E-05	2.47E-03	2.210E-01	4.477E+02	1.144
α_6	2.57E-16	2.02E-04	1.40E-06	1.17E-03	1.027E-01	5.087E+02	1.007

CCCG = 7, Gamma = 0.486

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9860693	0.9919021	0.9923113	0.9963381	7.879E+02	6.432E+00	--
α_2	8.33E-04	3.21E-03	2.84E-03	6.83E-03	2.840E+00	8.829E+02	0.918
α_3	3.30E-04	2.23E-03	1.82E-03	5.51E-03	1.746E+00	7.826E+02	1.037
α_4	9.60E-05	1.54E-03	1.10E-03	4.48E-03	1.084E+00	7.024E+02	1.156
α_5	4.63E-06	8.14E-04	3.94E-04	3.04E-03	5.376E-01	6.602E+02	1.231
α_6	2.45E-10	2.79E-04	2.81E-05	1.44E-03	1.979E-01	7.104E+02	1.145
α_7	7.27E-53	3.25E-05	3.25E-15	1.11E-04	2.656E-02	8.183E+02	0.994

CCCG = 8, Gamma = 0.486

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9871212	0.9926021	0.9929958	0.9967389	8.201E+02	6.112E+00	--
α_2	5.57E-04	2.58E-03	2.23E-03	5.80E-03	2.364E+00	9.152E+02	0.906
α_3	2.09E-04	1.76E-03	1.39E-03	4.56E-03	1.512E+00	8.594E+02	0.965
α_4	8.17E-05	1.39E-03	9.88E-04	4.09E-03	1.056E+00	7.563E+02	1.098
α_5	1.45E-05	9.60E-04	5.47E-04	3.31E-03	6.745E-01	7.020E+02	1.183
α_6	6.18E-08	4.60E-04	1.17E-04	2.09E-03	3.076E-01	6.691E+02	1.242
α_7	1.00E-15	1.43E-04	1.41E-06	8.25E-04	1.093E-01	7.636E+02	1.088
α_8	1.67E-18	1.08E-04	3.01E-07	6.32E-04	8.885E-02	8.188E+02	1.015

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.94E-01	9.93E-01	9.92E-01	9.92E-01	9.92E-01	9.93E-01
α_2	4.52E-03	5.59E-03	4.95E-03	4.59E-03	3.53E-03	3.21E-03	2.58E-03
α_3		8.84E-04	1.93E-03	2.50E-03	2.32E-03	2.23E-03	1.76E-03
α_4			5.98E-04	1.01E-03	1.28E-03	1.54E-03	1.39E-03
α_5				1.40E-04	4.93E-04	8.14E-04	9.60E-04
α_6					2.02E-04	2.79E-04	4.60E-04
α_7						3.25E-05	1.43E-04
α_8							1.08E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.94E-01	9.93E-01	9.92E-01	9.92E-01	9.92E-01	9.93E-01
Beta	4.52E-03	6.48E-03	7.47E-03	8.24E-03	7.82E-03	8.10E-03	7.40E-03
Gamma		1.36E-01	3.38E-01	4.43E-01	5.49E-01	6.04E-01	6.52E-01
Delta			2.37E-01	3.15E-01	4.60E-01	5.45E-01	6.36E-01
Epsilon				1.21E-01	3.52E-01	4.22E-01	5.45E-01
Mu					2.90E-01	2.77E-01	4.26E-01
Omega						1.04E-01	3.54E-01
Sigma							4.31E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	36.00	54.00	72.00	90.00	108.00	126.00	144.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 9.1

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9282500	0.9817775	0.9921910	0.9999555	2.459E+01	4.565E-01	--
α_2	4.45E-05	1.82E-02	7.81E-03	7.18E-02	4.565E-01	2.459E+01	0.751

CCCG = 3, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9239936	0.9725950	0.9794227	0.9978267	4.253E+01	1.198E+00	--
α_2	1.12E-03	2.37E-02	1.64E-02	7.13E-02	9.587E-01	3.945E+01	1.059
α_3	3.86E-08	3.68E-03	5.94E-04	1.80E-02	2.396E-01	6.487E+01	0.657

CCCG = 4, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9308744	0.9707637	0.9753634	0.9949083	6.436E+01	1.938E+00	--
α_2	1.81E-03	1.89E-02	1.45E-02	5.09E-02	1.325E+00	6.880E+01	0.878
α_3	7.09E-06	7.65E-03	2.75E-03	3.19E-02	3.927E-01	5.094E+01	1.199
α_4	1.04E-08	2.69E-03	3.60E-04	1.35E-02	2.207E-01	8.174E+01	0.751

CCCG = 5, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9415038	0.9704103	0.9729723	0.9905579	1.172E+02	3.572E+00	--
α_2	2.88E-03	1.55E-02	1.31E-02	3.61E-02	2.059E+00	1.309E+02	0.908
α_3	6.21E-04	1.00E-02	7.19E-03	2.91E-02	1.078E+00	1.066E+02	1.122
α_4	1.89E-06	3.58E-03	1.16E-03	1.54E-02	3.632E-01	1.010E+02	1.192
α_5	4.75E-21	5.14E-04	2.98E-07	2.98E-03	7.248E-02	1.409E+02	0.857

CCCG = 6, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9473107	0.9720358	0.9740594	0.9898448	1.494E+02	4.299E+00	--
α_2	2.12E-03	1.15E-02	9.75E-03	2.71E-02	2.041E+00	1.749E+02	0.850
α_3	8.90E-04	9.27E-03	7.12E-03	2.50E-02	1.332E+00	1.423E+02	1.047
α_4	5.24E-05	4.88E-03	2.64E-03	1.73E-02	6.181E-01	1.260E+02	1.187
α_5	1.21E-08	1.76E-03	2.62E-04	8.72E-03	2.313E-01	1.312E+02	1.144
α_6	4.70E-20	5.15E-04	4.85E-07	2.99E-03	7.684E-02	1.492E+02	1.007

CCCG = 7, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9515667	0.9717550	0.9731417	0.9872068	2.188E+02	6.359E+00	--
α_2	2.84E-03	1.11E-02	9.81E-03	2.36E-02	2.788E+00	2.490E+02	0.918
α_3	1.01E-03	7.39E-03	5.97E-03	1.86E-02	1.647E+00	2.213E+02	1.037
α_4	3.72E-04	5.58E-03	4.04E-03	1.60E-02	1.115E+00	1.989E+02	1.156
α_5	3.11E-05	3.21E-03	1.70E-03	1.15E-02	6.034E-01	1.872E+02	1.231
α_6	1.57E-10	8.81E-04	6.57E-05	4.68E-03	1.780E-01	2.018E+02	1.145
α_7	6.40E-51	1.18E-04	2.41E-14	4.15E-04	2.734E-02	2.326E+02	0.994

CCCG = 8, Gamma = 0.063

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9541385	0.9732056	0.9745119	0.9878110	2.333E+02	6.423E+00	--
α_2	2.48E-03	1.01E-02	8.86E-03	2.17E-02	2.676E+00	2.635E+02	0.906
α_3	6.15E-04	5.70E-03	4.45E-03	1.51E-02	1.424E+00	2.483E+02	0.965
α_4	2.57E-04	4.68E-03	3.28E-03	1.38E-02	1.027E+00	2.186E+02	1.098
α_5	7.43E-05	3.60E-03	2.16E-03	1.20E-02	7.337E-01	2.031E+02	1.183
α_6	2.04E-06	2.05E-03	7.40E-04	8.52E-03	3.975E-01	1.938E+02	1.242
α_7	3.48E-20	3.48E-04	3.34E-07	2.02E-03	7.703E-02	2.215E+02	1.088
α_8	3.42E-18	3.68E-04	9.20E-07	2.15E-03	8.749E-02	2.375E+02	1.015

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.73E-01	9.71E-01	9.70E-01	9.72E-01	9.72E-01	9.73E-01
α_2	1.82E-02	2.37E-02	1.89E-02	1.55E-02	1.15E-02	1.11E-02	1.01E-02
α_3		3.68E-03	7.65E-03	1.00E-02	9.27E-03	7.39E-03	5.70E-03
α_4			2.69E-03	3.58E-03	4.88E-03	5.58E-03	4.68E-03
α_5				5.14E-04	1.76E-03	3.21E-03	3.60E-03
α_6					5.15E-04	8.81E-04	2.05E-03
α_7						1.18E-04	3.48E-04
α_8							3.68E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.73E-01	9.71E-01	9.70E-01	9.72E-01	9.72E-01	9.73E-01
Beta	1.82E-02	2.74E-02	2.92E-02	2.96E-02	2.80E-02	2.82E-02	2.68E-02
Gamma		1.34E-01	3.54E-01	4.77E-01	5.87E-01	6.08E-01	6.25E-01
Delta			2.60E-01	2.90E-01	4.36E-01	5.70E-01	6.59E-01
Epsilon				1.25E-01	3.18E-01	4.30E-01	5.76E-01
Mu					2.26E-01	2.37E-01	4.34E-01
Omega						1.18E-01	2.59E-01
Sigma							5.14E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.04	6.07	8.09	10.11	12.13	14.16	16.18
N_1	0.6533	0.9600	1.2533	1.5333	1.8000	2.0580	2.3050
N_2	0.0067	0.0200	0.0400	0.0667	0.1000	0.1340	0.1725
N_3		0.0000	0.0000	0.0000	0.0000	0.0020	0.0046

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 4.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.024

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8349022	0.9603597	0.9855352	0.9999689	9.209E+00	3.801E-01	--
α_2	3.11E-05	3.96E-02	1.45E-02	1.65E-01	3.801E-01	9.209E+00	0.751

CCCG = 3, Gamma = 0.024

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8365269	0.9445918	0.9607520	0.9972890	1.637E+01	9.600E-01	--
α_2	6.69E-04	4.36E-02	2.57E-02	1.47E-01	6.673E-01	1.465E+01	1.059
α_3	1.04E-06	1.19E-02	2.84E-03	5.46E-02	2.927E-01	2.440E+01	0.657

CCCG = 4, Gamma = 0.024

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8548208	0.9405914	0.9507908	0.9913861	2.643E+01	1.669E+00	--
α_2	2.02E-03	3.47E-02	2.50E-02	1.01E-01	1.039E+00	2.886E+01	0.878
α_3	1.56E-05	1.78E-02	6.41E-03	7.41E-02	3.887E-01	2.150E+01	1.199
α_4	7.97E-08	6.91E-03	1.14E-03	3.38E-02	2.414E-01	3.471E+01	0.751

CCCG = 5, Gamma = 0.024

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8883632	0.9433209	0.9480779	0.9820006	5.803E+01	3.487E+00	--
α_2	4.07E-03	2.60E-02	2.16E-02	6.31E-02	1.791E+00	6.708E+01	0.908
α_3	1.73E-03	2.17E-02	1.62E-02	6.01E-02	1.207E+00	5.454E+01	1.122
α_4	1.47E-05	8.27E-03	3.32E-03	3.33E-02	4.340E-01	5.205E+01	1.192
α_5	1.67E-26	7.53E-04	2.68E-08	4.15E-03	5.493E-02	7.293E+01	0.857

CCCG = 6, Gamma = 0.024

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9029577	0.9493536	0.9532028	0.9825840	7.319E+01	3.905E+00	--
α_2	1.41E-03	1.46E-02	1.12E-02	3.92E-02	1.335E+00	9.036E+01	0.850
α_3	2.53E-03	2.06E-02	1.64E-02	5.27E-02	1.531E+00	7.290E+01	1.047
α_4	2.12E-04	1.10E-02	6.54E-03	3.67E-02	7.191E-01	6.492E+01	1.187
α_5	5.31E-08	3.62E-03	6.21E-04	1.76E-02	2.467E-01	6.786E+01	1.144
α_6	1.04E-20	9.41E-04	5.67E-07	5.46E-03	7.279E-02	7.728E+01	1.007

CCCG = 7, Gamma = 0.024

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9163769	0.9520178	0.9545080	0.9791486	1.145E+02	5.770E+00	--
α_2	1.39E-03	1.12E-02	8.92E-03	2.86E-02	1.549E+00	1.371E+02	0.918
α_3	2.89E-03	1.62E-02	1.36E-02	3.82E-02	1.989E+00	1.208E+02	1.037
α_4	1.05E-03	1.17E-02	8.89E-03	3.19E-02	1.287E+00	1.089E+02	1.156
α_5	1.12E-04	6.68E-03	3.88E-03	2.28E-02	6.913E-01	1.028E+02	1.231
α_6	1.55E-08	2.09E-03	3.15E-04	1.03E-02	2.327E-01	1.110E+02	1.145
α_7	1.12E-64	1.65E-04	2.50E-17	4.15E-04	2.112E-02	1.281E+02	0.994

CCCG = 8, Gamma = 0.024

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9278801	0.9568323	0.9586959	0.9794181	1.555E+02	7.016E+00	--
α_2	1.09E-03	8.48E-03	6.80E-03	2.16E-02	1.583E+00	1.851E+02	0.906
α_3	2.01E-03	1.13E-02	9.54E-03	2.68E-02	1.986E+00	1.732E+02	0.965
α_4	1.52E-03	1.09E-02	8.82E-03	2.71E-02	1.672E+00	1.524E+02	1.098
α_5	3.75E-04	7.07E-03	4.94E-03	2.10E-02	1.011E+00	1.420E+02	1.183
α_6	3.18E-05	4.19E-03	2.14E-03	1.53E-02	5.709E-01	1.356E+02	1.242
α_7	2.67E-10	1.16E-03	9.12E-05	6.16E-03	1.809E-01	1.552E+02	1.088
α_8	1.08E-107	7.47E-05	2.26E-27	5.60E-05	1.245E-02	1.666E+02	1.015

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.60E-01	9.45E-01	9.41E-01	9.43E-01	9.49E-01	9.52E-01	9.57E-01
α_2	3.96E-02	4.36E-02	3.47E-02	2.60E-02	1.46E-02	1.12E-02	8.48E-03
α_3		1.19E-02	1.78E-02	2.17E-02	2.06E-02	1.62E-02	1.13E-02
α_4			6.91E-03	8.27E-03	1.10E-02	1.17E-02	1.09E-02
α_5				7.53E-04	3.62E-03	6.68E-03	7.07E-03
α_6					9.41E-04	2.09E-03	4.19E-03
α_7						1.65E-04	1.16E-03
α_8							7.47E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.60E-01	9.45E-01	9.41E-01	9.43E-01	9.49E-01	9.52E-01	9.57E-01
Beta	3.96E-02	5.54E-02	5.94E-02	5.67E-02	5.06E-02	4.80E-02	4.32E-02
Gamma		2.14E-01	4.15E-01	5.41E-01	7.13E-01	7.67E-01	8.04E-01
Delta			2.80E-01	2.94E-01	4.30E-01	5.60E-01	6.73E-01
Epsilon				8.34E-02	2.94E-01	4.33E-01	5.35E-01
Mu					2.06E-01	2.52E-01	4.34E-01
Omega						7.31E-02	2.28E-01
Sigma							6.03E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	1.78	2.67	3.56	4.44	5.33	6.22	7.11
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 39.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.245

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9547409	0.9859230	0.9910544	0.9996025	5.631E+01	8.039E-01	--
α_2	3.98E-04	1.41E-02	8.95E-03	4.53E-02	8.039E-01	5.631E+01	0.751

CCCG = 3, Gamma = 0.242

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9454515	0.9763961	0.9798651	0.9954714	8.697E+01	2.103E+00	--
α_2	3.39E-03	2.15E-02	1.78E-02	5.20E-02	1.810E+00	8.257E+01	1.059
α_3	1.80E-07	2.15E-03	5.03E-04	9.91E-03	2.921E-01	1.357E+02	0.657

CCCG = 4, Gamma = 0.240

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9600910	0.9809291	0.9829606	0.9948220	1.519E+02	2.953E+00	--
α_2	1.66E-03	1.06E-02	8.75E-03	2.58E-02	1.812E+00	1.693E+02	0.878
α_3	3.19E-04	7.43E-03	5.03E-03	2.27E-02	9.307E-01	1.243E+02	1.199
α_4	2.09E-09	1.05E-03	1.24E-04	5.34E-03	2.099E-01	1.998E+02	0.751

CCCG = 5, Gamma = 0.239

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9684530	0.9835188	0.9847949	0.9942243	2.451E+02	4.107E+00	--
α_2	1.18E-03	6.87E-03	5.74E-03	1.64E-02	1.934E+00	2.795E+02	0.908
α_3	6.99E-04	6.33E-03	4.96E-03	1.67E-02	1.443E+00	2.263E+02	1.122
α_4	3.45E-05	2.95E-03	1.61E-03	1.04E-02	6.316E-01	2.138E+02	1.192
α_5	1.32E-16	3.31E-04	1.81E-06	1.92E-03	9.865E-02	2.981E+02	0.857

CCCG = 6, Gamma = 0.238

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9731496	0.9853964	0.9863651	0.9943344	3.254E+02	4.822E+00	--
α_2	7.50E-04	4.69E-03	3.88E-03	1.14E-02	1.839E+00	3.900E+02	0.850
α_3	5.39E-04	4.66E-03	3.67E-03	1.22E-02	1.483E+00	3.166E+02	1.047
α_4	2.00E-04	3.66E-03	2.57E-03	1.08E-02	1.026E+00	2.795E+02	1.187
α_5	9.23E-07	1.30E-03	4.43E-04	5.51E-03	3.786E-01	2.907E+02	1.144
α_6	4.69E-17	2.90E-04	1.31E-06	1.69E-03	9.572E-02	3.305E+02	1.007

CCCG = 7, Gamma = 0.238

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9761098	0.9862086	0.9869238	0.9938651	4.430E+02	6.195E+00	--
α_2	8.29E-04	4.22E-03	3.60E-03	9.74E-03	2.168E+00	5.116E+02	0.918
α_3	4.37E-04	3.45E-03	2.76E-03	8.84E-03	1.570E+00	4.534E+02	1.037
α_4	3.39E-04	3.36E-03	2.59E-03	9.01E-03	1.372E+00	4.067E+02	1.156
α_5	5.01E-05	2.02E-03	1.25E-03	6.63E-03	7.749E-01	3.825E+02	1.231
α_6	1.50E-08	6.26E-04	1.17E-04	3.00E-03	2.581E-01	4.119E+02	1.145
α_7	3.18E-28	1.11E-04	2.53E-09	6.05E-04	5.291E-02	4.746E+02	0.994

CCCG = 8, Gamma = 0.238

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9784119	0.9872631	0.9878638	0.9940632	5.296E+02	6.832E+00	--
α_2	7.64E-04	3.71E-03	3.18E-03	8.45E-03	2.260E+00	6.072E+02	0.906
α_3	2.64E-04	2.48E-03	1.93E-03	6.57E-03	1.416E+00	5.704E+02	0.965
α_4	2.65E-04	2.69E-03	2.07E-03	7.25E-03	1.355E+00	5.016E+02	1.098
α_5	1.41E-04	2.30E-03	1.64E-03	6.72E-03	1.075E+00	4.656E+02	1.183
α_6	3.57E-06	1.09E-03	4.80E-04	4.23E-03	4.834E-01	4.441E+02	1.242
α_7	1.76E-11	3.27E-04	1.93E-05	1.76E-03	1.657E-01	5.071E+02	1.088
α_8	1.27E-20	1.41E-04	1.32E-07	8.20E-04	7.682E-02	5.438E+02	1.015

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.86E-01	9.76E-01	9.81E-01	9.84E-01	9.85E-01	9.86E-01	9.87E-01
α_2	1.41E-02	2.15E-02	1.06E-02	6.87E-03	4.69E-03	4.22E-03	3.71E-03
α_3		2.15E-03	7.43E-03	6.33E-03	4.66E-03	3.45E-03	2.48E-03
α_4			1.05E-03	2.95E-03	3.66E-03	3.36E-03	2.69E-03
α_5				3.31E-04	1.30E-03	2.02E-03	2.30E-03
α_6					2.90E-04	6.26E-04	1.09E-03
α_7						1.11E-04	3.27E-04
α_8							1.41E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.86E-01	9.76E-01	9.81E-01	9.84E-01	9.85E-01	9.86E-01	9.87E-01
Beta	1.41E-02	2.36E-02	1.91E-02	1.65E-02	1.46E-02	1.38E-02	1.27E-02
Gamma		9.10E-02	4.45E-01	5.83E-01	6.79E-01	6.94E-01	7.09E-01
Delta			1.24E-01	3.41E-01	5.30E-01	6.39E-01	7.26E-01
Epsilon				1.01E-01	3.03E-01	4.51E-01	5.89E-01
Mu					1.82E-01	2.67E-01	4.03E-01
Omega						1.51E-01	3.01E-01
Sigma							3.02E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	17.33	26.00	34.67	43.33	52.00	60.67	69.33
N_1	0.6667	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.3333	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313
N_3		0.0000	0.5000	0.5000	0.3750	0.2500	0.1563

N₄			0.0000	0.2500	0.3750	0.3750	0.3125
N₅				0.0000	0.1250	0.2500	0.3125
N₆					0.0000	0.0625	0.1563
N₇						0.0000	0.0313
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 31.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.187

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9883885	0.9969882	0.9986412	0.9999889	1.633E+02	4.932E-01	--
α_2	1.11E-05	3.01E-03	1.36E-03	1.16E-02	4.932E-01	1.633E+02	0.751

CCCG = 3, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9892900	0.9963447	0.9974036	0.9997836	2.888E+02	1.060E+00	--
α_2	5.26E-05	2.81E-03	1.66E-03	9.49E-03	7.137E-01	2.532E+02	1.059
α_3	3.04E-07	8.45E-04	2.55E-04	3.69E-03	3.458E-01	4.089E+02	0.657

CCCG = 4, Gamma = 0.188

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9913626	0.9962882	0.9968504	0.9992922	5.676E+02	2.115E+00	--
α_2	3.28E-04	2.65E-03	2.11E-03	6.83E-03	1.549E+00	5.825E+02	0.878
α_3	1.93E-08	6.19E-04	1.21E-04	2.94E-03	2.646E-01	4.273E+02	1.199
α_4	4.87E-08	4.41E-04	1.08E-04	2.01E-03	3.010E-01	6.823E+02	0.751

CCCG = 5, Gamma = 0.189

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9934798	0.9963791	0.9966015	0.9985188	1.465E+03	5.325E+00	--
α_2	7.31E-04	2.29E-03	2.09E-03	4.56E-03	3.632E+00	1.580E+03	0.908
α_3	1.04E-04	1.06E-03	8.11E-04	2.85E-03	1.354E+00	1.280E+03	1.122
α_4	2.33E-08	2.45E-04	5.86E-05	1.13E-03	2.961E-01	1.206E+03	1.192
α_5	7.53E-35	2.53E-05	2.78E-11	1.25E-04	4.243E-02	1.678E+03	0.857

CCCG = 6, Gamma = 0.189

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9934629	0.9964366	0.9966725	0.9986046	1.380E+03	4.936E+00	--
α_2	5.03E-04	1.89E-03	1.68E-03	4.00E-03	2.915E+00	1.539E+03	0.850
α_3	8.57E-05	1.00E-03	7.55E-04	2.78E-03	1.257E+00	1.250E+03	1.047
α_4	1.85E-06	4.56E-04	2.09E-04	1.75E-03	5.031E-01	1.103E+03	1.187
α_5	2.92E-15	1.01E-04	1.33E-06	5.78E-04	1.155E-01	1.145E+03	1.144
α_6	5.22E-13	1.12E-04	4.09E-06	6.18E-04	1.451E-01	1.300E+03	1.007

CCCG = 7, Gamma = 0.189

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944826	0.9965082	0.9966272	0.9981277	2.755E+03	9.654E+00	--
α_2	6.21E-04	1.60E-03	1.49E-03	2.95E-03	4.851E+00	3.023E+03	0.918
α_3	2.68E-04	1.04E-03	9.23E-04	2.24E-03	2.800E+00	2.678E+03	1.037
α_4	5.88E-05	5.76E-04	4.45E-04	1.54E-03	1.384E+00	2.403E+03	1.156
α_5	7.68E-07	2.17E-04	9.70E-05	8.40E-04	4.902E-01	2.258E+03	1.231
α_6	1.12E-15	4.72E-05	5.98E-07	2.71E-04	1.146E-01	2.429E+03	1.145
α_7	2.75E-93	5.23E-06	5.57E-25	6.22E-06	1.464E-02	2.797E+03	0.994

CCCG = 8, Gamma = 0.189

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9944054	0.9966747	0.9968274	0.9984226	2.142E+03	7.148E+00	--
α_2	3.45E-04	1.27E-03	1.13E-03	2.67E-03	2.980E+00	2.342E+03	0.906
α_3	1.54E-04	8.91E-04	7.45E-04	2.13E-03	1.960E+00	2.198E+03	0.965
α_4	4.41E-05	6.02E-04	4.42E-04	1.71E-03	1.166E+00	1.934E+03	1.098
α_5	1.70E-06	2.99E-04	1.45E-04	1.12E-03	5.375E-01	1.795E+03	1.183
α_6	2.33E-11	1.06E-04	8.19E-06	5.58E-04	1.805E-01	1.710E+03	1.242
α_7	1.10E-35	2.12E-05	1.59E-11	1.04E-04	4.139E-02	1.952E+03	1.088
α_8	8.24E-09	1.35E-04	2.98E-05	6.30E-04	2.827E-01	2.092E+03	1.015

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
α_2	3.01E-03	2.81E-03	2.65E-03	2.29E-03	1.89E-03	1.60E-03	1.27E-03
α_3		8.45E-04	6.19E-04	1.06E-03	1.00E-03	1.04E-03	8.91E-04
α_4			4.41E-04	2.45E-04	4.56E-04	5.76E-04	6.02E-04
α_5				2.53E-05	1.01E-04	2.17E-04	2.99E-04
α_6					1.12E-04	4.72E-05	1.06E-04
α_7						5.23E-06	2.12E-05
α_8							1.35E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
Beta	3.01E-03	3.66E-03	3.71E-03	3.62E-03	3.56E-03	3.49E-03	3.33E-03
Gamma		2.31E-01	2.86E-01	3.67E-01	4.69E-01	5.41E-01	6.18E-01
Delta			4.16E-01	2.04E-01	4.00E-01	4.47E-01	5.66E-01
Epsilon				9.34E-02	3.18E-01	3.19E-01	4.82E-01
Mu					5.25E-01	1.95E-01	4.67E-01
Omega						9.99E-02	5.97E-01
Sigma							8.64E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	14.00	21.00	28.00	35.00	42.00	49.00	56.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.15 Reactor Trip Breakers

2.15.1 Reactor Protection System Reactor Trip Breakers

2.15.1.1 RPS-RTB-CC: Reactor Trip Breakers Fail to Open

Generic CCF Parameters

System Group: Electrical
System: Reactor Protection
Component Group: Electrical
Component Type: Circuit Breaker
Component Subtype: Reactor Trip Breaker
Failure Mode: Fail to Open
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 7.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9389691	0.9843727	0.9931626	0.9999527	1.0000000	2.951E+01	4.685E-01
α_2	4.41E-05	1.56E-02	6.84E-03	6.10E-02	0.00E+00	4.685E-01	2.951E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9514870	0.9829619	0.9875242	0.9988253	1.0000000	6.508E+01	1.128E+00
α_2	4.31E-04	1.29E-02	8.39E-03	4.05E-02	0.00E+00	8.512E-01	6.536E+01
α_3	2.09E-07	4.18E-03	8.96E-04	1.96E-02	0.00E+00	2.768E-01	6.593E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9545324	0.9810010	0.9841180	0.9968157	1.0000000	9.778E+01	1.894E+00
α_2	1.09E-03	1.26E-02	9.56E-03	3.47E-02	0.00E+00	1.260E+00	9.841E+01
α_3	4.39E-06	4.04E-03	1.48E-03	1.67E-02	0.00E+00	4.024E-01	9.927E+01
α_4	1.61E-08	2.32E-03	3.46E-04	1.15E-02	0.00E+00	2.315E-01	9.944E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9657802	0.9829560	0.9845270	0.9947609	1.0000000	1.979E+02	3.432E+00
α_2	1.63E-03	9.56E-03	7.99E-03	2.28E-02	0.00E+00	1.924E+00	1.994E+02
α_3	3.02E-04	5.21E-03	3.69E-03	1.53E-02	0.00E+00	1.049E+00	2.003E+02
α_4	1.44E-06	1.90E-03	6.54E-04	8.01E-03	0.00E+00	3.822E-01	2.010E+02
α_5	3.31E-20	3.81E-04	3.55E-07	2.21E-03	0.00E+00	7.674E-02	2.013E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
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α_1	0.9683501	0.9837610	0.9851049	0.9945722	1.0000000	2.323E+02	3.835E+00
α_2	1.03E-03	7.20E-03	5.87E-03	1.79E-02	0.00E+00	1.701E+00	2.345E+02
α_3	4.03E-04	5.11E-03	3.80E-03	1.43E-02	0.00E+00	1.207E+00	2.349E+02
α_4	2.31E-05	2.52E-03	1.33E-03	9.09E-03	0.00E+00	5.960E-01	2.356E+02
α_5	3.67E-09	9.36E-04	1.25E-04	4.70E-03	0.00E+00	2.211E-01	2.359E+02
α_6	3.66E-15	4.65E-04	4.71E-06	2.68E-03	0.00E+00	1.098E-01	2.360E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9736734	0.9850581	0.9858887	0.9935993	1.0000000	3.789E+02	5.747E+00
α_2	1.19E-03	5.83E-03	5.00E-03	1.33E-02	0.00E+00	2.243E+00	3.824E+02
α_3	5.68E-04	4.24E-03	3.41E-03	1.07E-02	0.00E+00	1.630E+00	3.830E+02
α_4	1.75E-04	2.82E-03	2.01E-03	8.19E-03	0.00E+00	1.083E+00	3.836E+02
α_5	1.06E-05	1.47E-03	7.41E-04	5.40E-03	0.00E+00	5.654E-01	3.841E+02
α_6	2.74E-10	4.98E-04	4.60E-05	2.60E-03	0.00E+00	1.916E-01	3.845E+02
α_7	6.20E-41	9.05E-05	3.37E-12	3.97E-04	0.00E+00	3.480E-02	3.846E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9749260	0.9857872	0.9865815	0.9939244	1.0000000	3.971E+02	5.726E+00
α_2	9.03E-04	5.01E-03	4.22E-03	1.18E-02	0.00E+00	2.018E+00	4.008E+02
α_3	3.56E-04	3.45E-03	2.67E-03	9.21E-03	0.00E+00	1.391E+00	4.015E+02
α_4	1.57E-04	2.64E-03	1.87E-03	7.72E-03	0.00E+00	1.062E+00	4.018E+02
α_5	3.08E-05	1.74E-03	1.02E-03	5.92E-03	0.00E+00	7.026E-01	4.021E+02
α_6	3.41E-07	8.68E-04	2.66E-04	3.78E-03	0.00E+00	3.497E-01	4.025E+02
α_7	1.31E-15	2.68E-04	2.46E-06	1.55E-03	0.00E+00	1.078E-01	4.027E+02
α_8	2.74E-17	2.35E-04	9.96E-07	1.37E-03	0.00E+00	9.469E-02	4.028E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.83E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
α_2	1.56E-02	1.29E-02	1.26E-02	9.56E-03	7.20E-03	5.83E-03	5.01E-03
α_3		4.18E-03	4.04E-03	5.21E-03	5.11E-03	4.24E-03	3.45E-03
α_4			2.32E-03	1.90E-03	2.52E-03	2.82E-03	2.64E-03
α_5				3.81E-04	9.36E-04	1.47E-03	1.74E-03
α_6					4.65E-04	4.98E-04	8.68E-04
α_7						9.05E-05	2.68E-04
α_8							2.35E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.83E-01	9.81E-01	9.83E-01	9.84E-01	9.85E-01	9.86E-01
Beta	1.56E-02	1.70E-02	1.90E-02	1.70E-02	1.62E-02	1.49E-02	1.42E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01

Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.10	7.10	7.10	7.10	7.10	7.10	7.10
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 4.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.577

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9535105	0.9879808	0.9946116	0.9999598	3.974E+01	4.834E-01	--
α_2	4.02E-05	1.20E-02	5.39E-03	4.65E-02	4.834E-01	3.974E+01	1.204

CCCG = 3, Gamma = 0.577

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9653739	0.9875131	0.9906353	0.9989769	9.693E+01	1.226E+00	--
α_2	4.82E-04	9.88E-03	6.83E-03	2.97E-02	9.769E-01	9.792E+01	1.365
α_3	4.18E-08	2.61E-03	4.54E-04	1.27E-02	2.487E-01	9.508E+01	1.416

CCCG = 4, Gamma = 0.577

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9636592	0.9844369	0.9868074	0.9971072	1.301E+02	2.057E+00	--
α_2	1.17E-03	1.06E-02	8.31E-03	2.78E-02	1.442E+00	1.346E+02	1.382
α_3	3.94E-06	3.14E-03	1.18E-03	1.29E-02	4.114E-01	1.305E+02	1.436
α_4	2.40E-09	1.82E-03	1.99E-04	9.35E-03	2.036E-01	1.115E+02	1.683

CCCG = 5, Gamma = 0.577

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9713963	0.9854917	0.9867469	0.9952980	2.502E+02	3.683E+00	--
α_2	1.77E-03	8.62E-03	7.40E-03	1.97E-02	2.243E+00	2.578E+02	1.378
α_3	2.10E-04	4.17E-03	2.89E-03	1.25E-02	9.912E-01	2.367E+02	1.507
α_4	1.00E-06	1.47E-03	4.96E-04	6.22E-03	3.765E-01	2.562E+02	1.397
α_5	2.14E-21	2.47E-04	1.41E-07	1.43E-03	7.237E-02	2.925E+02	1.225

CCCG = 6, Gamma = 0.577

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9728900	0.9858193	0.9869138	0.9950094	2.877E+02	4.139E+00	--
α_2	1.30E-03	6.74E-03	5.73E-03	1.56E-02	2.128E+00	3.136E+02	1.294
α_3	3.01E-04	4.35E-03	3.17E-03	1.25E-02	1.134E+00	2.593E+02	1.569
α_4	1.27E-05	1.95E-03	9.67E-04	7.21E-03	5.533E-01	2.834E+02	1.439
α_5	2.85E-09	7.33E-04	9.79E-05	3.68E-03	2.210E-01	3.014E+02	1.355
α_6	5.17E-16	4.06E-04	2.82E-06	2.35E-03	1.027E-01	2.531E+02	1.613

CCCG = 7, Gamma = 0.577

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9776837	0.9870094	0.9876595	0.9941154	4.887E+02	6.432E+00	--
α_2	1.38E-03	5.29E-03	4.69E-03	1.13E-02	2.840E+00	5.337E+02	1.289
α_3	5.66E-04	3.81E-03	3.12E-03	9.42E-03	1.746E+00	4.566E+02	1.509
α_4	1.43E-04	2.29E-03	1.64E-03	6.67E-03	1.084E+00	4.717E+02	1.463
α_5	6.60E-06	1.16E-03	5.62E-04	4.34E-03	5.376E-01	4.632E+02	1.491
α_6	3.43E-10	3.90E-04	3.94E-05	2.02E-03	1.979E-01	5.070E+02	1.364
α_7	1.02E-52	4.55E-05	4.56E-15	1.56E-04	2.656E-02	5.831E+02	1.186

CCCG = 8, Gamma = 0.577

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9785585	0.9876657	0.9883157	0.9945531	4.894E+02	6.112E+00	--
α_2	9.47E-04	4.37E-03	3.78E-03	9.83E-03	2.364E+00	5.383E+02	1.279
α_3	3.81E-04	3.20E-03	2.53E-03	8.29E-03	1.512E+00	4.714E+02	1.462
α_4	1.32E-04	2.25E-03	1.59E-03	6.60E-03	1.056E+00	4.684E+02	1.473
α_5	2.10E-05	1.39E-03	7.89E-04	4.78E-03	6.745E-01	4.861E+02	1.420
α_6	9.58E-08	7.13E-04	1.81E-04	3.23E-03	3.076E-01	4.313E+02	1.602
α_7	1.42E-15	2.03E-04	2.00E-06	1.17E-03	1.093E-01	5.382E+02	1.284
α_8	3.30E-18	2.14E-04	5.94E-07	1.25E-03	8.885E-02	4.151E+02	1.665

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.88E-01	9.88E-01	9.84E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.20E-02	9.88E-03	1.06E-02	8.62E-03	6.74E-03	5.29E-03	4.37E-03
α_3		2.61E-03	3.14E-03	4.17E-03	4.35E-03	3.81E-03	3.20E-03
α_4			1.82E-03	1.47E-03	1.95E-03	2.29E-03	2.25E-03
α_5				2.47E-04	7.33E-04	1.16E-03	1.39E-03
α_6					4.06E-04	3.90E-04	7.13E-04
α_7						4.55E-05	2.03E-04
α_8							2.14E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.88E-01	9.88E-01	9.84E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.20E-02	1.25E-02	1.56E-02	1.45E-02	1.42E-02	1.30E-02	1.23E-02
Gamma		2.09E-01	3.19E-01	4.06E-01	5.25E-01	5.93E-01	6.45E-01
Delta			3.67E-01	2.91E-01	4.15E-01	5.05E-01	5.98E-01
Epsilon				1.44E-01	3.69E-01	4.10E-01	5.28E-01
Mu					3.56E-01	2.73E-01	4.49E-01
Omega						1.05E-01	3.69E-01
Sigma							5.13E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	4.10	4.10	4.10	4.10	4.10	4.10	4.10
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 3.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.423

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9200219	0.9794417	0.9909029	0.9999400	2.242E+01	4.706E-01	--
α_2	6.00E-05	2.06E-02	9.10E-03	8.00E-02	4.706E-01	2.242E+01	1.204

CCCG = 3, Gamma = 0.423

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9334651	0.9767420	0.9830433	0.9984634	4.630E+01	1.103E+00	--
α_2	4.92E-04	1.69E-02	1.08E-02	5.42E-02	8.104E-01	4.706E+01	1.365
α_3	5.36E-07	6.33E-03	1.50E-03	2.92E-02	2.921E-01	4.585E+01	1.416

CCCG = 4, Gamma = 0.423

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9439641	0.9763053	0.9800447	0.9958504	8.045E+01	1.953E+00	--
α_2	1.45E-03	1.54E-02	1.18E-02	4.17E-02	1.312E+00	8.373E+01	1.382
α_3	8.88E-06	5.26E-03	2.09E-03	2.13E-02	4.307E-01	8.142E+01	1.436
α_4	6.01E-09	3.01E-03	3.56E-04	1.53E-02	2.099E-01	6.962E+01	1.683

CCCG = 5, Gamma = 0.423

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577197	0.9794906	0.9815634	0.9941752	1.484E+02	3.107E+00	--
α_2	1.53E-03	1.08E-02	8.81E-03	2.70E-02	1.684E+00	1.538E+02	1.378
α_3	2.94E-04	6.63E-03	4.51E-03	2.02E-02	9.426E-01	1.412E+02	1.507
α_4	1.87E-06	2.49E-03	8.56E-04	1.05E-02	3.816E-01	1.531E+02	1.397
α_5	2.25E-16	5.64E-04	3.09E-06	3.28E-03	9.865E-02	1.749E+02	1.225

CCCG = 6, Gamma = 0.423

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9628695	0.9809479	0.9825234	0.9936424	1.968E+02	3.822E+00	--
α_2	1.14E-03	7.84E-03	6.40E-03	1.95E-02	1.714E+00	2.170E+02	1.294
α_3	4.04E-04	6.14E-03	4.44E-03	1.77E-02	1.108E+00	1.792E+02	1.569
α_4	4.38E-05	3.31E-03	1.85E-03	1.15E-02	6.509E-01	1.960E+02	1.439
α_5	2.41E-08	1.21E-03	2.19E-04	5.85E-03	2.536E-01	2.086E+02	1.355
α_6	8.86E-17	5.46E-04	2.48E-06	3.18E-03	9.572E-02	1.753E+02	1.613

CCCG = 7, Gamma = 0.423

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9682412	0.9823913	0.9834701	0.9928565	2.898E+02	5.195E+00	--
α_2	1.25E-03	6.57E-03	5.57E-03	1.53E-02	2.105E+00	3.184E+02	1.289
α_3	4.53E-04	4.82E-03	3.68E-03	1.31E-02	1.320E+00	2.725E+02	1.509
α_4	1.80E-04	3.53E-03	2.45E-03	1.06E-02	9.967E-01	2.814E+02	1.463
α_5	9.59E-06	1.89E-03	9.01E-04	7.15E-03	5.249E-01	2.765E+02	1.491
α_6	4.80E-10	6.46E-04	6.32E-05	3.35E-03	1.956E-01	3.028E+02	1.364
α_7	4.33E-28	1.52E-04	3.44E-09	8.24E-04	5.291E-02	3.483E+02	1.186

CCCG = 8, Gamma = 0.423

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9705496	0.9832200	0.9841384	0.9927539	3.417E+02	5.832E+00	--
α_2	1.19E-03	5.88E-03	5.04E-03	1.34E-02	2.229E+00	3.768E+02	1.279
α_3	3.26E-04	3.80E-03	2.86E-03	1.05E-02	1.260E+00	3.303E+02	1.462
α_4	1.80E-04	3.17E-03	2.23E-03	9.33E-03	1.042E+00	3.281E+02	1.473
α_5	5.25E-05	2.23E-03	1.37E-03	7.36E-03	7.626E-01	3.406E+02	1.420
α_6	2.47E-07	1.08E-03	3.02E-04	4.81E-03	3.271E-01	3.023E+02	1.602
α_7	3.45E-13	3.56E-04	9.55E-06	2.00E-03	1.344E-01	3.773E+02	1.284
α_8	2.38E-20	2.64E-04	2.48E-07	1.53E-03	7.682E-02	2.911E+02	1.665

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.79E-01	9.77E-01	9.76E-01	9.79E-01	9.81E-01	9.82E-01	9.83E-01
α_2	2.06E-02	1.69E-02	1.54E-02	1.08E-02	7.84E-03	6.57E-03	5.88E-03
α_3		6.33E-03	5.26E-03	6.63E-03	6.14E-03	4.82E-03	3.80E-03
α_4			3.01E-03	2.49E-03	3.31E-03	3.53E-03	3.17E-03
α_5				5.64E-04	1.21E-03	1.89E-03	2.23E-03
α_6					5.46E-04	6.46E-04	1.08E-03
α_7						1.52E-04	3.56E-04
α_8							2.64E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.79E-01	9.77E-01	9.76E-01	9.79E-01	9.81E-01	9.82E-01	9.83E-01
Beta	2.06E-02	2.33E-02	2.37E-02	2.05E-02	1.91E-02	1.76E-02	1.68E-02
Gamma		2.72E-01	3.49E-01	4.72E-01	5.89E-01	6.27E-01	6.50E-01
Delta			3.64E-01	3.15E-01	4.52E-01	5.63E-01	6.51E-01
Epsilon				1.85E-01	3.47E-01	4.33E-01	5.54E-01
Mu					3.10E-01	2.96E-01	4.32E-01
Omega						1.90E-01	3.65E-01
Sigma							4.26E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	3.00	3.00	3.00	3.00	3.00	3.00	3.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.16 Air Compressors

2.16.1 Motor-Driven Air Compressors

2.16.1.1 ALL-MDC-FS: Motor-Driven Air Compressors Fail to Start

Generic CCF Parameters

Component Group: Other
Component Type: Compressor
Component Subtype: Motor Driven
Failure Mode: Fail to Start
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 178.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9908468	0.9976688	0.9990000	0.9999873	1.0000000	2.005E+02	4.685E-01
α_2	6.45E-06	2.33E-03	1.00E-03	9.16E-03	0.00E+00	4.685E-01	2.005E+02

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9863742	0.9952445	0.9965412	0.9996729	1.0000000	2.361E+02	1.128E+00
α_2	1.19E-04	3.59E-03	2.33E-03	1.14E-02	0.00E+00	8.512E-01	2.364E+02
α_3	5.80E-08	1.17E-03	2.48E-04	5.48E-03	0.00E+00	2.768E-01	2.369E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9831699	0.9930039	0.9941727	0.9988381	1.0000000	2.688E+02	1.894E+00
α_2	4.00E-04	4.65E-03	3.51E-03	1.28E-02	0.00E+00	1.260E+00	2.694E+02
α_3	1.61E-06	1.49E-03	5.44E-04	6.16E-03	0.00E+00	4.024E-01	2.703E+02
α_4	5.92E-09	8.55E-04	1.27E-04	4.23E-03	0.00E+00	2.315E-01	2.704E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9814418	0.9907829	0.9916488	0.9971744	1.0000000	3.689E+02	3.432E+00
α_2	8.77E-04	5.17E-03	4.31E-03	1.24E-02	0.00E+00	1.924E+00	3.704E+02
α_3	1.63E-04	2.82E-03	1.99E-03	8.29E-03	0.00E+00	1.049E+00	3.713E+02
α_4	7.79E-07	1.03E-03	3.53E-04	4.33E-03	0.00E+00	3.822E-01	3.720E+02
α_5	1.79E-20	2.06E-04	1.92E-07	1.20E-03	0.00E+00	7.674E-02	3.723E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9815992	0.9905812	0.9913747	0.9968620	1.0000000	4.033E+02	3.835E+00
α_2	5.98E-04	4.18E-03	3.40E-03	1.04E-02	0.00E+00	1.701E+00	4.055E+02

α_3	2.33E-04	2.96E-03	2.20E-03	8.30E-03	0.00E+00	1.207E+00	4.059E+02
α_4	1.34E-05	1.46E-03	7.68E-04	5.28E-03	0.00E+00	5.960E-01	4.066E+02
α_5	2.12E-09	5.43E-04	7.25E-05	2.72E-03	0.00E+00	2.211E-01	4.069E+02
α_6	2.12E-15	2.70E-04	2.73E-06	1.55E-03	0.00E+00	1.098E-01	4.070E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9817508	0.9896565	0.9902357	0.9955798	1.0000000	5.499E+02	5.747E+00
α_2	8.25E-04	4.04E-03	3.46E-03	9.22E-03	0.00E+00	2.243E+00	5.534E+02
α_3	3.93E-04	2.93E-03	2.36E-03	7.42E-03	0.00E+00	1.630E+00	5.540E+02
α_4	1.21E-04	1.95E-03	1.39E-03	5.67E-03	0.00E+00	1.083E+00	5.546E+02
α_5	7.35E-06	1.02E-03	5.13E-04	3.74E-03	0.00E+00	5.654E-01	5.551E+02
α_6	1.89E-10	3.45E-04	3.18E-05	1.80E-03	0.00E+00	1.916E-01	5.555E+02
α_7	4.29E-41	6.26E-05	2.33E-12	2.75E-04	0.00E+00	3.480E-02	5.556E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9823795	0.9900225	0.9905884	0.9957457	1.0000000	5.681E+02	5.726E+00
α_2	6.33E-04	3.52E-03	2.96E-03	8.31E-03	0.00E+00	2.018E+00	5.718E+02
α_3	2.50E-04	2.42E-03	1.88E-03	6.47E-03	0.00E+00	1.391E+00	5.725E+02
α_4	1.10E-04	1.85E-03	1.31E-03	5.42E-03	0.00E+00	1.062E+00	5.728E+02
α_5	2.16E-05	1.22E-03	7.15E-04	4.16E-03	0.00E+00	7.026E-01	5.731E+02
α_6	2.39E-07	6.09E-04	1.87E-04	2.65E-03	0.00E+00	3.497E-01	5.735E+02
α_7	9.19E-16	1.88E-04	1.72E-06	1.09E-03	0.00E+00	1.078E-01	5.737E+02
α_8	1.92E-17	1.65E-04	6.99E-07	9.61E-04	0.00E+00	9.469E-02	5.738E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.95E-01	9.93E-01	9.91E-01	9.91E-01	9.90E-01	9.90E-01
α_2	2.33E-03	3.59E-03	4.65E-03	5.17E-03	4.18E-03	4.04E-03	3.52E-03
α_3		1.17E-03	1.49E-03	2.82E-03	2.96E-03	2.93E-03	2.42E-03
α_4			8.55E-04	1.03E-03	1.46E-03	1.95E-03	1.85E-03
α_5				2.06E-04	5.43E-04	1.02E-03	1.22E-03
α_6					2.70E-04	3.45E-04	6.09E-04
α_7						6.26E-05	1.88E-04
α_8							1.65E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.95E-01	9.93E-01	9.91E-01	9.91E-01	9.90E-01	9.90E-01
Beta	2.33E-03	4.76E-03	7.00E-03	9.22E-03	9.42E-03	1.03E-02	9.98E-03
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	178.10	178.10	178.10	178.10	178.10	178.10	178.10
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 87.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.491

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9950191	0.9987182	0.9994335	0.9999958	3.766E+02	4.834E-01	--
α_2	4.21E-06	1.28E-03	5.67E-04	4.98E-03	4.834E-01	3.766E+02	0.350

CCCG = 3, Gamma = 0.491

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9926350	0.9973569	0.9980282	0.9997853	4.625E+02	1.226E+00	--
α_2	1.02E-04	2.10E-03	1.44E-03	6.33E-03	9.769E-01	4.650E+02	0.469
α_3	8.71E-09	5.46E-04	9.46E-05	2.65E-03	2.487E-01	4.549E+02	0.480

CCCG = 4, Gamma = 0.491

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9901032	0.9957827	0.9964381	0.9992219	4.857E+02	2.057E+00	--
α_2	3.21E-04	2.91E-03	2.28E-03	7.68E-03	1.442E+00	4.935E+02	0.549
α_3	1.08E-06	8.61E-04	3.23E-04	3.54E-03	4.114E-01	4.771E+02	0.568
α_4	5.79E-10	4.42E-04	4.81E-05	2.27E-03	2.036E-01	4.604E+02	0.589

CCCG = 5, Gamma = 0.491

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9882720	0.9940696	0.9945910	0.9980859	6.174E+02	3.683E+00	--
α_2	7.24E-04	3.55E-03	3.04E-03	8.10E-03	2.243E+00	6.303E+02	0.698
α_3	8.22E-05	1.64E-03	1.13E-03	4.91E-03	9.912E-01	6.052E+02	0.729
α_4	4.26E-07	6.25E-04	2.11E-04	2.65E-03	3.765E-01	6.017E+02	0.734
α_5	1.07E-21	1.24E-04	7.06E-08	7.16E-04	7.237E-02	5.835E+02	0.757

CCCG = 6, Gamma = 0.491

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9880812	0.9937825	0.9942697	0.9978197	6.616E+02	4.139E+00	--
α_2	5.89E-04	3.07E-03	2.60E-03	7.12E-03	2.128E+00	6.917E+02	0.709
α_3	1.21E-04	1.75E-03	1.27E-03	5.01E-03	1.134E+00	6.467E+02	0.759
α_4	5.62E-06	8.60E-04	4.26E-04	3.18E-03	5.533E-01	6.429E+02	0.765
α_5	1.32E-09	3.40E-04	4.54E-05	1.71E-03	2.210E-01	6.498E+02	0.757
α_6	2.55E-16	2.00E-04	1.39E-06	1.16E-03	1.027E-01	5.125E+02	0.960

CCCG = 7, Gamma = 0.491

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9880821	0.9930745	0.9934252	0.9968696	9.223E+02	6.432E+00	--
α_2	7.62E-04	2.93E-03	2.60E-03	6.25E-03	2.840E+00	9.656E+02	0.800
α_3	2.86E-04	1.93E-03	1.58E-03	4.77E-03	1.746E+00	9.045E+02	0.855
α_4	7.51E-05	1.21E-03	8.63E-04	3.51E-03	1.084E+00	8.974E+02	0.863
α_5	3.43E-06	6.03E-04	2.92E-04	2.25E-03	5.376E-01	8.917E+02	0.869
α_6	1.96E-10	2.23E-04	2.25E-05	1.15E-03	1.979E-01	8.868E+02	0.874
α_7	7.63E-53	3.41E-05	3.41E-15	1.16E-04	2.656E-02	7.792E+02	0.995

CCCG = 8, Gamma = 0.491

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9884330	0.9933571	0.9937111	0.9970725	9.140E+02	6.112E+00	--
α_2	5.31E-04	2.45E-03	2.12E-03	5.52E-03	2.364E+00	9.609E+02	0.804
α_3	1.97E-04	1.66E-03	1.31E-03	4.30E-03	1.512E+00	9.119E+02	0.848
α_4	6.95E-05	1.19E-03	8.40E-04	3.48E-03	1.056E+00	8.896E+02	0.870
α_5	1.14E-05	7.54E-04	4.29E-04	2.60E-03	6.745E-01	8.941E+02	0.866
α_6	4.66E-08	3.47E-04	8.82E-05	1.58E-03	3.076E-01	8.859E+02	0.874
α_7	8.89E-16	1.27E-04	1.25E-06	7.33E-04	1.093E-01	8.597E+02	0.901
α_8	1.85E-18	1.20E-04	3.33E-07	6.98E-04	8.885E-02	7.415E+02	1.045

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.99E-01	9.97E-01	9.96E-01	9.94E-01	9.94E-01	9.93E-01	9.93E-01
α_2	1.28E-03	2.10E-03	2.91E-03	3.55E-03	3.07E-03	2.93E-03	2.45E-03
α_3		5.46E-04	8.61E-04	1.64E-03	1.75E-03	1.93E-03	1.66E-03
α_4			4.42E-04	6.25E-04	8.60E-04	1.21E-03	1.19E-03
α_5				1.24E-04	3.40E-04	6.03E-04	7.54E-04
α_6					2.00E-04	2.23E-04	3.47E-04
α_7						3.41E-05	1.27E-04
α_8							1.20E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.99E-01	9.97E-01	9.96E-01	9.94E-01	9.94E-01	9.93E-01	9.93E-01
Beta	1.28E-03	2.64E-03	4.22E-03	5.93E-03	6.22E-03	6.93E-03	6.64E-03
Gamma		2.07E-01	3.09E-01	4.02E-01	5.07E-01	5.77E-01	6.31E-01
Delta			3.39E-01	3.14E-01	4.44E-01	5.17E-01	6.05E-01
Epsilon				1.65E-01	3.86E-01	4.16E-01	5.32E-01
Mu					3.71E-01	2.99E-01	4.41E-01
Omega						1.33E-01	4.16E-01
Sigma							4.85E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	87.50	87.50	87.50	87.50	87.50	87.50	87.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 27.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.152

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9847696	0.9961754	0.9984171	0.9999916	1.172E+02	4.498E-01	--
α_2	8.37E-06	3.82E-03	1.58E-03	1.52E-02	4.498E-01	1.172E+02	0.350

CCCG = 3, Gamma = 0.152

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9750906	0.9911544	0.9934614	0.9993338	1.320E+02	1.178E+00	--
α_2	3.08E-04	7.01E-03	4.76E-03	2.14E-02	9.387E-01	1.329E+02	0.469
α_3	1.91E-08	1.83E-03	2.94E-04	8.98E-03	2.396E-01	1.305E+02	0.480

CCCG = 4, Gamma = 0.152

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9679669	0.9866376	0.9888447	0.9977596	1.402E+02	1.898E+00	--
α_2	7.98E-04	8.90E-03	6.76E-03	2.43E-02	1.285E+00	1.431E+02	0.549
α_3	2.59E-06	2.82E-03	1.01E-03	1.18E-02	3.927E-01	1.389E+02	0.568
α_4	6.30E-09	1.64E-03	2.19E-04	8.25E-03	2.207E-01	1.341E+02	0.589

CCCG = 5, Gamma = 0.152

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9633763	0.9816449	0.9832995	0.9942582	1.875E+02	3.506E+00	--
α_2	1.82E-03	1.02E-02	8.60E-03	2.42E-02	1.992E+00	1.929E+02	0.698
α_3	3.56E-04	5.77E-03	4.13E-03	1.68E-02	1.078E+00	1.857E+02	0.729
α_4	1.03E-06	1.96E-03	6.33E-04	8.40E-03	3.632E-01	1.851E+02	0.734
α_5	3.72E-21	4.03E-04	2.33E-07	2.33E-03	7.248E-02	1.797E+02	0.757

CCCG = 6, Gamma = 0.152

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9638005	0.9809618	0.9823969	0.9932199	2.164E+02	4.199E+00	--
α_2	1.45E-03	8.43E-03	7.05E-03	2.01E-02	1.941E+00	2.284E+02	0.709
α_3	5.93E-04	6.19E-03	4.75E-03	1.67E-02	1.332E+00	2.137E+02	0.759
α_4	3.10E-05	2.89E-03	1.56E-03	1.03E-02	6.181E-01	2.130E+02	0.765
α_5	7.35E-09	1.07E-03	1.59E-04	5.31E-03	2.313E-01	2.155E+02	0.757
α_6	4.12E-20	4.52E-04	4.25E-07	2.62E-03	7.684E-02	1.701E+02	0.960

CCCG = 7, Gamma = 0.152

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9628911	0.9785074	0.9796003	0.9903914	2.833E+02	6.223E+00	--
α_2	2.15E-03	8.78E-03	7.72E-03	1.90E-02	2.654E+00	2.996E+02	0.800
α_3	7.92E-04	5.82E-03	4.70E-03	1.47E-02	1.645E+00	2.812E+02	0.855
α_4	2.65E-04	3.98E-03	2.88E-03	1.14E-02	1.115E+00	2.793E+02	0.863
α_5	2.09E-05	2.17E-03	1.15E-03	7.77E-03	6.034E-01	2.779E+02	0.869
α_6	1.14E-10	6.43E-04	4.79E-05	3.41E-03	1.780E-01	2.767E+02	0.874
α_7	6.12E-51	1.12E-04	2.31E-14	3.97E-04	2.734E-02	2.432E+02	0.995

CCCG = 8, Gamma = 0.152

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9636580	0.9789365	0.9800046	0.9905676	2.903E+02	6.246E+00	--
α_2	1.86E-03	8.07E-03	7.04E-03	1.78E-02	2.504E+00	3.077E+02	0.804
α_3	5.17E-04	4.82E-03	3.76E-03	1.28E-02	1.419E+00	2.927E+02	0.848
α_4	1.97E-04	3.58E-03	2.51E-03	1.06E-02	1.027E+00	2.857E+02	0.870
α_5	5.25E-05	2.55E-03	1.53E-03	8.51E-03	7.337E-01	2.874E+02	0.866
α_6	1.39E-06	1.39E-03	5.03E-04	5.80E-03	3.975E-01	2.849E+02	0.874
α_7	2.78E-20	2.78E-04	2.67E-07	1.62E-03	7.703E-02	2.768E+02	0.901
α_8	3.40E-18	3.66E-04	9.15E-07	2.14E-03	8.749E-02	2.387E+02	1.045

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.91E-01	9.87E-01	9.82E-01	9.81E-01	9.79E-01	9.79E-01
α_2	3.82E-03	7.01E-03	8.90E-03	1.02E-02	8.43E-03	8.78E-03	8.07E-03
α_3		1.83E-03	2.82E-03	5.77E-03	6.19E-03	5.82E-03	4.82E-03
α_4			1.64E-03	1.96E-03	2.89E-03	3.98E-03	3.58E-03
α_5				4.03E-04	1.07E-03	2.17E-03	2.55E-03
α_6					4.52E-04	6.43E-04	1.39E-03
α_7						1.12E-04	2.78E-04
α_8							3.66E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.91E-01	9.87E-01	9.82E-01	9.81E-01	9.79E-01	9.79E-01
Beta	3.82E-03	8.85E-03	1.34E-02	1.84E-02	1.90E-02	2.15E-02	2.11E-02
Gamma		2.07E-01	3.34E-01	4.43E-01	5.57E-01	5.91E-01	6.17E-01
Delta			3.68E-01	2.90E-01	4.16E-01	5.43E-01	6.29E-01
Epsilon				1.71E-01	3.45E-01	4.24E-01	5.61E-01
Mu					2.96E-01	2.58E-01	4.44E-01
Omega						1.49E-01	3.16E-01
Sigma							5.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	27.00	27.00	27.00	27.00	27.00	27.00	27.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 7.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.039

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9549353	0.9893060	0.9962851	0.9999921	3.516E+01	3.801E-01	--
α_2	7.94E-06	1.07E-02	3.71E-03	4.51E-02	3.801E-01	3.516E+01	0.350

CCCG = 3, Gamma = 0.039

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9337442	0.9779525	0.9847406	0.9989580	4.258E+01	9.600E-01	--
α_2	2.25E-04	1.52E-02	8.73E-03	5.23E-02	6.673E-01	4.319E+01	0.469
α_3	5.90E-07	6.83E-03	1.62E-03	3.15E-02	2.927E-01	4.255E+01	0.480

CCCG = 4, Gamma = 0.039

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9221557	0.9685802	0.9742648	0.9955400	5.145E+01	1.669E+00	--
α_2	1.10E-03	1.92E-02	1.37E-02	5.62E-02	1.039E+00	5.311E+01	0.549
α_3	6.43E-06	7.44E-03	2.64E-03	3.11E-02	3.887E-01	5.186E+01	0.568
α_4	5.50E-08	4.79E-03	7.88E-04	2.34E-02	2.414E-01	5.015E+01	0.589

CCCG = 5, Gamma = 0.039

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9241383	0.9617528	0.9650864	0.9879664	8.768E+01	3.487E+00	--
α_2	2.99E-03	1.92E-02	1.59E-02	4.68E-02	1.791E+00	9.145E+01	0.698
α_3	1.07E-03	1.35E-02	1.01E-02	3.76E-02	1.207E+00	8.814E+01	0.729
α_4	8.64E-06	4.89E-03	1.95E-03	1.97E-02	4.340E-01	8.831E+01	0.734
α_5	1.42E-26	6.39E-04	2.27E-08	3.52E-03	5.493E-02	8.596E+01	0.757

CCCG = 6, Gamma = 0.039

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9294444	0.9633631	0.9662286	0.9874848	1.027E+02	3.905E+00	--
α_2	1.15E-03	1.19E-02	9.14E-03	3.20E-02	1.335E+00	1.109E+02	0.709
α_3	1.79E-03	1.46E-02	1.17E-02	3.75E-02	1.531E+00	1.033E+02	0.759
α_4	1.33E-04	6.91E-03	4.11E-03	2.32E-02	7.191E-01	1.034E+02	0.765
α_5	3.43E-08	2.35E-03	4.01E-04	1.14E-02	2.467E-01	1.049E+02	0.757
α_6	9.66E-21	8.78E-04	5.28E-07	5.09E-03	7.279E-02	8.285E+01	0.960

CCCG = 7, Gamma = 0.039

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9334995	0.9619591	0.9639749	0.9835316	1.459E+02	5.770E+00	--
α_2	1.20E-03	9.67E-03	7.72E-03	2.48E-02	1.549E+00	1.586E+02	0.800
α_3	2.36E-03	1.33E-02	1.12E-02	3.13E-02	1.989E+00	1.479E+02	0.855
α_4	7.79E-04	8.66E-03	6.58E-03	2.37E-02	1.287E+00	1.473E+02	0.863
α_5	7.82E-05	4.69E-03	2.72E-03	1.60E-02	6.913E-01	1.469E+02	0.869
α_6	1.17E-08	1.59E-03	2.39E-04	7.84E-03	2.327E-01	1.464E+02	0.874
α_7	1.11E-64	1.64E-04	2.48E-17	4.13E-04	2.112E-02	1.289E+02	0.995

CCCG = 8, Gamma = 0.039

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9409326	0.9647236	0.9662718	0.9832262	1.919E+02	7.016E+00	--
α_2	9.69E-04	7.53E-03	6.04E-03	1.92E-02	1.583E+00	2.086E+02	0.804
α_3	1.77E-03	9.97E-03	8.38E-03	2.36E-02	1.986E+00	1.973E+02	0.848
α_4	1.20E-03	8.60E-03	6.99E-03	2.15E-02	1.672E+00	1.926E+02	0.870
α_5	2.74E-04	5.18E-03	3.62E-03	1.54E-02	1.011E+00	1.942E+02	0.866
α_6	2.24E-05	2.95E-03	1.50E-03	1.08E-02	5.709E-01	1.928E+02	0.874
α_7	2.21E-10	9.64E-04	7.55E-05	5.10E-03	1.809E-01	1.874E+02	0.901
α_8	1.11E-107	7.69E-05	2.33E-27	5.77E-05	1.245E-02	1.618E+02	1.045

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.78E-01	9.69E-01	9.62E-01	9.63E-01	9.62E-01	9.65E-01
α_2	1.07E-02	1.52E-02	1.92E-02	1.92E-02	1.19E-02	9.67E-03	7.53E-03
α_3		6.83E-03	7.44E-03	1.35E-02	1.46E-02	1.33E-02	9.97E-03
α_4			4.79E-03	4.89E-03	6.91E-03	8.66E-03	8.60E-03
α_5				6.39E-04	2.35E-03	4.69E-03	5.18E-03
α_6					8.78E-04	1.59E-03	2.95E-03
α_7						1.64E-04	9.64E-04
α_8							7.69E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.78E-01	9.69E-01	9.62E-01	9.63E-01	9.62E-01	9.65E-01
Beta	1.07E-02	2.20E-02	3.14E-02	3.82E-02	3.66E-02	3.80E-02	3.53E-02
Gamma		3.10E-01	3.89E-01	4.98E-01	6.75E-01	7.46E-01	7.86E-01
Delta			3.92E-01	2.90E-01	4.10E-01	5.32E-01	6.41E-01
Epsilon				1.15E-01	3.18E-01	4.26E-01	5.16E-01
Mu					2.72E-01	2.72E-01	4.35E-01
Omega						9.36E-02	2.61E-01
Sigma							7.39E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.00	7.00	7.00	7.00	7.00	7.00	7.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 32.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9886979	0.9971171	0.9987547	0.9999918	1.628E+02	4.706E-01	--
α_2	8.18E-06	2.88E-03	1.25E-03	1.13E-02	4.706E-01	1.628E+02	0.350

CCCG = 3, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9841729	0.9945174	0.9960451	0.9996438	2.000E+02	1.103E+00	--
α_2	1.15E-04	4.00E-03	2.53E-03	1.29E-02	8.104E-01	2.015E+02	0.469
α_3	1.24E-07	1.48E-03	3.46E-04	6.82E-03	2.921E-01	1.974E+02	0.480

CCCG = 4, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9823713	0.9926000	0.9938022	0.9987183	2.619E+02	1.953E+00	--
α_2	4.55E-04	4.89E-03	3.73E-03	1.33E-02	1.312E+00	2.668E+02	0.549
α_3	2.79E-06	1.66E-03	6.57E-04	6.74E-03	4.307E-01	2.583E+02	0.568
α_4	1.67E-09	8.41E-04	9.91E-05	4.28E-03	2.099E-01	2.493E+02	0.589

CCCG = 5, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9811654	0.9909036	0.9918429	0.9974320	3.384E+02	3.107E+00	--
α_2	6.80E-04	4.82E-03	3.92E-03	1.21E-02	1.684E+00	3.474E+02	0.698
α_3	1.24E-04	2.82E-03	1.91E-03	8.61E-03	9.426E-01	3.336E+02	0.729
α_4	8.62E-07	1.15E-03	3.95E-04	4.85E-03	3.816E-01	3.319E+02	0.734
α_5	1.22E-16	3.06E-04	1.68E-06	1.78E-03	9.865E-02	3.219E+02	0.757

CCCG = 6, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9822340	0.9909163	0.9916819	0.9969830	4.170E+02	3.822E+00	--
α_2	5.63E-04	3.89E-03	3.17E-03	9.68E-03	1.714E+00	4.389E+02	0.709
α_3	1.76E-04	2.69E-03	1.94E-03	7.77E-03	1.108E+00	4.103E+02	0.759
α_4	2.10E-05	1.59E-03	8.87E-04	5.56E-03	6.509E-01	4.080E+02	0.765
α_5	1.22E-08	6.14E-04	1.11E-04	2.96E-03	2.536E-01	4.126E+02	0.757
α_6	4.77E-17	2.94E-04	1.33E-06	1.71E-03	9.572E-02	3.255E+02	0.960

CCCG = 7, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9822229	0.9901675	0.9907791	0.9960235	5.232E+02	5.195E+00	--
α_2	7.22E-04	3.81E-03	3.23E-03	8.87E-03	2.105E+00	5.510E+02	0.800
α_3	2.39E-04	2.55E-03	1.95E-03	6.93E-03	1.320E+00	5.163E+02	0.855
α_4	9.90E-05	1.94E-03	1.35E-03	5.82E-03	9.967E-01	5.122E+02	0.863
α_5	5.21E-06	1.03E-03	4.89E-04	3.89E-03	5.249E-01	5.091E+02	0.869
α_6	2.87E-10	3.86E-04	3.78E-05	2.00E-03	1.956E-01	5.064E+02	0.874
α_7	3.39E-28	1.19E-04	2.69E-09	6.45E-04	5.291E-02	4.451E+02	0.995

CCCG = 8, Gamma = 0.182

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9831879	0.9904416	0.9909722	0.9958835	6.043E+02	5.832E+00	--
α_2	7.07E-04	3.49E-03	2.98E-03	7.98E-03	2.229E+00	6.372E+02	0.804
α_3	1.78E-04	2.08E-03	1.56E-03	5.74E-03	1.260E+00	6.050E+02	0.848
α_4	1.00E-04	1.76E-03	1.24E-03	5.20E-03	1.042E+00	5.901E+02	0.870
α_5	3.01E-05	1.28E-03	7.85E-04	4.23E-03	7.626E-01	5.932E+02	0.866
α_6	1.27E-07	5.56E-04	1.55E-04	2.47E-03	3.271E-01	5.879E+02	0.874
α_7	2.28E-13	2.35E-04	6.31E-06	1.32E-03	1.344E-01	5.706E+02	0.901
α_8	1.41E-20	1.56E-04	1.46E-07	9.06E-04	7.682E-02	4.922E+02	1.045

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.95E-01	9.93E-01	9.91E-01	9.91E-01	9.90E-01	9.90E-01
α_2	2.88E-03	4.00E-03	4.89E-03	4.82E-03	3.89E-03	3.81E-03	3.49E-03
α_3		1.48E-03	1.66E-03	2.82E-03	2.69E-03	2.55E-03	2.08E-03
α_4			8.41E-04	1.15E-03	1.59E-03	1.94E-03	1.76E-03
α_5				3.06E-04	6.14E-04	1.03E-03	1.28E-03
α_6					2.94E-04	3.86E-04	5.56E-04
α_7						1.19E-04	2.35E-04
α_8							1.56E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.95E-01	9.93E-01	9.91E-01	9.91E-01	9.90E-01	9.90E-01
Beta	2.88E-03	5.48E-03	7.40E-03	9.10E-03	9.08E-03	9.83E-03	9.56E-03
Gamma		2.70E-01	3.39E-01	4.70E-01	5.72E-01	6.13E-01	6.35E-01
Delta			3.36E-01	3.41E-01	4.82E-01	5.77E-01	6.58E-01
Epsilon				2.11E-01	3.63E-01	4.41E-01	5.59E-01
Mu					3.24E-01	3.29E-01	4.25E-01
Omega						2.35E-01	4.13E-01
Sigma							3.99E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	32.50	32.50	32.50	32.50	32.50	32.50	32.50
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 24.1

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.135

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9950025	0.9987047	0.9994169	0.9999953	3.803E+02	4.932E-01	--
α_2	4.74E-06	1.30E-03	5.83E-04	5.00E-03	4.932E-01	3.803E+02	0.350

CCCG = 3, Gamma = 0.135

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9946046	0.9981602	0.9986947	0.9998913	5.748E+02	1.060E+00	--
α_2	2.30E-05	1.23E-03	7.25E-04	4.15E-03	7.137E-01	5.796E+02	0.469
α_3	2.19E-07	6.10E-04	1.84E-04	2.66E-03	3.458E-01	5.666E+02	0.480

CCCG = 4, Gamma = 0.135

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9946128	0.9976863	0.9980376	0.9995592	9.118E+02	2.115E+00	--
α_2	2.07E-04	1.67E-03	1.33E-03	4.30E-03	1.549E+00	9.263E+02	0.549
α_3	9.22E-09	2.96E-04	5.78E-05	1.41E-03	2.646E-01	8.950E+02	0.568
α_4	3.85E-08	3.49E-04	8.55E-05	1.59E-03	3.010E-01	8.631E+02	0.589

CCCG = 5, Gamma = 0.135

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9952392	0.9973569	0.9975196	0.9989192	2.009E+03	5.325E+00	--
α_2	5.66E-04	1.78E-03	1.62E-03	3.53E-03	3.632E+00	2.040E+03	0.698
α_3	6.79E-05	6.91E-04	5.31E-04	1.86E-03	1.354E+00	1.957E+03	0.729
α_4	1.44E-08	1.52E-04	3.63E-05	6.99E-04	2.961E-01	1.945E+03	0.734
α_5	6.70E-35	2.25E-05	2.48E-11	1.11E-04	4.243E-02	1.885E+03	0.757

CCCG = 6, Gamma = 0.135

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9948412	0.9971886	0.9973750	0.9988994	1.751E+03	4.936E+00	--
α_2	4.25E-04	1.60E-03	1.42E-03	3.38E-03	2.915E+00	1.819E+03	0.709
α_3	6.30E-05	7.39E-04	5.55E-04	2.04E-03	1.257E+00	1.700E+03	0.759
α_4	1.21E-06	2.98E-04	1.36E-04	1.14E-03	5.031E-01	1.689E+03	0.765
α_5	1.96E-15	6.77E-05	8.92E-07	3.88E-04	1.155E-01	1.707E+03	0.757
α_6	5.04E-13	1.08E-04	3.95E-06	5.97E-04	1.451E-01	1.346E+03	0.960

CCCG = 7, Gamma = 0.135

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9954058	0.9970929	0.9971921	0.9984415	3.311E+03	9.654E+00	--
α_2	5.46E-04	1.41E-03	1.31E-03	2.60E-03	4.851E+00	3.438E+03	0.800
α_3	2.23E-04	8.69E-04	7.68E-04	1.86E-03	2.800E+00	3.220E+03	0.855
α_4	4.43E-05	4.33E-04	3.35E-04	1.16E-03	1.384E+00	3.193E+03	0.863
α_5	5.47E-07	1.55E-04	6.91E-05	5.98E-04	4.902E-01	3.172E+03	0.869
α_6	8.64E-16	3.63E-05	4.60E-07	2.09E-04	1.146E-01	3.154E+03	0.874
α_7	2.78E-93	5.28E-06	5.62E-25	6.28E-06	1.464E-02	2.771E+03	0.995

CCCG = 8, Gamma = 0.135

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9951513	0.9971184	0.9972509	0.9986333	2.473E+03	7.148E+00	--
α_2	3.11E-04	1.15E-03	1.02E-03	2.41E-03	2.980E+00	2.599E+03	0.804
α_3	1.38E-04	7.95E-04	6.64E-04	1.90E-03	1.960E+00	2.465E+03	0.848
α_4	3.54E-05	4.85E-04	3.55E-04	1.38E-03	1.166E+00	2.404E+03	0.870
α_5	1.26E-06	2.22E-04	1.08E-04	8.33E-04	5.375E-01	2.416E+03	0.866
α_6	1.67E-11	7.54E-05	5.85E-06	3.99E-04	1.805E-01	2.393E+03	0.874
α_7	9.22E-36	1.78E-05	1.33E-11	8.72E-05	4.139E-02	2.322E+03	0.901
α_8	8.61E-09	1.41E-04	3.11E-05	6.58E-04	2.827E-01	2.003E+03	1.045

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.99E-01	9.98E-01	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	1.30E-03	1.23E-03	1.67E-03	1.78E-03	1.60E-03	1.41E-03	1.15E-03
α_3		6.10E-04	2.96E-04	6.91E-04	7.39E-04	8.69E-04	7.95E-04
α_4			3.49E-04	1.52E-04	2.98E-04	4.33E-04	4.85E-04
α_5				2.25E-05	6.77E-05	1.55E-04	2.22E-04
α_6					1.08E-04	3.63E-05	7.54E-05
α_7						5.28E-06	1.78E-05
α_8							1.41E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.99E-01	9.98E-01	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	1.30E-03	1.84E-03	2.31E-03	2.64E-03	2.81E-03	2.91E-03	2.88E-03
Gamma		3.32E-01	2.78E-01	3.28E-01	4.31E-01	5.15E-01	6.02E-01
Delta			5.41E-01	2.02E-01	3.90E-01	4.20E-01	5.42E-01
Epsilon				1.29E-01	3.71E-01	3.12E-01	4.85E-01
Mu					6.14E-01	2.12E-01	5.13E-01
Omega						1.27E-01	6.78E-01
Sigma							8.88E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	24.10	24.10	24.10	24.10	24.10	24.10	24.10
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

2.16.1.2 ALL-MDC-FR: Motor-Driven Air Compressors Fail to Run

Generic CCF Parameters

Component Group: Other
Component Type: Compressor
Component Subtype: Motor Driven
Failure Mode: Fail to Run
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 315.4

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9886660	0.9956716	0.9965953	0.9995062	0.9968394	3.378E+02	1.469E+00
α_2	4.92E-04	4.33E-03	3.40E-03	1.13E-02	3.16E-03	1.469E+00	3.378E+02

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9907342	0.9960090	0.9966064	0.9992348	0.9978907	5.311E+02	2.128E+00
α_2	2.48E-04	2.53E-03	1.95E-03	6.83E-03	1.05E-03	1.351E+00	5.319E+02
α_3	3.63E-05	1.46E-03	9.00E-04	4.77E-03	1.05E-03	7.768E-01	5.324E+02

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9915386	0.9960053	0.9964550	0.9989414	0.9984172	7.215E+02	2.894E+00
α_2	2.47E-04	2.08E-03	1.65E-03	5.41E-03	3.96E-04	1.510E+00	7.229E+02
α_3	4.88E-05	1.25E-03	8.28E-04	3.87E-03	7.91E-04	9.024E-01	7.235E+02
α_4	2.13E-06	6.65E-04	2.92E-04	2.59E-03	3.96E-04	4.815E-01	7.239E+02

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9915121	0.9954947	0.9958286	0.9983504	0.9987334	9.793E+02	4.432E+00
α_2	3.82E-04	2.08E-03	1.76E-03	4.90E-03	1.58E-04	2.049E+00	9.817E+02
α_3	1.56E-04	1.45E-03	1.13E-03	3.83E-03	4.75E-04	1.424E+00	9.823E+02
α_4	1.76E-05	7.70E-04	4.69E-04	2.55E-03	4.75E-04	7.572E-01	9.830E+02
α_5	2.36E-10	2.05E-04	2.18E-05	1.05E-03	1.58E-04	2.017E-01	9.836E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9924237	0.9958896	0.9961699	0.9984117	0.9989443	1.171E+03	4.835E+00
α_2	2.25E-04	1.50E-03	1.23E-03	3.70E-03	6.60E-05	1.764E+00	1.174E+03
α_3	1.38E-04	1.24E-03	9.70E-04	3.26E-03	2.64E-04	1.457E+00	1.175E+03
α_4	3.93E-05	8.25E-04	5.66E-04	2.50E-03	3.96E-04	9.710E-01	1.175E+03
α_5	1.14E-06	4.00E-04	1.73E-04	1.57E-03	2.64E-04	4.711E-01	1.176E+03

α_6	1.53E-11	1.46E-04	9.84E-06	7.83E-04	6.60E-05	1.723E-01	1.176E+03
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CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9922428	0.9954485	0.9956660	0.9978945	0.9990949	1.476E+03	6.747E+00
α_2	3.18E-04	1.53E-03	1.32E-03	3.49E-03	2.83E-05	2.274E+00	1.480E+03
α_3	1.84E-04	1.20E-03	9.89E-04	2.96E-03	1.41E-04	1.786E+00	1.481E+03
α_4	9.76E-05	9.41E-04	7.29E-04	2.51E-03	2.83E-04	1.395E+00	1.481E+03
α_5	2.15E-05	5.92E-04	3.88E-04	1.86E-03	2.83E-04	8.779E-01	1.482E+03
α_6	8.82E-08	2.35E-04	7.14E-05	1.02E-03	1.41E-04	3.478E-01	1.482E+03
α_7	8.02E-24	4.46E-05	1.11E-08	2.54E-04	2.83E-05	6.605E-02	1.482E+03

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9930836	0.9959444	0.9961400	0.9981321	0.9992080	1.652E+03	6.726E+00
α_2	2.23E-04	1.23E-03	1.03E-03	2.89E-03	1.24E-05	2.034E+00	1.656E+03
α_3	1.03E-04	8.95E-04	7.04E-04	2.34E-03	7.43E-05	1.484E+00	1.657E+03
α_4	7.08E-05	7.82E-04	5.93E-04	2.14E-03	1.86E-04	1.296E+00	1.657E+03
α_5	3.26E-05	6.12E-04	4.27E-04	1.82E-03	2.48E-04	1.015E+00	1.657E+03
α_6	2.95E-06	3.52E-04	1.82E-04	1.28E-03	1.86E-04	5.841E-01	1.658E+03
α_7	1.39E-10	1.22E-04	1.29E-05	6.25E-04	7.43E-05	2.016E-01	1.658E+03
α_8	5.93E-16	6.65E-05	6.90E-07	3.83E-04	1.24E-05	1.103E-01	1.658E+03

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.96E-01	9.96E-01	9.95E-01	9.96E-01	9.95E-01	9.96E-01
α_2	4.33E-03	2.53E-03	2.08E-03	2.08E-03	1.50E-03	1.53E-03	1.23E-03
α_3		1.46E-03	1.25E-03	1.45E-03	1.24E-03	1.20E-03	8.95E-04
α_4			6.65E-04	7.70E-04	8.25E-04	9.41E-04	7.82E-04
α_5				2.05E-04	4.00E-04	5.92E-04	6.12E-04
α_6					1.46E-04	2.35E-04	3.52E-04
α_7						4.46E-05	1.22E-04
α_8							6.65E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.96E-01	9.96E-01	9.95E-01	9.96E-01	9.95E-01	9.96E-01
Beta	4.33E-03	3.99E-03	3.99E-03	4.51E-03	4.11E-03	4.55E-03	4.06E-03
Gamma		3.65E-01	4.78E-01	5.38E-01	6.35E-01	6.63E-01	6.98E-01
Delta			3.48E-01	4.02E-01	5.26E-01	6.01E-01	6.84E-01
Epsilon				2.10E-01	3.99E-01	4.81E-01	5.96E-01
Mu					2.68E-01	3.20E-01	4.69E-01
Omega						1.60E-01	3.48E-01
Sigma							3.54E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	315.40	473.10	630.80	788.50	946.20	1103.90	1261.60
N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313	0.0156
N₃		0.5000	0.5000	0.3750	0.2500	0.1563	0.0938
N₄			0.2500	0.3750	0.3750	0.3125	0.2344
N₅				0.1250	0.2500	0.3125	0.3125
N₆					0.0625	0.1563	0.2344
N₇						0.0313	0.0938
N₈							0.0156

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 122.5

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.387

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9925355	0.9980785	0.9991500	0.9999937	2.511E+02	4.834E-01	--
α_2	6.32E-06	1.92E-03	8.50E-04	7.46E-03	4.834E-01	2.511E+02	0.663

CCCG = 3, Gamma = 0.388

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9942312	0.9979303	0.9984565	0.9998320	5.910E+02	1.226E+00	--
α_2	7.27E-05	1.50E-03	1.03E-03	4.53E-03	9.769E-01	6.502E+02	0.483
α_3	9.08E-09	5.69E-04	9.85E-05	2.76E-03	2.487E-01	4.366E+02	0.720

CCCG = 4, Gamma = 0.388

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9945682	0.9976873	0.9980479	0.9995738	8.874E+02	2.057E+00	--
α_2	1.49E-04	1.36E-03	1.06E-03	3.58E-03	1.442E+00	1.061E+03	0.404
α_3	8.07E-07	6.46E-04	2.42E-04	2.66E-03	4.114E-01	6.369E+02	0.673
α_4	4.06E-10	3.10E-04	3.37E-05	1.59E-03	2.036E-01	6.568E+02	0.653

CCCG = 5, Gamma = 0.388

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9943589	0.9971507	0.9974026	0.9990817	1.289E+03	3.683E+00	--
α_2	3.01E-04	1.48E-03	1.26E-03	3.38E-03	2.243E+00	1.516E+03	0.435
α_3	4.20E-05	8.36E-04	5.78E-04	2.51E-03	9.912E-01	1.185E+03	0.557
α_4	2.95E-07	4.33E-04	1.46E-04	1.84E-03	3.765E-01	8.687E+02	0.760
α_5	8.91E-22	1.03E-04	5.86E-08	5.94E-04	7.237E-02	7.035E+02	0.939

CCCG = 6, Gamma = 0.388

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9949961	0.9973929	0.9975986	0.9990872	1.583E+03	4.139E+00	--
α_2	2.12E-04	1.10E-03	9.38E-04	2.57E-03	2.128E+00	1.924E+03	0.401
α_3	5.00E-05	7.25E-04	5.27E-04	2.08E-03	1.134E+00	1.562E+03	0.494
α_4	2.96E-06	4.54E-04	2.25E-04	1.68E-03	5.533E-01	1.219E+03	0.633
α_5	8.66E-10	2.23E-04	2.97E-05	1.12E-03	2.210E-01	9.923E+02	0.778
α_6	1.28E-16	1.00E-04	6.97E-07	5.81E-04	1.027E-01	1.024E+03	0.754

CCCG = 7, Gamma = 0.388

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9948137	0.9969896	0.9971432	0.9986411	2.130E+03	6.432E+00	--
α_2	2.92E-04	1.13E-03	9.96E-04	2.40E-03	2.840E+00	2.522E+03	0.442
α_3	1.20E-04	8.07E-04	6.59E-04	2.00E-03	1.746E+00	2.162E+03	0.516
α_4	3.59E-05	5.77E-04	4.13E-04	1.68E-03	1.084E+00	1.877E+03	0.594
α_5	1.92E-06	3.37E-04	1.63E-04	1.26E-03	5.376E-01	1.593E+03	0.701
α_6	1.25E-10	1.43E-04	1.44E-05	7.37E-04	1.979E-01	1.387E+03	0.805
α_7	4.72E-53	2.11E-05	2.11E-15	7.20E-05	2.656E-02	1.259E+03	0.887

CCCG = 8, Gamma = 0.388

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9954303	0.9973787	0.9975195	0.9988465	2.326E+03	6.112E+00	--
α_2	1.82E-04	8.43E-04	7.28E-04	1.90E-03	2.364E+00	2.801E+03	0.420
α_3	7.28E-05	6.12E-04	4.84E-04	1.59E-03	1.512E+00	2.468E+03	0.477
α_4	2.89E-05	4.93E-04	3.49E-04	1.45E-03	1.056E+00	2.139E+03	0.550
α_5	5.47E-06	3.61E-04	2.06E-04	1.25E-03	6.745E-01	1.867E+03	0.630
α_6	2.55E-08	1.90E-04	4.82E-05	8.61E-04	3.076E-01	1.621E+03	0.726
α_7	5.34E-16	7.64E-05	7.54E-07	4.41E-04	1.093E-01	1.430E+03	0.823
α_8	6.95E-19	4.51E-05	1.25E-07	2.63E-04	8.885E-02	1.971E+03	0.597

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.98E-01	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
α_2	1.92E-03	1.50E-03	1.36E-03	1.48E-03	1.10E-03	1.13E-03	8.43E-04
α_3		5.69E-04	6.46E-04	8.36E-04	7.25E-04	8.07E-04	6.12E-04
α_4			3.10E-04	4.33E-04	4.54E-04	5.77E-04	4.93E-04
α_5				1.03E-04	2.23E-04	3.37E-04	3.61E-04
α_6					1.00E-04	1.43E-04	1.90E-04
α_7						2.11E-05	7.64E-05
α_8							4.51E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.98E-01	9.98E-01	9.97E-01	9.97E-01	9.97E-01	9.97E-01
Beta	1.92E-03	2.07E-03	2.31E-03	2.85E-03	2.61E-03	3.01E-03	2.62E-03
Gamma		2.75E-01	4.13E-01	4.82E-01	5.76E-01	6.26E-01	6.78E-01
Delta			3.24E-01	3.91E-01	5.17E-01	5.72E-01	6.56E-01
Epsilon				1.92E-01	4.16E-01	4.65E-01	5.77E-01
Mu					3.11E-01	3.27E-01	4.63E-01
Omega						1.29E-01	3.90E-01
Sigma							3.71E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	122.50	183.75	245.00	306.25	367.50	428.75	490.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 64.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.204

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9849093	0.9962106	0.9984317	0.9999917	1.182E+02	4.498E-01	--
α_2	8.29E-06	3.79E-03	1.57E-03	1.51E-02	4.498E-01	1.182E+02	0.663

CCCG = 3, Gamma = 0.204

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9866778	0.9952788	0.9965182	0.9996457	2.484E+02	1.178E+00	--
α_2	1.50E-04	3.42E-03	2.32E-03	1.05E-02	9.387E-01	2.735E+02	0.483
α_3	1.36E-08	1.30E-03	2.09E-04	6.38E-03	2.396E-01	1.839E+02	0.720

CCCG = 4, Gamma = 0.204

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9877000	0.9948880	0.9957447	0.9991477	3.695E+02	1.898E+00	--
α_2	2.55E-04	2.86E-03	2.17E-03	7.84E-03	1.285E+00	4.480E+02	0.404
α_3	1.34E-06	1.46E-03	5.18E-04	6.09E-03	3.927E-01	2.691E+02	0.673
α_4	3.04E-09	7.94E-04	1.06E-04	3.99E-03	2.207E-01	2.776E+02	0.653

CCCG = 5, Gamma = 0.205

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9865878	0.9933067	0.9939235	0.9979182	5.203E+02	3.506E+00	--
α_2	5.67E-04	3.20E-03	2.69E-03	7.59E-03	1.992E+00	6.201E+02	0.435
α_3	1.37E-04	2.22E-03	1.59E-03	6.47E-03	1.078E+00	4.846E+02	0.557
α_4	5.34E-07	1.02E-03	3.29E-04	4.38E-03	3.632E-01	3.557E+02	0.760
α_5	2.32E-21	2.51E-04	1.45E-07	1.45E-03	7.248E-02	2.882E+02	0.939

CCCG = 6, Gamma = 0.205

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9880540	0.9937447	0.9942279	0.9977849	6.671E+02	4.199E+00	--
α_2	4.04E-04	2.36E-03	1.97E-03	5.64E-03	1.941E+00	8.216E+02	0.401
α_3	1.90E-04	1.99E-03	1.52E-03	5.40E-03	1.332E+00	6.672E+02	0.494
α_4	1.27E-05	1.19E-03	6.38E-04	4.22E-03	6.181E-01	5.208E+02	0.633
α_5	3.73E-09	5.45E-04	8.08E-05	2.70E-03	2.313E-01	4.242E+02	0.778
α_6	1.60E-20	1.76E-04	1.65E-07	1.02E-03	7.684E-02	4.377E+02	0.754

CCCG = 7, Gamma = 0.205

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9871246	0.9925734	0.9929616	0.9966967	8.317E+02	6.223E+00	--
α_2	6.48E-04	2.66E-03	2.34E-03	5.78E-03	2.654E+00	9.947E+02	0.442
α_3	2.62E-04	1.92E-03	1.55E-03	4.86E-03	1.645E+00	8.531E+02	0.516
α_4	9.98E-05	1.50E-03	1.09E-03	4.33E-03	1.115E+00	7.409E+02	0.594
α_5	9.25E-06	9.59E-04	5.07E-04	3.44E-03	6.034E-01	6.289E+02	0.701
α_6	5.76E-11	3.25E-04	2.42E-05	1.72E-03	1.780E-01	5.478E+02	0.805
α_7	2.99E-51	5.50E-05	1.13E-14	1.94E-04	2.734E-02	4.974E+02	0.887

CCCG = 8, Gamma = 0.205

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9886151	0.9934292	0.9937720	0.9970729	9.443E+02	6.246E+00	--
α_2	5.02E-04	2.19E-03	1.90E-03	4.83E-03	2.504E+00	1.143E+03	0.420
α_3	1.50E-04	1.41E-03	1.09E-03	3.73E-03	1.419E+00	1.007E+03	0.477
α_4	6.44E-05	1.17E-03	8.23E-04	3.48E-03	1.027E+00	8.732E+02	0.550
α_5	1.98E-05	9.62E-04	5.76E-04	3.22E-03	7.337E-01	7.623E+02	0.630
α_6	5.97E-07	6.00E-04	2.16E-04	2.50E-03	3.975E-01	6.617E+02	0.726
α_7	1.32E-20	1.32E-04	1.26E-07	7.65E-04	7.703E-02	5.842E+02	0.823
α_8	1.01E-18	1.09E-04	2.71E-07	6.33E-04	8.749E-02	8.051E+02	0.597

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.95E-01	9.95E-01	9.93E-01	9.94E-01	9.93E-01	9.93E-01
α_2	3.79E-03	3.42E-03	2.86E-03	3.20E-03	2.36E-03	2.66E-03	2.19E-03
α_3		1.30E-03	1.46E-03	2.22E-03	1.99E-03	1.92E-03	1.41E-03
α_4			7.94E-04	1.02E-03	1.19E-03	1.50E-03	1.17E-03
α_5				2.51E-04	5.45E-04	9.59E-04	9.62E-04
α_6					1.76E-04	3.25E-04	6.00E-04
α_7						5.50E-05	1.32E-04
α_8							1.09E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.95E-01	9.95E-01	9.93E-01	9.94E-01	9.93E-01	9.93E-01
Beta	3.79E-03	4.72E-03	5.11E-03	6.69E-03	6.26E-03	7.43E-03	6.57E-03
Gamma		2.76E-01	4.40E-01	5.22E-01	6.23E-01	6.42E-01	6.67E-01
Delta			3.53E-01	3.64E-01	4.89E-01	5.96E-01	6.79E-01
Epsilon				1.98E-01	3.78E-01	4.71E-01	6.05E-01
Mu					2.44E-01	2.84E-01	4.67E-01
Omega						1.45E-01	2.86E-01
Sigma							4.52E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	64.60	96.90	129.20	161.50	193.80	226.10	258.40
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 7.5

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.027

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8296900	0.9342755	0.9476579	0.9929449	1.962E+01	1.380E+00	--
α_2	7.06E-03	6.57E-02	5.23E-02	1.70E-01	1.380E+00	1.962E+01	0.663

CCCG = 3, Gamma = 0.026

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970729	0.9560176	0.9626768	0.9921518	4.260E+01	1.960E+00	--
α_2	1.63E-03	2.19E-02	1.62E-02	6.13E-02	1.167E+00	5.224E+01	0.483
α_3	6.03E-04	2.21E-02	1.41E-02	7.12E-02	7.927E-01	3.503E+01	0.720

CCCG = 4, Gamma = 0.025

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9204472	0.9628033	0.9670271	0.9907056	6.909E+01	2.669E+00	--
α_2	1.22E-03	1.34E-02	1.02E-02	3.66E-02	1.289E+00	9.456E+01	0.404
α_3	5.89E-04	1.55E-02	1.03E-02	4.79E-02	8.887E-01	5.660E+01	0.673
α_4	3.01E-05	8.29E-03	3.75E-03	3.19E-02	4.914E-01	5.878E+01	0.653

CCCG = 5, Gamma = 0.025

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9402737	0.9679106	0.9701185	0.9880013	1.353E+02	4.487E+00	--
α_2	1.81E-03	1.07E-02	8.94E-03	2.56E-02	1.916E+00	1.771E+02	0.435
α_3	1.46E-03	1.13E-02	9.09E-03	2.88E-02	1.582E+00	1.382E+02	0.557
α_4	2.26E-04	7.90E-03	5.01E-03	2.54E-02	8.090E-01	1.016E+02	0.760
α_5	4.59E-10	2.17E-03	1.68E-04	1.15E-02	1.799E-01	8.276E+01	0.939

CCCG = 6, Gamma = 0.025

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9502633	0.9727235	0.9744589	0.9892543	1.749E+02	4.905E+00	--
α_2	6.09E-04	5.83E-03	4.53E-03	1.55E-02	1.398E+00	2.383E+02	0.401
α_3	1.40E-03	9.15E-03	7.53E-03	2.24E-02	1.781E+00	1.928E+02	0.494
α_4	4.61E-04	7.21E-03	5.19E-03	2.09E-02	1.094E+00	1.507E+02	0.633
α_5	1.54E-05	4.02E-03	1.83E-03	1.55E-02	4.967E-01	1.230E+02	0.778
α_6	1.19E-12	1.06E-03	2.94E-05	5.96E-03	1.353E-01	1.273E+02	0.754

CCCG = 7, Gamma = 0.025

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9564590	0.9742686	0.9754618	0.9880032	2.563E+02	6.770E+00	--
α_2	6.03E-04	4.71E-03	3.77E-03	1.20E-02	1.580E+00	3.341E+02	0.442
α_3	1.45E-03	7.46E-03	6.35E-03	1.72E-02	2.145E+00	2.855E+02	0.516
α_4	8.37E-04	6.41E-03	5.14E-03	1.63E-02	1.600E+00	2.481E+02	0.594
α_5	2.46E-04	4.74E-03	3.30E-03	1.41E-02	1.004E+00	2.108E+02	0.701
α_6	1.81E-06	2.11E-03	7.43E-04	8.84E-03	3.890E-01	1.840E+02	0.805
α_7	5.04E-28	3.13E-04	6.27E-09	1.69E-03	5.237E-02	1.674E+02	0.887

CCCG = 8, Gamma = 0.025

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9629991	0.9773434	0.9782373	0.9886355	3.458E+02	8.016E+00	--
α_2	4.53E-04	3.48E-03	2.79E-03	8.85E-03	1.599E+00	4.581E+02	0.420
α_3	9.61E-04	5.14E-03	4.35E-03	1.20E-02	2.080E+00	4.027E+02	0.477
α_4	9.11E-04	5.43E-03	4.53E-03	1.31E-02	1.906E+00	3.490E+02	0.550
α_5	4.08E-04	4.32E-03	3.30E-03	1.17E-02	1.324E+00	3.050E+02	0.630
α_6	8.50E-05	3.03E-03	1.91E-03	9.79E-03	8.053E-01	2.650E+02	0.726
α_7	5.37E-08	1.17E-03	2.46E-04	5.51E-03	2.747E-01	2.343E+02	0.823
α_8	8.11E-50	8.69E-05	3.37E-14	3.15E-04	2.808E-02	3.232E+02	0.597

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.34E-01	9.56E-01	9.63E-01	9.68E-01	9.73E-01	9.74E-01	9.77E-01
α_2	6.57E-02	2.19E-02	1.34E-02	1.07E-02	5.83E-03	4.71E-03	3.48E-03
α_3		2.21E-02	1.55E-02	1.13E-02	9.15E-03	7.46E-03	5.14E-03
α_4			8.29E-03	7.90E-03	7.21E-03	6.41E-03	5.43E-03
α_5				2.17E-03	4.02E-03	4.74E-03	4.32E-03
α_6					1.06E-03	2.11E-03	3.03E-03
α_7						3.13E-04	1.17E-03
α_8							8.69E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.34E-01	9.56E-01	9.63E-01	9.68E-01	9.73E-01	9.74E-01	9.77E-01
Beta	6.57E-02	4.40E-02	3.72E-02	3.21E-02	2.73E-02	2.57E-02	2.27E-02
Gamma		5.03E-01	6.38E-01	6.66E-01	7.86E-01	8.17E-01	8.47E-01
Delta			3.49E-01	4.71E-01	5.73E-01	6.45E-01	7.32E-01
Epsilon				2.16E-01	4.13E-01	5.28E-01	6.13E-01
Mu					2.09E-01	3.38E-01	4.98E-01
Omega						1.29E-01	2.93E-01
Sigma							6.91E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	7.50	11.25	15.00	18.75	22.50	26.25	30.00
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	1.0000	0.5000	0.2500	0.1250	0.0625	0.0313	0.0156
N_3		0.5000	0.5000	0.3750	0.2500	0.1563	0.0938

N₄			0.2500	0.3750	0.3750	0.3125	0.2344
N₅				0.1250	0.2500	0.3125	0.3125
N₆					0.0625	0.1563	0.2344
N₇						0.0313	0.0938
N₈							0.0156

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 76.6

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.242

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9879072	0.9969152	0.9986671	0.9999912	1.521E+02	4.706E-01	--
α_2	8.76E-06	3.08E-03	1.33E-03	1.21E-02	4.706E-01	1.521E+02	0.663

CCCG = 3, Gamma = 0.242

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9901848	0.9966035	0.9975529	0.9997797	3.235E+02	1.102E+00	--
α_2	6.31E-05	2.21E-03	1.40E-03	7.13E-03	8.104E-01	3.660E+02	0.483
α_3	9.94E-08	1.19E-03	2.78E-04	5.48E-03	2.921E-01	2.458E+02	0.720

CCCG = 4, Gamma = 0.242

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9914738	0.9964270	0.9970114	0.9993827	5.445E+02	1.953E+00	--
α_2	1.83E-04	1.98E-03	1.51E-03	5.39E-03	1.312E+00	6.619E+02	0.404
α_3	1.81E-06	1.08E-03	4.27E-04	4.38E-03	4.307E-01	3.973E+02	0.673
α_4	1.02E-09	5.12E-04	6.03E-05	2.60E-03	2.099E-01	4.099E+02	0.653

CCCG = 5, Gamma = 0.243

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9915518	0.9959276	0.9963521	0.9988533	7.598E+02	3.107E+00	--
α_2	2.56E-04	1.82E-03	1.48E-03	4.56E-03	1.684E+00	9.243E+02	0.435
α_3	5.75E-05	1.30E-03	8.83E-04	3.99E-03	9.426E-01	7.220E+02	0.557
α_4	5.40E-07	7.20E-04	2.47E-04	3.04E-03	3.816E-01	5.296E+02	0.760
α_5	9.18E-17	2.30E-04	1.26E-06	1.34E-03	9.865E-02	4.289E+02	0.939

CCCG = 6, Gamma = 0.243

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9926360	0.9962418	0.9965618	0.9987549	1.013E+03	3.822E+00	--
α_2	1.95E-04	1.35E-03	1.10E-03	3.36E-03	1.714E+00	1.270E+03	0.401
α_3	7.02E-05	1.07E-03	7.74E-04	3.10E-03	1.108E+00	1.031E+03	0.494
α_4	1.07E-05	8.08E-04	4.50E-04	2.82E-03	6.509E-01	8.045E+02	0.633
α_5	7.66E-09	3.87E-04	6.96E-05	1.87E-03	2.536E-01	6.551E+02	0.778
α_6	2.29E-17	1.42E-04	6.42E-07	8.24E-04	9.572E-02	6.759E+02	0.754

CCCG = 7, Gamma = 0.243

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
--------------	------	------	--------	-------	---	---	--------------

α_1	0.9925863	0.9959068	0.9961643	0.9983484	1.264E+03	5.195E+00	--
α_2	2.60E-04	1.37E-03	1.16E-03	3.20E-03	2.105E+00	1.532E+03	0.442
α_3	9.41E-05	1.00E-03	7.65E-04	2.73E-03	1.320E+00	1.313E+03	0.516
α_4	4.45E-05	8.73E-04	6.05E-04	2.62E-03	9.967E-01	1.140E+03	0.594
α_5	2.74E-06	5.42E-04	2.57E-04	2.05E-03	5.249E-01	9.676E+02	0.701
α_6	1.72E-10	2.32E-04	2.27E-05	1.20E-03	1.956E-01	8.426E+02	0.805
α_7	1.97E-28	6.92E-05	1.57E-09	3.75E-04	5.291E-02	7.651E+02	0.887

CCCG = 8, Gamma = 0.243

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9933281	0.9962133	0.9964258	0.9983727	1.534E+03	5.832E+00	--
α_2	2.40E-04	1.19E-03	1.02E-03	2.72E-03	2.229E+00	1.875E+03	0.420
α_3	6.53E-05	7.62E-04	5.73E-04	2.11E-03	1.260E+00	1.652E+03	0.477
α_4	4.13E-05	7.27E-04	5.12E-04	2.15E-03	1.042E+00	1.432E+03	0.550
α_5	1.43E-05	6.10E-04	3.73E-04	2.01E-03	7.626E-01	1.250E+03	0.630
α_6	6.89E-08	3.01E-04	8.41E-05	1.34E-03	3.271E-01	1.085E+03	0.726
α_7	1.36E-13	1.40E-04	3.76E-06	7.88E-04	1.344E-01	9.576E+02	0.823
α_8	5.24E-21	5.82E-05	5.46E-08	3.38E-04	7.682E-02	1.320E+03	0.597

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	3.08E-03	2.21E-03	1.98E-03	1.82E-03	1.35E-03	1.37E-03	1.19E-03
α_3		1.19E-03	1.08E-03	1.30E-03	1.07E-03	1.00E-03	7.62E-04
α_4			5.12E-04	7.20E-04	8.08E-04	8.73E-04	7.27E-04
α_5				2.30E-04	3.87E-04	5.42E-04	6.10E-04
α_6					1.42E-04	2.32E-04	3.01E-04
α_7						6.92E-05	1.40E-04
α_8							5.82E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	3.08E-03	3.40E-03	3.57E-03	4.07E-03	3.76E-03	4.09E-03	3.79E-03
Gamma		3.50E-01	4.46E-01	5.53E-01	6.41E-01	6.65E-01	6.86E-01
Delta			3.21E-01	4.22E-01	5.55E-01	6.31E-01	7.07E-01
Epsilon				2.42E-01	3.95E-01	4.91E-01	6.04E-01
Mu					2.68E-01	3.57E-01	4.51E-01
Omega						2.30E-01	3.97E-01
Sigma							2.93E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	76.60	114.90	153.20	191.50	229.80	268.10	306.40
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 44.2

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.140

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9917664	0.9978651	0.9990379	0.9999922	2.305E+02	4.932E-01	--
α_2	7.83E-06	2.13E-03	9.62E-04	8.23E-03	4.932E-01	2.305E+02	0.663

CCCG = 3, Gamma = 0.140

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9944567	0.9981098	0.9986588	0.9998883	5.595E+02	1.060E+00	--
α_2	2.05E-05	1.10E-03	6.47E-04	3.71E-03	7.137E-01	6.496E+02	0.483
α_3	2.85E-07	7.93E-04	2.40E-04	3.46E-03	3.458E-01	4.359E+02	0.720

CCCG = 4, Gamma = 0.140

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9959368	0.9982554	0.9985205	0.9996677	1.210E+03	2.115E+00	--
α_2	1.35E-04	1.09E-03	8.68E-04	2.81E-03	1.549E+00	1.418E+03	0.404
α_3	9.70E-09	3.11E-04	6.07E-05	1.48E-03	2.646E-01	8.513E+02	0.673
α_4	3.79E-08	3.43E-04	8.41E-05	1.57E-03	3.010E-01	8.776E+02	0.653

CCCG = 5, Gamma = 0.140

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9969064	0.9982830	0.9983889	0.9992981	3.096E+03	5.325E+00	--
α_2	3.33E-04	1.04E-03	9.50E-04	2.08E-03	3.632E+00	3.476E+03	0.435
α_3	4.89E-05	4.98E-04	3.83E-04	1.34E-03	1.354E+00	2.716E+03	0.557
α_4	1.41E-08	1.49E-04	3.55E-05	6.83E-04	2.961E-01	1.991E+03	0.760
α_5	7.83E-35	2.63E-05	2.90E-11	1.30E-04	4.243E-02	1.612E+03	0.939

CCCG = 6, Gamma = 0.140

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9969765	0.9983529	0.9984624	0.9993555	2.992E+03	4.936E+00	--
α_2	2.22E-04	8.34E-04	7.41E-04	1.76E-03	2.915E+00	3.491E+03	0.401
α_3	3.78E-05	4.43E-04	3.33E-04	1.23E-03	1.257E+00	2.835E+03	0.494
α_4	9.24E-07	2.27E-04	1.04E-04	8.72E-04	5.031E-01	2.212E+03	0.633
α_5	1.86E-15	6.41E-05	8.46E-07	3.68E-04	1.155E-01	1.801E+03	0.778
α_6	3.65E-13	7.81E-05	2.86E-06	4.33E-04	1.451E-01	1.857E+03	0.754

CCCG = 7, Gamma = 0.140

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9973377	0.9983159	0.9983735	0.9990975	5.723E+03	9.654E+00	--
α_2	2.88E-04	7.43E-04	6.93E-04	1.37E-03	4.851E+00	6.522E+03	0.442
α_3	1.28E-04	5.01E-04	4.42E-04	1.07E-03	2.800E+00	5.591E+03	0.516
α_4	2.91E-05	2.85E-04	2.20E-04	7.63E-04	1.384E+00	4.855E+03	0.594
α_5	4.21E-07	1.19E-04	5.32E-05	4.60E-04	4.902E-01	4.119E+03	0.701
α_6	7.60E-16	3.20E-05	4.05E-07	1.83E-04	1.146E-01	3.586E+03	0.805
α_7	2.36E-93	4.50E-06	4.78E-25	5.34E-06	1.464E-02	3.256E+03	0.887

CCCG = 8, Gamma = 0.140

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9973758	0.9984410	0.9985129	0.9992609	4.578E+03	7.148E+00	--
α_2	1.51E-04	5.57E-04	4.96E-04	1.17E-03	2.980E+00	5.343E+03	0.420
α_3	7.21E-05	4.16E-04	3.48E-04	9.94E-04	1.960E+00	4.707E+03	0.477
α_4	2.09E-05	2.86E-04	2.09E-04	8.11E-04	1.166E+00	4.080E+03	0.550
α_5	8.57E-07	1.51E-04	7.30E-05	5.65E-04	5.375E-01	3.562E+03	0.630
α_6	1.29E-11	5.84E-05	4.53E-06	3.09E-04	1.805E-01	3.091E+03	0.726
α_7	7.85E-36	1.52E-05	1.14E-11	7.42E-05	4.139E-02	2.728E+03	0.823
α_8	4.59E-09	7.52E-05	1.66E-05	3.51E-04	2.827E-01	3.759E+03	0.597

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.98E-01	9.98E-01	9.98E-01	9.98E-01	9.98E-01	9.98E-01	9.98E-01
α_2	2.13E-03	1.10E-03	1.09E-03	1.04E-03	8.34E-04	7.43E-04	5.57E-04
α_3		7.93E-04	3.11E-04	4.98E-04	4.43E-04	5.01E-04	4.16E-04
α_4			3.43E-04	1.49E-04	2.27E-04	2.85E-04	2.86E-04
α_5				2.63E-05	6.41E-05	1.19E-04	1.51E-04
α_6					7.81E-05	3.20E-05	5.84E-05
α_7						4.50E-06	1.52E-05
α_8							7.52E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.98E-01	9.98E-01	9.98E-01	9.98E-01	9.98E-01	9.98E-01	9.98E-01
Beta	2.13E-03	1.89E-03	1.74E-03	1.72E-03	1.65E-03	1.68E-03	1.56E-03
Gamma		4.19E-01	3.75E-01	3.92E-01	4.94E-01	5.59E-01	6.42E-01
Delta			5.25E-01	2.60E-01	4.55E-01	4.68E-01	5.84E-01
Epsilon				1.50E-01	3.85E-01	3.53E-01	5.12E-01
Mu					5.49E-01	2.34E-01	4.96E-01
Omega						1.23E-01	6.07E-01
Sigma							8.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	44.20	66.30	88.40	110.50	132.60	154.70	176.80
N_1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N_3		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

3. GENERAL CCF DISTRIBUTIONS

This section shows the general CCF distributions, including the General Demand (Section 3.1.1), General Rate (Section 3.1.2), and CCF Prior (Section 3.1.3) distributions for the various cause groups. The General Demand and the General Rate distributions were obtained by updating different CCF priors with data for 2006 to 2020. The CCF Prior section presents the generic and causal CCF prior distributions that were developed in [13],[14] using data collected from 1997 to 2015. If a CCF template that analyst would like to model in the PRA is not provided in this report, the general CCF distributions in this section can be used instead.

3.1 General Distributions

3.1.1 General Demand CCF Distributions

3.1.1.1 CCF-DEM: All CCF Demand Based Events 2006 to 2020

Generic CCF Parameters

Failure Mode: Fail to Close, Fail to Load and-or Run, Fail to Open, Fail to Open or Close, Fail to Start, Fail to Stop
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 2210.4

Total Number of Common-Cause Failure Events: 43

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9798172	0.9866580	0.9870147	0.9922749	0.9868441	8.884E+02	1.201E+01
α_2	7.73E-03	1.33E-02	1.30E-02	2.02E-02	1.32E-02	1.201E+01	8.884E+02

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9800934	0.9857386	0.9859720	0.9905767	0.9859567	1.347E+03	1.948E+01
α_2	5.96E-03	9.93E-03	9.69E-03	1.47E-02	9.73E-03	1.357E+01	1.353E+03
α_3	1.87E-03	4.33E-03	4.09E-03	7.60E-03	4.31E-03	5.915E+00	1.360E+03

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9809653	0.9857968	0.9859705	0.9900290	0.9861305	1.801E+03	2.595E+01
α_2	5.25E-03	8.44E-03	8.26E-03	1.22E-02	8.16E-03	1.542E+01	1.812E+03
α_3	1.96E-03	4.06E-03	3.88E-03	6.77E-03	4.04E-03	7.418E+00	1.820E+03
α_4	4.81E-04	1.71E-03	1.53E-03	3.54E-03	1.66E-03	3.116E+00	1.824E+03

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9831846	0.9872091	0.9873486	0.9907699	0.9876473	2.326E+03	3.014E+01
α_2	3.54E-03	5.87E-03	5.73E-03	8.68E-03	5.51E-03	1.383E+01	2.342E+03
α_3	2.14E-03	4.02E-03	3.88E-03	6.38E-03	3.90E-03	9.481E+00	2.347E+03
α_4	8.98E-04	2.22E-03	2.08E-03	4.02E-03	2.24E-03	5.230E+00	2.351E+03
α_5	8.73E-05	6.76E-04	5.41E-04	1.73E-03	7.01E-04	1.592E+00	2.354E+03

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9848009	0.9883176	0.9884350	0.9914405	0.9887653	2.784E+03	3.291E+01
α_2	2.52E-03	4.34E-03	4.22E-03	6.56E-03	4.07E-03	1.223E+01	2.805E+03
α_3	1.89E-03	3.50E-03	3.38E-03	5.51E-03	3.35E-03	9.866E+00	2.807E+03

α_4	1.03E-03	2.28E-03	2.17E-03	3.93E-03	2.25E-03	6.429E+00	2.811E+03
α_5	3.79E-04	1.23E-03	1.12E-03	2.48E-03	1.26E-03	3.471E+00	2.814E+03
α_6	1.33E-05	3.25E-04	2.18E-04	1.01E-03	3.12E-04	9.167E-01	2.816E+03

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9861106	0.9891843	0.9892825	0.9919351	0.9897362	3.355E+03	3.669E+01
α_2	2.02E-03	3.51E-03	3.41E-03	5.33E-03	3.20E-03	1.190E+01	3.380E+03
α_3	1.52E-03	2.84E-03	2.74E-03	4.49E-03	2.66E-03	9.634E+00	3.382E+03
α_4	1.05E-03	2.18E-03	2.08E-03	3.64E-03	2.09E-03	7.390E+00	3.385E+03
α_5	5.83E-04	1.48E-03	1.38E-03	2.70E-03	1.47E-03	5.010E+00	3.387E+03
α_6	1.40E-04	6.74E-04	5.79E-04	1.53E-03	6.95E-04	2.286E+00	3.390E+03
α_7	3.95E-07	1.39E-04	5.99E-05	5.45E-04	1.45E-04	4.712E-01	3.392E+03

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9872190	0.9900002	0.9900869	0.9924912	0.9905142	3.798E+03	3.836E+01
α_2	1.62E-03	2.88E-03	2.79E-03	4.43E-03	2.62E-03	1.104E+01	3.825E+03
α_3	1.24E-03	2.36E-03	2.28E-03	3.78E-03	2.23E-03	9.062E+00	3.827E+03
α_4	8.72E-04	1.85E-03	1.76E-03	3.12E-03	1.75E-03	7.087E+00	3.829E+03
α_5	6.46E-04	1.51E-03	1.42E-03	2.67E-03	1.48E-03	5.793E+00	3.830E+03
α_6	3.00E-04	9.44E-04	8.59E-04	1.88E-03	9.51E-04	3.622E+00	3.833E+03
α_7	4.02E-05	3.72E-04	2.90E-04	9.86E-04	3.84E-04	1.428E+00	3.835E+03
α_8	2.42E-08	8.73E-05	2.52E-05	3.85E-04	6.98E-05	3.348E-01	3.836E+03

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.86E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01	9.90E-01
α_2	1.33E-02	9.93E-03	8.44E-03	5.87E-03	4.34E-03	3.51E-03	2.88E-03
α_3		4.33E-03	4.06E-03	4.02E-03	3.50E-03	2.84E-03	2.36E-03
α_4			1.71E-03	2.22E-03	2.28E-03	2.18E-03	1.85E-03
α_5				6.76E-04	1.23E-03	1.48E-03	1.51E-03
α_6					3.25E-04	6.74E-04	9.44E-04
α_7						1.39E-04	3.72E-04
α_8							8.73E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.86E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01	9.90E-01
Beta	1.33E-02	1.43E-02	1.42E-02	1.28E-02	1.17E-02	1.08E-02	1.00E-02
Gamma		3.04E-01	4.06E-01	5.41E-01	6.28E-01	6.76E-01	7.12E-01
Delta			2.96E-01	4.18E-01	5.23E-01	6.11E-01	6.68E-01
Epsilon				2.33E-01	4.06E-01	5.12E-01	6.12E-01
Mu					2.09E-01	3.55E-01	4.82E-01
Omega						1.71E-01	3.27E-01
Sigma							1.90E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	848.64	1272.95	1697.27	2121.59	2545.91	2970.22	3394.54
N₁	17.3182	15.7604	13.4079	13.4558	13.2968	13.3409	13.3089
N₂	11.5443	12.7169	14.1594	11.9084	10.5294	9.6544	9.0172
N₃		5.6387	7.0158	8.4321	8.6586	8.0045	7.6713
N₄			2.8848	4.8474	5.8331	6.3069	6.0244
N₅				1.5153	3.2504	4.4441	5.0907
N₆					0.8069	2.0939	3.2721
N₇						0.4364	1.3200
N₈							0.2401

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 852.7

Total Number of Common-Cause Failure Events: 10

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.381

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9888933	0.9954593	0.9962586	0.9992931	3.957E+02	1.805E+00	--
α_2	7.07E-04	4.54E-03	3.74E-03	1.11E-02	1.805E+00	3.957E+02	0.953

CCCG = 3, Gamma = 0.383

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9877530	0.9935639	0.9940543	0.9976999	6.572E+02	4.257E+00	--
α_2	1.67E-03	5.34E-03	4.85E-03	1.07E-02	3.542E+00	6.601E+02	0.951
α_3	2.07E-05	1.10E-03	6.49E-04	3.71E-03	7.154E-01	6.498E+02	0.970

CCCG = 4, Gamma = 0.383

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9867302	0.9921119	0.9924728	0.9962612	8.944E+02	7.111E+00	--
α_2	2.51E-03	6.04E-03	5.68E-03	1.08E-02	5.488E+00	9.032E+02	0.934
α_3	9.02E-05	1.31E-03	9.52E-04	3.75E-03	1.134E+00	8.640E+02	0.981
α_4	1.90E-06	5.38E-04	2.41E-04	2.08E-03	4.897E-01	9.092E+02	0.933

CCCG = 5, Gamma = 0.384

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9882807	0.9926053	0.9928603	0.9960595	1.271E+03	9.465E+00	--
α_2	1.86E-03	4.37E-03	4.12E-03	7.73E-03	5.736E+00	1.307E+03	0.902
α_3	4.77E-04	2.02E-03	1.77E-03	4.44E-03	2.569E+00	1.267E+03	0.933
α_4	3.09E-05	7.73E-04	5.15E-04	2.39E-03	9.089E-01	1.175E+03	1.007
α_5	4.21E-09	2.28E-04	4.06E-05	1.10E-03	2.520E-01	1.103E+03	1.074

CCCG = 6, Gamma = 0.384

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9891852	0.9930253	0.9932405	0.9961309	1.508E+03	1.059E+01	--
α_2	1.40E-03	3.43E-03	3.22E-03	6.18E-03	5.322E+00	1.547E+03	0.901
α_3	5.38E-04	1.96E-03	1.75E-03	4.10E-03	3.021E+00	1.538E+03	0.908
α_4	1.05E-04	9.82E-04	7.64E-04	2.60E-03	1.423E+00	1.447E+03	0.966
α_5	4.64E-06	4.52E-04	2.41E-04	1.61E-03	6.122E-01	1.354E+03	1.033
α_6	4.67E-10	1.51E-04	1.92E-05	7.59E-04	2.171E-01	1.442E+03	0.970

CCCG = 7, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9901383	0.9933506	0.9935116	0.9960136	2.021E+03	1.353E+01	--
α_2	1.21E-03	2.81E-03	2.65E-03	4.93E-03	5.912E+00	2.100E+03	0.877
α_3	5.84E-04	1.80E-03	1.64E-03	3.57E-03	3.706E+00	2.051E+03	0.899
α_4	2.19E-04	1.10E-03	9.38E-04	2.53E-03	2.197E+00	1.996E+03	0.924
α_5	4.12E-05	6.04E-04	4.38E-04	1.73E-03	1.129E+00	1.870E+03	0.987
α_6	9.01E-07	2.75E-04	1.21E-04	1.07E-03	4.833E-01	1.757E+03	1.051
α_7	3.77E-17	5.96E-05	3.58E-07	3.46E-04	1.002E-01	1.683E+03	1.097

CCCG = 8, Gamma = 0.385

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9908784	0.9938271	0.9939734	0.9962762	2.226E+03	1.382E+01	--
α_2	9.56E-04	2.31E-03	2.17E-03	4.15E-03	5.422E+00	2.338E+03	0.858
α_3	4.80E-04	1.56E-03	1.41E-03	3.14E-03	3.466E+00	2.217E+03	0.906
α_4	2.18E-04	1.04E-03	8.91E-04	2.35E-03	2.310E+00	2.228E+03	0.902
α_5	7.19E-05	6.70E-04	5.22E-04	1.78E-03	1.423E+00	2.121E+03	0.948
α_6	8.32E-06	3.74E-04	2.27E-04	1.24E-03	7.505E-01	2.004E+03	1.003
α_7	2.83E-08	1.66E-04	4.39E-05	7.45E-04	3.162E-01	1.908E+03	1.054
α_8	7.15E-14	5.19E-05	1.49E-06	2.91E-04	1.367E-01	2.631E+03	0.764

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.94E-01	9.92E-01	9.93E-01	9.93E-01	9.93E-01	9.94E-01
α_2	4.54E-03	5.34E-03	6.04E-03	4.37E-03	3.43E-03	2.81E-03	2.31E-03
α_3		1.10E-03	1.31E-03	2.02E-03	1.96E-03	1.80E-03	1.56E-03
α_4			5.38E-04	7.73E-04	9.82E-04	1.10E-03	1.04E-03
α_5				2.28E-04	4.52E-04	6.04E-04	6.70E-04
α_6					1.51E-04	2.75E-04	3.74E-04
α_7						5.96E-05	1.66E-04
α_8							5.19E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.94E-01	9.92E-01	9.93E-01	9.93E-01	9.93E-01	9.94E-01
Beta	4.54E-03	6.44E-03	7.89E-03	7.39E-03	6.97E-03	6.65E-03	6.17E-03
Gamma		1.71E-01	2.34E-01	4.09E-01	5.08E-01	5.78E-01	6.25E-01
Delta			2.91E-01	3.31E-01	4.47E-01	5.30E-01	5.95E-01
Epsilon				2.28E-01	3.80E-01	4.60E-01	5.49E-01
Mu					2.50E-01	3.57E-01	4.69E-01
Omega						1.78E-01	3.68E-01
Sigma							2.39E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	327.38	491.06	654.75	818.44	982.13	1145.82	1309.50
N_1	5.6887	5.9683	5.2604	5.6658	5.9904	6.2415	6.4290
N_2	1.3216	2.5647	4.0461	3.4927	3.1945	3.0721	3.0584
N_3		0.4667	0.7222	1.5774	1.8865	1.9603	1.9542

N₄			0.2861	0.5324	0.8693	1.1132	1.2544
N₅				0.1796	0.3912	0.5918	0.7480
N₆					0.1144	0.2854	0.4429
N₇						0.0737	0.2069
N₈							0.0478

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 367.4

Total Number of Common-Cause Failure Events: 18

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.173

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9457909	0.9697040	0.9714847	0.9875332	1.690E+02	5.281E+00	--
α_2	1.25E-02	3.03E-02	2.85E-02	5.42E-02	5.281E+00	1.690E+02	0.953

CCCG = 3, Gamma = 0.172

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9502686	0.9692149	0.9703603	0.9842499	2.633E+02	8.363E+00	--
α_2	8.35E-03	2.00E-02	1.88E-02	3.56E-02	5.469E+00	2.681E+02	0.951
α_3	2.86E-03	1.08E-02	9.60E-03	2.28E-02	2.894E+00	2.652E+02	0.970

CCCG = 4, Gamma = 0.171

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9550814	0.9708293	0.9716818	0.9836670	3.560E+02	1.070E+01	--
α_2	6.19E-03	1.48E-02	1.39E-02	2.63E-02	5.512E+00	3.673E+02	0.934
α_3	3.25E-03	1.02E-02	9.28E-03	2.02E-02	3.615E+00	3.513E+02	0.981
α_4	5.32E-04	4.20E-03	3.36E-03	1.08E-02	1.569E+00	3.717E+02	0.933

CCCG = 5, Gamma = 0.170

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9605263	0.9732714	0.9738925	0.9838967	4.928E+02	1.353E+01	--
α_2	4.74E-03	1.10E-02	1.04E-02	1.94E-02	5.818E+00	5.226E+02	0.902
α_3	3.12E-03	8.56E-03	7.93E-03	1.62E-02	4.379E+00	5.069E+02	0.933
α_4	1.27E-03	5.39E-03	4.71E-03	1.18E-02	2.553E+00	4.710E+02	1.007
α_5	4.52E-05	1.76E-03	1.09E-03	5.76E-03	7.832E-01	4.433E+02	1.074

CCCG = 6, Gamma = 0.170

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9643582	0.9754104	0.9759229	0.9847137	6.014E+02	1.516E+01	--
α_2	3.30E-03	8.15E-03	7.64E-03	1.47E-02	5.202E+00	6.331E+02	0.901
α_3	2.91E-03	7.56E-03	7.04E-03	1.39E-02	4.788E+00	6.288E+02	0.908
α_4	1.38E-03	5.03E-03	4.49E-03	1.05E-02	2.999E+00	5.927E+02	0.966
α_5	4.46E-04	3.08E-03	2.51E-03	7.66E-03	1.716E+00	5.554E+02	1.033
α_6	1.84E-06	7.70E-04	3.22E-04	3.05E-03	4.569E-01	5.926E+02	0.970

CCCG = 7, Gamma = 0.169

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9676737	0.9770773	0.9774804	0.9851055	7.690E+02	1.804E+01	--
α_2	3.13E-03	7.20E-03	6.81E-03	1.26E-02	5.955E+00	8.209E+02	0.877
α_3	2.05E-03	5.54E-03	5.14E-03	1.04E-02	4.473E+00	8.024E+02	0.899
α_4	1.53E-03	4.72E-03	4.31E-03	9.33E-03	3.705E+00	7.810E+02	0.924
α_5	8.01E-04	3.45E-03	3.01E-03	7.59E-03	2.532E+00	7.323E+02	0.987
α_6	1.16E-04	1.66E-03	1.21E-03	4.73E-03	1.143E+00	6.889E+02	1.051
α_7	2.76E-09	3.54E-04	5.37E-05	1.75E-03	2.338E-01	6.606E+02	1.097

CCCG = 8, Gamma = 0.169

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9700931	0.9786561	0.9790165	0.9859894	8.644E+02	1.885E+01	--
α_2	2.70E-03	6.25E-03	5.90E-03	1.10E-02	5.858E+00	9.310E+02	0.858
α_3	1.51E-03	4.45E-03	4.09E-03	8.65E-03	3.953E+00	8.835E+02	0.906
α_4	1.14E-03	3.79E-03	3.43E-03	7.68E-03	3.381E+00	8.882E+02	0.902
α_5	9.09E-04	3.42E-03	3.04E-03	7.24E-03	2.905E+00	8.454E+02	0.948
α_6	3.77E-04	2.32E-03	1.92E-03	5.63E-03	1.862E+00	7.994E+02	1.003
α_7	1.49E-05	9.05E-04	5.22E-04	3.09E-03	6.901E-01	7.622E+02	1.054
α_8	2.20E-10	1.92E-04	2.04E-05	9.86E-04	2.017E-01	1.051E+03	0.764

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.70E-01	9.69E-01	9.71E-01	9.73E-01	9.75E-01	9.77E-01	9.79E-01
α_2	3.03E-02	2.00E-02	1.48E-02	1.10E-02	8.15E-03	7.20E-03	6.25E-03
α_3		1.08E-02	1.02E-02	8.56E-03	7.56E-03	5.54E-03	4.45E-03
α_4			4.20E-03	5.39E-03	5.03E-03	4.72E-03	3.79E-03
α_5				1.76E-03	3.08E-03	3.45E-03	3.42E-03
α_6					7.70E-04	1.66E-03	2.32E-03
α_7						3.54E-04	9.05E-04
α_8							1.92E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.70E-01	9.69E-01	9.71E-01	9.73E-01	9.75E-01	9.77E-01	9.79E-01
Beta	3.03E-02	3.08E-02	2.92E-02	2.67E-02	2.46E-02	2.29E-02	2.13E-02
Gamma		3.51E-01	4.93E-01	5.88E-01	6.69E-01	6.86E-01	7.07E-01
Delta			2.92E-01	4.55E-01	5.40E-01	6.47E-01	7.05E-01
Epsilon				2.46E-01	4.33E-01	5.36E-01	6.43E-01
Mu					2.00E-01	3.68E-01	5.00E-01
Omega						1.76E-01	3.21E-01
Sigma							1.75E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	141.06	211.58	282.11	352.64	423.17	493.69	564.22
N_1	6.0632	5.5644	5.2684	5.0482	4.9373	4.7596	4.5407
N_2	4.8309	4.5303	4.2267	3.8259	3.2608	3.3013	3.3541
N_3		2.6541	3.2221	3.3008	3.4558	2.8280	2.5344

N₄			1.3487	2.1900	2.3805	2.5895	2.3542
N₅				0.7107	1.4842	1.9287	2.1713
N₆					0.3800	0.9648	1.4641
N₇						0.2065	0.6131
N₈							0.1142

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 66.0

Total Number of Common-Cause Failure Events: 1

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.030

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9391331	0.9835140	0.9917552	0.9998960	3.262E+01	5.468E-01	--
α_2	1.04E-04	1.65E-02	8.24E-03	6.09E-02	5.468E-01	3.262E+01	0.953

CCCG = 3, Gamma = 0.030

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9311952	0.9734875	0.9789837	0.9969648	5.361E+01	1.460E+00	--
α_2	1.58E-03	2.11E-02	1.57E-02	5.93E-02	1.167E+00	5.412E+01	0.951
α_3	4.65E-07	5.40E-03	1.28E-03	2.49E-02	2.927E-01	5.390E+01	0.970

CCCG = 4, Gamma = 0.030

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276701	0.9662285	0.9700890	0.9915782	7.636E+01	2.669E+00	--
α_2	4.74E-03	2.56E-02	2.18E-02	5.97E-02	2.039E+00	7.757E+01	0.934
α_3	4.41E-06	5.13E-03	1.81E-03	2.15E-02	3.887E-01	7.540E+01	0.981
α_4	3.46E-08	3.03E-03	4.96E-04	1.48E-02	2.414E-01	7.945E+01	0.933

CCCG = 5, Gamma = 0.030

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9369659	0.9661127	0.9684359	0.9873192	1.279E+02	4.487E+00	--
α_2	4.12E-03	1.81E-02	1.58E-02	4.00E-02	2.458E+00	1.333E+02	0.902
α_3	1.45E-03	1.17E-02	9.36E-03	3.01E-02	1.540E+00	1.298E+02	0.933
α_4	6.29E-06	3.57E-03	1.42E-03	1.44E-02	4.340E-01	1.212E+02	1.007
α_5	1.07E-26	4.82E-04	1.71E-08	2.65E-03	5.493E-02	1.140E+02	1.074

CCCG = 6, Gamma = 0.030

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9448948	0.9697500	0.9716631	0.9880682	1.572E+02	4.905E+00	--
α_2	1.64E-03	1.07E-02	8.83E-03	2.63E-02	1.779E+00	1.642E+02	0.901
α_3	2.11E-03	1.20E-02	1.01E-02	2.84E-02	1.975E+00	1.628E+02	0.908
α_4	1.66E-04	5.36E-03	3.44E-03	1.71E-02	8.302E-01	1.540E+02	0.966
α_5	2.49E-08	1.70E-03	2.91E-04	8.28E-03	2.467E-01	1.446E+02	1.033
α_6	5.18E-21	4.72E-04	2.83E-07	2.73E-03	7.279E-02	1.541E+02	0.970

CCCG = 7, Gamma = 0.030

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9504020	0.9706590	0.9720096	0.9863031	2.240E+02	6.770E+00	--
α_2	1.23E-03	7.68E-03	6.36E-03	1.86E-02	1.845E+00	2.386E+02	0.877
α_3	2.32E-03	1.04E-02	9.02E-03	2.31E-02	2.433E+00	2.322E+02	0.899
α_4	7.88E-04	6.61E-03	5.24E-03	1.71E-02	1.509E+00	2.266E+02	0.924
α_5	6.85E-05	3.41E-03	2.04E-03	1.14E-02	7.283E-01	2.129E+02	0.987
α_6	8.55E-09	1.16E-03	1.74E-04	5.73E-03	2.327E-01	2.004E+02	1.051
α_7	7.46E-65	1.10E-04	1.66E-17	2.77E-04	2.112E-02	1.921E+02	1.097

CCCG = 8, Gamma = 0.030

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9549922	0.9724047	0.9734826	0.9861366	2.825E+02	8.016E+00	--
α_2	8.83E-04	5.78E-03	4.75E-03	1.42E-02	1.781E+00	3.064E+02	0.858
α_3	1.78E-03	8.16E-03	7.06E-03	1.83E-02	2.381E+00	2.895E+02	0.906
α_4	1.17E-03	6.71E-03	5.63E-03	1.60E-02	1.968E+00	2.913E+02	0.902
α_5	2.62E-04	3.98E-03	2.87E-03	1.15E-02	1.110E+00	2.779E+02	0.948
α_6	1.84E-05	2.21E-03	1.14E-03	8.04E-03	5.832E-01	2.629E+02	1.003
α_7	1.65E-10	7.21E-04	5.64E-05	3.81E-03	1.809E-01	2.507E+02	1.054
α_8	5.19E-108	3.60E-05	1.09E-27	2.69E-05	1.245E-02	3.459E+02	0.764

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.84E-01	9.73E-01	9.66E-01	9.66E-01	9.70E-01	9.71E-01	9.72E-01
α_2	1.65E-02	2.11E-02	2.56E-02	1.81E-02	1.07E-02	7.68E-03	5.78E-03
α_3		5.40E-03	5.13E-03	1.17E-02	1.20E-02	1.04E-02	8.16E-03
α_4			3.03E-03	3.57E-03	5.36E-03	6.61E-03	6.71E-03
α_5				4.82E-04	1.70E-03	3.41E-03	3.98E-03
α_6					4.72E-04	1.16E-03	2.21E-03
α_7						1.10E-04	7.21E-04
α_8							3.60E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.84E-01	9.73E-01	9.66E-01	9.66E-01	9.70E-01	9.71E-01	9.72E-01
Beta	1.65E-02	2.65E-02	3.38E-02	3.39E-02	3.02E-02	2.93E-02	2.76E-02
Gamma		2.04E-01	2.42E-01	4.66E-01	6.46E-01	7.38E-01	7.91E-01
Delta			3.71E-01	2.57E-01	3.86E-01	5.21E-01	6.26E-01
Epsilon				1.19E-01	2.89E-01	4.14E-01	5.09E-01
Mu					2.17E-01	2.71E-01	4.27E-01
Omega						8.66E-02	2.55E-01
Sigma							4.76E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	25.34	38.01	50.68	63.35	76.02	88.69	101.36
N_1	0.6667	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	0.1667	0.5000	1.0000	0.6667	0.4444	0.2963	0.1975
N_3		0.0000	0.0000	0.3333	0.4444	0.4444	0.3951

N₄			0.0000	0.0000	0.1111	0.2222	0.2963
N₅				0.0000	0.0000	0.0370	0.0988
N₆					0.0000	0.0000	0.0123
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 658.3

Total Number of Common-Cause Failure Events: 11

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.298

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9669507	0.9813299	0.9823879	0.9920957	2.948E+02	5.610E+00	--
α_2	7.90E-03	1.87E-02	1.76E-02	3.30E-02	5.610E+00	2.948E+02	0.953

CCCG = 3, Gamma = 0.297

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9709178	0.9820036	0.9826811	0.9907765	4.629E+02	8.484E+00	--
α_2	5.08E-03	1.20E-02	1.13E-02	2.11E-02	5.674E+00	4.689E+02	0.951
α_3	1.56E-03	6.04E-03	5.35E-03	1.29E-02	2.810E+00	4.623E+02	0.970

CCCG = 4, Gamma = 0.297

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9752000	0.9839584	0.9844423	0.9910652	6.529E+02	1.064E+01	--
α_2	3.58E-03	8.42E-03	7.94E-03	1.49E-02	5.681E+00	6.687E+02	0.934
α_3	1.69E-03	5.45E-03	4.95E-03	1.09E-02	3.502E+00	6.385E+02	0.981
α_4	2.43E-04	2.16E-03	1.70E-03	5.68E-03	1.460E+00	6.737E+02	0.933

CCCG = 5, Gamma = 0.297

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9797193	0.9865664	0.9869238	0.9921937	8.915E+02	1.214E+01	--
α_2	1.92E-03	5.02E-03	4.67E-03	9.29E-03	4.746E+00	9.411E+02	0.902
α_3	1.60E-03	4.55E-03	4.19E-03	8.71E-03	4.163E+00	9.111E+02	0.933
α_4	6.80E-04	2.96E-03	2.58E-03	6.53E-03	2.507E+00	8.452E+02	1.007
α_5	1.78E-05	9.10E-04	5.41E-04	3.06E-03	7.237E-01	7.942E+02	1.074

CCCG = 6, Gamma = 0.297

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9824590	0.9882120	0.9885016	0.9929765	1.106E+03	1.319E+01	--
α_2	1.20E-03	3.48E-03	3.20E-03	6.72E-03	4.053E+00	1.159E+03	0.901
α_3	1.17E-03	3.45E-03	3.16E-03	6.68E-03	3.979E+00	1.151E+03	0.908
α_4	8.13E-04	2.88E-03	2.58E-03	5.96E-03	3.123E+00	1.083E+03	0.966
α_5	2.15E-04	1.60E-03	1.29E-03	4.06E-03	1.629E+00	1.014E+03	1.033
α_6	4.49E-07	3.78E-04	1.40E-04	1.56E-03	4.082E-01	1.081E+03	0.970

CCCG = 7, Gamma = 0.297

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9846567	0.9894847	0.9897155	0.9935251	1.394E+03	1.481E+01	--
α_2	8.74E-04	2.61E-03	2.39E-03	5.09E-03	3.885E+00	1.485E+03	0.877
α_3	8.98E-04	2.68E-03	2.45E-03	5.23E-03	3.890E+00	1.449E+03	0.899
α_4	7.21E-04	2.39E-03	2.16E-03	4.85E-03	3.379E+00	1.409E+03	0.924
α_5	4.03E-04	1.82E-03	1.58E-03	4.08E-03	2.411E+00	1.320E+03	0.987
α_6	4.72E-05	8.37E-04	5.89E-04	2.47E-03	1.039E+00	1.241E+03	1.051
α_7	3.33E-10	1.76E-04	2.05E-05	8.95E-04	2.092E-01	1.189E+03	1.097

CCCG = 8, Gamma = 0.297

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9862265	0.9904800	0.9906788	0.9940554	1.624E+03	1.561E+01	--
α_2	6.06E-04	1.97E-03	1.79E-03	3.98E-03	3.458E+00	1.749E+03	0.858
α_3	7.29E-04	2.24E-03	2.05E-03	4.43E-03	3.725E+00	1.656E+03	0.906
α_4	5.29E-04	1.87E-03	1.68E-03	3.88E-03	3.121E+00	1.665E+03	0.902
α_5	4.63E-04	1.79E-03	1.58E-03	3.81E-03	2.835E+00	1.584E+03	0.948
α_6	1.57E-04	1.12E-03	9.08E-04	2.81E-03	1.680E+00	1.497E+03	1.003
α_7	5.29E-06	4.45E-04	2.43E-04	1.57E-03	6.344E-01	1.426E+03	1.054
α_8	1.29E-12	7.88E-05	3.69E-06	4.31E-04	1.549E-01	1.967E+03	0.764

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.82E-01	9.84E-01	9.87E-01	9.88E-01	9.89E-01	9.90E-01
α_2	1.87E-02	1.20E-02	8.42E-03	5.02E-03	3.48E-03	2.61E-03	1.97E-03
α_3		6.04E-03	5.45E-03	4.55E-03	3.45E-03	2.68E-03	2.24E-03
α_4			2.16E-03	2.96E-03	2.88E-03	2.39E-03	1.87E-03
α_5				9.10E-04	1.60E-03	1.82E-03	1.79E-03
α_6					3.78E-04	8.37E-04	1.12E-03
α_7						1.76E-04	4.45E-04
α_8							7.88E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.82E-01	9.84E-01	9.87E-01	9.88E-01	9.89E-01	9.90E-01
Beta	1.87E-02	1.80E-02	1.60E-02	1.34E-02	1.18E-02	1.05E-02	9.52E-03
Gamma		3.36E-01	4.75E-01	6.26E-01	7.04E-01	7.52E-01	7.93E-01
Delta			2.84E-01	4.60E-01	5.85E-01	6.61E-01	7.03E-01
Epsilon				2.35E-01	4.08E-01	5.42E-01	6.47E-01
Mu					1.91E-01	3.57E-01	4.79E-01
Omega						1.74E-01	3.18E-01
Sigma							1.51E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	252.74	379.11	505.48	631.85	758.22	884.59	1010.96
N_1	3.8054	2.3448	1.3801	1.2982	1.1526	1.0553	1.0248
N_2	5.1390	4.8633	4.3695	3.0622	2.3394	1.7795	1.2287
N_3		2.5179	3.0714	3.2202	2.8710	2.5701	2.4651

N₄			1.2500	2.1250	2.4722	2.3819	2.0795
N₅				0.6250	1.3750	1.8866	2.0725
N₆					0.3125	0.8438	1.3528
N₇						0.1563	0.5000
N₈							0.0781

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 266.0

Total Number of Common-Cause Failure Events: 3

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9905370	0.9974000	0.9986626	0.9999790	2.223E+02	5.794E-01	--
α_2	2.10E-05	2.60E-03	1.34E-03	9.46E-03	5.794E-01	2.223E+02	0.953

CCCG = 3, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9915013	0.9968723	0.9976144	0.9997072	4.201E+02	1.318E+00	--
α_2	1.10E-04	2.29E-03	1.58E-03	6.94E-03	9.723E-01	4.227E+02	0.951
α_3	2.99E-07	8.33E-04	2.52E-04	3.64E-03	3.458E-01	4.149E+02	0.970

CCCG = 4, Gamma = 0.119

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9922149	0.9964244	0.9968628	0.9991356	7.334E+02	2.632E+00	--
α_2	5.18E-04	2.79E-03	2.36E-03	6.55E-03	2.066E+00	7.376E+02	0.934
α_3	1.17E-08	3.76E-04	7.35E-05	1.79E-03	2.646E-01	7.039E+02	0.981
α_4	4.49E-08	4.06E-04	9.97E-05	1.86E-03	3.010E-01	7.402E+02	0.933

CCCG = 5, Gamma = 0.119

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9940763	0.9965918	0.9967724	0.9984908	1.809E+03	6.186E+00	--
α_2	9.02E-04	2.44E-03	2.26E-03	4.59E-03	4.493E+00	1.836E+03	0.902
α_3	7.47E-05	7.60E-04	5.84E-04	2.05E-03	1.354E+00	1.780E+03	0.933
α_4	1.70E-08	1.79E-04	4.28E-05	8.24E-04	2.961E-01	1.649E+03	1.007
α_5	8.16E-35	2.74E-05	3.02E-11	1.36E-04	4.243E-02	1.547E+03	1.074

CCCG = 6, Gamma = 0.119

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9937501	0.9963985	0.9965880	0.9983997	1.723E+03	6.227E+00	--
α_2	8.51E-04	2.40E-03	2.22E-03	4.60E-03	4.205E+00	1.745E+03	0.901
α_3	6.19E-05	7.24E-04	5.44E-04	2.00E-03	1.258E+00	1.735E+03	0.908
α_4	1.25E-06	3.08E-04	1.41E-04	1.18E-03	5.031E-01	1.632E+03	0.966
α_5	2.19E-15	7.57E-05	9.98E-07	4.34E-04	1.155E-01	1.527E+03	1.033
α_6	4.17E-13	8.93E-05	3.27E-06	4.94E-04	1.451E-01	1.625E+03	0.970

CCCG = 7, Gamma = 0.119

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9950669	0.9967952	0.9968907	0.9981978	3.440E+03	1.106E+01	--
α_2	7.52E-04	1.72E-03	1.62E-03	3.00E-03	6.056E+00	3.519E+03	0.877
α_3	2.38E-04	8.73E-04	7.78E-04	1.83E-03	3.002E+00	3.437E+03	0.899
α_4	4.23E-05	4.14E-04	3.19E-04	1.11E-03	1.384E+00	3.344E+03	0.924
α_5	5.54E-07	1.56E-04	6.99E-05	6.05E-04	4.902E-01	3.132E+03	0.987
α_6	9.26E-16	3.90E-05	4.94E-07	2.24E-04	1.146E-01	2.942E+03	1.051
α_7	2.73E-93	5.20E-06	5.53E-25	6.17E-06	1.464E-02	2.817E+03	1.097

CCCG = 8, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9950051	0.9969056	0.9970227	0.9984062	2.799E+03	8.689E+00	--
α_2	5.05E-04	1.44E-03	1.33E-03	2.76E-03	4.159E+00	2.886E+03	0.858
α_3	1.73E-04	8.34E-04	7.16E-04	1.90E-03	2.283E+00	2.735E+03	0.906
α_4	3.44E-05	4.39E-04	3.25E-04	1.23E-03	1.206E+00	2.749E+03	0.902
α_5	1.17E-06	2.05E-04	9.94E-05	7.69E-04	5.375E-01	2.616E+03	0.948
α_6	1.61E-11	7.30E-05	5.67E-06	3.86E-04	1.805E-01	2.471E+03	1.003
α_7	9.10E-36	1.76E-05	1.32E-11	8.60E-05	4.139E-02	2.353E+03	1.054
α_8	5.31E-09	8.71E-05	1.92E-05	4.06E-04	2.827E-01	3.244E+03	0.764

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01
α_2	2.60E-03	2.29E-03	2.79E-03	2.44E-03	2.40E-03	1.72E-03	1.44E-03
α_3		8.33E-04	3.76E-04	7.60E-04	7.24E-04	8.73E-04	8.34E-04
α_4			4.06E-04	1.79E-04	3.08E-04	4.14E-04	4.39E-04
α_5				2.74E-05	7.57E-05	1.56E-04	2.05E-04
α_6					8.93E-05	3.90E-05	7.30E-05
α_7						5.20E-06	1.76E-05
α_8							8.71E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.97E-01	9.97E-01	9.96E-01	9.97E-01	9.96E-01	9.97E-01	9.97E-01
Beta	2.60E-03	3.13E-03	3.58E-03	3.41E-03	3.60E-03	3.20E-03	3.09E-03
Gamma		2.66E-01	2.19E-01	2.84E-01	3.32E-01	4.64E-01	5.35E-01
Delta			5.20E-01	2.14E-01	3.95E-01	4.13E-01	4.96E-01
Epsilon				1.33E-01	3.49E-01	3.27E-01	4.66E-01
Mu					5.41E-01	2.20E-01	4.64E-01
Omega						1.18E-01	5.89E-01
Sigma							8.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	102.13	153.19	204.25	255.31	306.38	357.44	408.50
N_1	1.0943	1.3829	1.4990	1.4437	1.2166	1.2845	1.3143
N_2	0.0862	0.2586	0.5171	0.8609	1.2903	1.2051	1.1785
N_3		0.0000	0.0000	0.0003	0.0008	0.2016	0.3225

N₄			0.0000	0.0000	0.0000	0.0000	0.0401
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

3.1.2 General Rate CCF Distributions

3.1.2.1 CCF-RATE: All CCF Rate Based Events 2006 to 2020

Generic CCF Parameters

Failure Mode: Bypass, Control Function, Fail to Control, Fail to Operate, Fail to Run, Fail to Run < 1H, Fail to Run > 1H, High dP, Loss of Heat Transfer, Plug, Spurious Operation
Date Range: 2006 through 2020
Prior: Default 2015

Total Number of Independent Failure Events: 2127.0

Total Number of Common-Cause Failure Events: 56

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9704334	0.9783685	0.9786795	0.9852508	0.9783423	1.009E+03	2.231E+01
α_2	1.47E-02	2.16E-02	2.13E-02	2.96E-02	2.17E-02	2.231E+01	1.009E+03

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9727831	0.9790804	0.9792875	0.9846781	0.9790079	1.524E+03	3.255E+01
α_2	8.40E-03	1.27E-02	1.25E-02	1.77E-02	1.26E-02	1.973E+01	1.536E+03
α_3	4.87E-03	8.24E-03	8.03E-03	1.23E-02	8.38E-03	1.283E+01	1.543E+03

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9752269	0.9804727	0.9806295	0.9851878	0.9805161	2.035E+03	4.053E+01
α_2	6.56E-03	9.84E-03	9.68E-03	1.36E-02	9.66E-03	2.042E+01	2.055E+03
α_3	3.64E-03	6.18E-03	6.02E-03	9.25E-03	6.26E-03	1.282E+01	2.063E+03
α_4	1.68E-03	3.52E-03	3.36E-03	5.89E-03	3.56E-03	7.297E+00	2.068E+03

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9784324	0.9827777	0.9829004	0.9867110	0.9828127	2.617E+03	4.586E+01
α_2	4.41E-03	6.80E-03	6.68E-03	9.61E-03	6.56E-03	1.811E+01	2.644E+03
α_3	3.27E-03	5.37E-03	5.24E-03	7.89E-03	5.36E-03	1.429E+01	2.648E+03
α_4	2.00E-03	3.70E-03	3.58E-03	5.82E-03	3.84E-03	9.853E+00	2.653E+03
α_5	4.30E-04	1.36E-03	1.23E-03	2.70E-03	1.43E-03	3.608E+00	2.659E+03

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9806889	0.9844621	0.9845661	0.9878851	0.9845555	3.132E+03	4.944E+01
α_2	3.02E-03	4.86E-03	4.76E-03	7.05E-03	4.66E-03	1.546E+01	3.166E+03
α_3	2.85E-03	4.64E-03	4.54E-03	6.78E-03	4.59E-03	1.477E+01	3.167E+03
α_4	1.83E-03	3.31E-03	3.21E-03	5.14E-03	3.37E-03	1.054E+01	3.171E+03
α_5	9.90E-04	2.14E-03	2.03E-03	3.64E-03	2.23E-03	6.798E+00	3.175E+03

α_6	9.64E-05	5.89E-04	4.89E-04	1.43E-03	5.98E-04	1.875E+00	3.180E+03
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CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9826873	0.9859570	0.9860388	0.9889411	0.9860866	3.761E+03	5.357E+01
α_2	2.36E-03	3.85E-03	3.77E-03	5.64E-03	3.62E-03	1.470E+01	3.800E+03
α_3	2.05E-03	3.44E-03	3.36E-03	5.14E-03	3.35E-03	1.314E+01	3.801E+03
α_4	1.77E-03	3.08E-03	3.00E-03	4.69E-03	3.11E-03	1.176E+01	3.803E+03
α_5	1.16E-03	2.26E-03	2.17E-03	3.65E-03	2.34E-03	8.620E+00	3.806E+03
α_6	4.25E-04	1.16E-03	1.08E-03	2.19E-03	1.23E-03	4.429E+00	3.810E+03
α_7	9.86E-06	2.41E-04	1.61E-04	7.43E-04	2.57E-04	9.176E-01	3.814E+03

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9841605	0.9871084	0.9871812	0.9898003	0.9872675	4.261E+03	5.565E+01
α_2	1.93E-03	3.20E-03	3.13E-03	4.74E-03	3.01E-03	1.383E+01	4.303E+03
α_3	1.48E-03	2.62E-03	2.54E-03	4.02E-03	2.53E-03	1.131E+01	4.305E+03
α_4	1.47E-03	2.60E-03	2.53E-03	4.00E-03	2.60E-03	1.124E+01	4.305E+03
α_5	1.18E-03	2.22E-03	2.14E-03	3.51E-03	2.26E-03	9.562E+00	4.307E+03
α_6	6.76E-04	1.50E-03	1.42E-03	2.58E-03	1.56E-03	6.457E+00	4.310E+03
α_7	1.56E-04	6.29E-04	5.54E-04	1.36E-03	6.65E-04	2.715E+00	4.314E+03
α_8	6.96E-07	1.24E-04	6.00E-05	4.65E-04	1.13E-04	5.361E-01	4.316E+03

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.78E-01	9.79E-01	9.80E-01	9.83E-01	9.84E-01	9.86E-01	9.87E-01
α_2	2.16E-02	1.27E-02	9.84E-03	6.80E-03	4.86E-03	3.85E-03	3.20E-03
α_3		8.24E-03	6.18E-03	5.37E-03	4.64E-03	3.44E-03	2.62E-03
α_4			3.52E-03	3.70E-03	3.31E-03	3.08E-03	2.60E-03
α_5				1.36E-03	2.14E-03	2.26E-03	2.22E-03
α_6					5.89E-04	1.16E-03	1.50E-03
α_7						2.41E-04	6.29E-04
α_8							1.24E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.78E-01	9.79E-01	9.80E-01	9.83E-01	9.84E-01	9.86E-01	9.87E-01
Beta	2.16E-02	2.09E-02	1.95E-02	1.72E-02	1.55E-02	1.40E-02	1.29E-02
Gamma		3.94E-01	4.96E-01	6.05E-01	6.87E-01	7.26E-01	7.51E-01
Delta			3.63E-01	4.85E-01	5.65E-01	6.62E-01	7.30E-01
Epsilon				2.68E-01	4.52E-01	5.43E-01	6.32E-01
Mu					2.16E-01	3.83E-01	5.04E-01
Omega						1.72E-01	3.35E-01
Sigma							1.65E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	964.47	1446.70	1928.94	2411.17	2893.41	3375.64	3857.88
N₁	22.1769	18.8894	15.5673	14.7285	13.8564	13.5809	13.1187
N₂	21.8416	18.8759	19.1574	16.1822	13.7606	12.4583	11.8112
N₃		12.5496	12.4166	13.2400	13.5626	11.5073	9.9158
N₄			7.0653	9.4703	9.9397	10.6812	10.1807
N₅				3.5314	6.5769	8.0542	8.8594
N₆					1.7656	4.2372	6.1073
N₇						0.8828	2.6071
N₈							0.4414

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 735.3

Total Number of Common-Cause Failure Events: 3

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.333

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9892720	0.9957767	0.9966066	0.9994445	3.792E+02	1.608E+00	--
α_2	5.55E-04	4.22E-03	3.39E-03	1.07E-02	1.608E+00	3.792E+02	0.997

CCCG = 3, Gamma = 0.336

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9911797	0.9959624	0.9964628	0.9990351	6.415E+02	2.601E+00	--
α_2	4.52E-04	2.81E-03	2.32E-03	6.82E-03	1.852E+00	6.574E+02	0.961
α_3	2.71E-05	1.23E-03	7.44E-04	4.08E-03	7.487E-01	6.086E+02	1.039

CCCG = 4, Gamma = 0.338

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9917163	0.9958142	0.9961836	0.9986504	8.760E+02	3.682E+00	--
α_2	5.07E-04	2.47E-03	2.12E-03	5.64E-03	2.255E+00	9.097E+02	0.936
α_3	5.48E-05	1.14E-03	7.83E-04	3.45E-03	9.739E-01	8.524E+02	1.000
α_4	1.31E-06	5.72E-04	2.38E-04	2.28E-03	4.536E-01	7.919E+02	1.077

CCCG = 5, Gamma = 0.339

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9921154	0.9955828	0.9958445	0.9981568	1.243E+03	5.516E+00	--
α_2	6.21E-04	2.26E-03	2.02E-03	4.74E-03	3.019E+00	1.331E+03	0.893
α_3	1.52E-04	1.25E-03	9.89E-04	3.22E-03	1.533E+00	1.228E+03	0.968
α_4	1.68E-05	7.02E-04	4.31E-04	2.31E-03	7.671E-01	1.092E+03	1.090
α_5	1.73E-10	2.05E-04	2.05E-05	1.06E-03	1.974E-01	9.630E+02	1.236

CCCG = 6, Gamma = 0.340

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9927965	0.9958561	0.9960757	0.9981659	1.484E+03	6.176E+00	--
α_2	4.79E-04	1.81E-03	1.60E-03	3.82E-03	2.907E+00	1.607E+03	0.874
α_3	1.52E-04	1.11E-03	8.97E-04	2.80E-03	1.651E+00	1.484E+03	0.948
α_4	3.45E-05	7.12E-04	4.89E-04	2.15E-03	9.782E-01	1.374E+03	1.024
α_5	1.14E-06	3.82E-04	1.66E-04	1.49E-03	4.749E-01	1.244E+03	1.132
α_6	6.88E-12	1.34E-04	7.84E-06	7.23E-04	1.652E-01	1.234E+03	1.141

CCCG = 7, Gamma = 0.340

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9930198	0.9956771	0.9958409	0.9977754	1.995E+03	8.662E+00	--
α_2	5.27E-04	1.65E-03	1.50E-03	3.29E-03	3.628E+00	2.191E+03	0.846
α_3	2.28E-04	1.11E-03	9.51E-04	2.53E-03	2.261E+00	2.037E+03	0.911
α_4	9.26E-05	7.94E-04	6.26E-04	2.07E-03	1.494E+00	1.881E+03	0.987
α_5	1.74E-05	5.01E-04	3.26E-04	1.58E-03	8.649E-01	1.725E+03	1.076
α_6	9.97E-08	2.26E-04	7.07E-05	9.78E-04	3.551E-01	1.571E+03	1.182
α_7	1.27E-26	3.98E-05	2.51E-09	2.21E-04	5.781E-02	1.452E+03	1.279

CCCG = 8, Gamma = 0.341

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9936333	0.9960710	0.9962225	0.9979917	2.160E+03	8.519E+00	--
α_2	3.78E-04	1.33E-03	1.19E-03	2.74E-03	3.154E+00	2.376E+03	0.851
α_3	1.66E-04	9.10E-04	7.67E-04	2.14E-03	2.044E+00	2.245E+03	0.901
α_4	7.63E-05	6.92E-04	5.41E-04	1.83E-03	1.445E+00	2.085E+03	0.970
α_5	2.84E-05	5.25E-04	3.67E-04	1.56E-03	1.021E+00	1.943E+03	1.041
α_6	1.87E-06	3.04E-04	1.49E-04	1.13E-03	5.463E-01	1.794E+03	1.128
α_7	1.57E-10	1.22E-04	1.32E-05	6.27E-04	2.033E-01	1.664E+03	1.216
α_8	1.01E-16	4.92E-05	3.78E-07	2.85E-04	1.045E-01	2.122E+03	0.954

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
α_2	4.22E-03	2.81E-03	2.47E-03	2.26E-03	1.81E-03	1.65E-03	1.33E-03
α_3		1.23E-03	1.14E-03	1.25E-03	1.11E-03	1.11E-03	9.10E-04
α_4			5.72E-04	7.02E-04	7.12E-04	7.94E-04	6.92E-04
α_5				2.05E-04	3.82E-04	5.01E-04	5.25E-04
α_6					1.34E-04	2.26E-04	3.04E-04
α_7						3.98E-05	1.22E-04
α_8							4.92E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01
Beta	4.22E-03	4.04E-03	4.19E-03	4.42E-03	4.14E-03	4.32E-03	3.93E-03
Gamma		3.04E-01	4.09E-01	4.88E-01	5.64E-01	6.18E-01	6.63E-01
Delta			3.34E-01	4.21E-01	5.25E-01	5.85E-01	6.50E-01
Epsilon				2.26E-01	4.20E-01	4.91E-01	5.91E-01
Mu					2.60E-01	3.47E-01	4.75E-01
Omega						1.50E-01	3.60E-01
Sigma							2.87E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	333.42	500.12	666.83	833.54	1000.25	1166.95	1333.66
N_1	0.9167	1.0000	1.0000	0.9896	0.9427	0.8755	0.7987
N_2	1.1250	0.8750	0.8125	0.7760	0.7791	0.7884	0.7903
N_3		0.5000	0.5625	0.5417	0.5169	0.5150	0.5324

N₄			0.2500	0.3906	0.4249	0.4103	0.3887
N₅				0.1250	0.2539	0.3273	0.3465
N₆					0.0625	0.1572	0.2387
N₇						0.0313	0.0940
N₈							0.0156

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 374.4

Total Number of Common-Cause Failure Events: 12

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.178

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9634793	0.9816095	0.9832391	0.9941701	1.904E+02	3.567E+00	--
α_2	5.83E-03	1.84E-02	1.68E-02	3.65E-02	3.567E+00	1.904E+02	0.997

CCCG = 3, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9582030	0.9744446	0.9754578	0.9872268	3.024E+02	7.930E+00	--
α_2	1.03E-02	2.20E-02	2.10E-02	3.71E-02	6.891E+00	3.068E+02	0.961
α_3	2.03E-04	3.59E-03	2.53E-03	1.06E-02	1.040E+00	2.889E+02	1.039

CCCG = 4, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9619478	0.9755166	0.9762707	0.9865109	4.082E+02	1.024E+01	--
α_2	6.69E-03	1.48E-02	1.41E-02	2.55E-02	6.389E+00	4.248E+02	0.936
α_3	2.37E-03	8.08E-03	7.28E-03	1.65E-02	3.259E+00	4.003E+02	1.000
α_4	1.45E-05	1.59E-03	8.34E-04	5.73E-03	5.957E-01	3.741E+02	1.077

CCCG = 5, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9667327	0.9777425	0.9782984	0.9868547	5.580E+02	1.270E+01	--
α_2	4.13E-03	9.57E-03	9.04E-03	1.68E-02	5.856E+00	6.058E+02	0.893
α_3	3.21E-03	8.39E-03	7.82E-03	1.55E-02	4.731E+00	5.591E+02	0.968
α_4	5.99E-04	3.71E-03	3.07E-03	8.99E-03	1.856E+00	4.991E+02	1.090
α_5	1.53E-08	5.89E-04	1.11E-04	2.82E-03	2.600E-01	4.414E+02	1.236

CCCG = 6, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9702071	0.9797424	0.9802044	0.9877009	6.759E+02	1.397E+01	--
α_2	2.38E-03	6.24E-03	5.81E-03	1.16E-02	4.702E+00	7.487E+02	0.874
α_3	3.03E-03	7.49E-03	7.02E-03	1.35E-02	5.205E+00	6.898E+02	0.948
α_4	1.14E-03	4.41E-03	3.90E-03	9.38E-03	2.835E+00	6.404E+02	1.024
α_5	1.09E-04	1.83E-03	1.30E-03	5.35E-03	1.062E+00	5.810E+02	1.132
α_6	2.62E-11	2.96E-04	1.92E-05	1.58E-03	1.706E-01	5.771E+02	1.141

CCCG = 7, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9729186	0.9810732	0.9814393	0.9879782	8.567E+02	1.653E+01	--
α_2	2.12E-03	5.29E-03	4.95E-03	9.60E-03	5.138E+00	9.667E+02	0.846
α_3	1.94E-03	5.15E-03	4.79E-03	9.58E-03	4.648E+00	8.984E+02	0.911
α_4	1.60E-03	4.73E-03	4.34E-03	9.19E-03	3.943E+00	8.297E+02	0.987
α_5	5.13E-04	2.73E-03	2.31E-03	6.39E-03	2.088E+00	7.621E+02	1.076
α_6	1.11E-05	9.16E-04	5.03E-04	3.22E-03	6.373E-01	6.951E+02	1.182
α_7	2.73E-21	1.15E-04	8.15E-08	6.68E-04	7.422E-02	6.429E+02	1.279

CCCG = 8, Gamma = 0.177

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9748107	0.9823110	0.9826435	0.9886769	9.473E+02	1.706E+01	--
α_2	1.79E-03	4.58E-03	4.28E-03	8.40E-03	4.928E+00	1.071E+03	0.851
α_3	1.19E-03	3.67E-03	3.35E-03	7.24E-03	3.727E+00	1.012E+03	0.901
α_4	1.34E-03	4.05E-03	3.70E-03	7.93E-03	3.820E+00	9.400E+02	0.970
α_5	8.10E-04	3.17E-03	2.80E-03	6.79E-03	2.788E+00	8.766E+02	1.041
α_6	1.64E-04	1.67E-03	1.28E-03	4.50E-03	1.355E+00	8.100E+02	1.128
α_7	1.05E-07	4.37E-04	1.23E-04	1.94E-03	3.291E-01	7.522E+02	1.216
α_8	1.19E-15	1.16E-04	1.24E-06	6.66E-04	1.109E-01	9.594E+02	0.954

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.82E-01	9.74E-01	9.76E-01	9.78E-01	9.80E-01	9.81E-01	9.82E-01
α_2	1.84E-02	2.20E-02	1.48E-02	9.57E-03	6.24E-03	5.29E-03	4.58E-03
α_3		3.59E-03	8.08E-03	8.39E-03	7.49E-03	5.15E-03	3.67E-03
α_4			1.59E-03	3.71E-03	4.41E-03	4.73E-03	4.05E-03
α_5				5.89E-04	1.83E-03	2.73E-03	3.17E-03
α_6					2.96E-04	9.16E-04	1.67E-03
α_7						1.15E-04	4.37E-04
α_8							1.16E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.82E-01	9.74E-01	9.76E-01	9.78E-01	9.80E-01	9.81E-01	9.82E-01
Beta	1.84E-02	2.56E-02	2.45E-02	2.23E-02	2.03E-02	1.89E-02	1.77E-02
Gamma		1.40E-01	3.95E-01	5.70E-01	6.92E-01	7.21E-01	7.41E-01
Delta			1.64E-01	3.39E-01	4.66E-01	6.23E-01	7.20E-01
Epsilon				1.37E-01	3.25E-01	4.43E-01	5.71E-01
Mu					1.39E-01	2.74E-01	4.12E-01
Omega						1.12E-01	2.49E-01
Sigma							2.09E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	169.77	254.65	339.54	424.42	509.31	594.19	679.07
N_1	6.4319	4.1957	3.4692	3.2728	3.2332	3.1542	3.0253
N_2	3.1174	5.9521	5.1043	3.8636	2.7607	2.4839	2.4241
N_3		0.8000	2.8667	3.6528	3.8735	3.0026	2.3078

N₄			0.3750	1.4931	2.2164	2.8279	2.7929
N₅				0.1875	0.8310	1.4844	2.0548
N₆					0.0938	0.4593	0.9570
N₇						0.0469	0.2521
N₈							0.0234

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 175.0

Total Number of Common-Cause Failure Events: 27

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.100

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8182393	0.8744105	0.8767447	0.9226075	9.357E+01	1.344E+01	--
α_2	7.74E-02	1.26E-01	1.23E-01	1.82E-01	1.344E+01	9.357E+01	0.997

CCCG = 3, Gamma = 0.096

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8456956	0.8893534	0.8910039	0.9273750	1.399E+02	1.740E+01	--
α_2	2.80E-02	5.34E-02	5.16E-02	8.50E-02	8.742E+00	1.550E+02	0.961
α_3	2.99E-02	5.72E-02	5.53E-02	9.12E-02	8.661E+00	1.426E+02	1.039

CCCG = 4, Gamma = 0.093

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8609130	0.8972997	0.8985596	0.9293853	1.886E+02	2.159E+01	--
α_2	2.39E-02	4.39E-02	4.25E-02	6.86E-02	9.742E+00	2.122E+02	0.936
α_3	1.63E-02	3.42E-02	3.27E-02	5.71E-02	7.103E+00	2.006E+02	1.000
α_4	9.49E-03	2.46E-02	2.30E-02	4.53E-02	4.743E+00	1.881E+02	1.077

CCCG = 5, Gamma = 0.091

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8823093	0.9114374	0.9123958	0.9372940	2.607E+02	2.534E+01	--
α_2	1.64E-02	3.03E-02	2.93E-02	4.76E-02	9.634E+00	3.084E+02	0.893
α_3	1.24E-02	2.55E-02	2.44E-02	4.22E-02	7.473E+00	2.857E+02	0.968
α_4	9.92E-03	2.27E-02	2.15E-02	3.97E-02	5.923E+00	2.545E+02	1.090
α_5	2.12E-03	1.00E-02	8.65E-03	2.27E-02	2.305E+00	2.274E+02	1.236

CCCG = 6, Gamma = 0.090

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8956854	0.9208203	0.9216297	0.9431927	3.190E+02	2.743E+01	--
α_2	1.09E-02	2.14E-02	2.06E-02	3.47E-02	8.284E+00	3.793E+02	0.874
α_3	1.13E-02	2.25E-02	2.16E-02	3.67E-02	8.036E+00	3.495E+02	0.948
α_4	7.36E-03	1.72E-02	1.63E-02	3.04E-02	5.706E+00	3.252E+02	1.024
α_5	5.00E-03	1.41E-02	1.30E-02	2.67E-02	4.207E+00	2.952E+02	1.132
α_6	3.13E-04	4.03E-03	2.99E-03	1.13E-02	1.198E+00	2.957E+02	1.141

CCCG = 7, Gamma = 0.089

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9104257	0.9312776	0.9319295	0.9499048	4.105E+02	3.029E+01	--
α_2	7.73E-03	1.56E-02	1.49E-02	2.56E-02	7.866E+00	4.974E+02	0.846
α_3	7.87E-03	1.61E-02	1.54E-02	2.67E-02	7.562E+00	4.619E+02	0.911
α_4	6.64E-03	1.47E-02	1.40E-02	2.53E-02	6.379E+00	4.270E+02	0.987
α_5	5.07E-03	1.27E-02	1.19E-02	2.31E-02	5.053E+00	3.923E+02	1.076
α_6	2.05E-03	7.87E-03	6.98E-03	1.67E-02	2.845E+00	3.589E+02	1.182
α_7	1.46E-05	1.75E-03	9.02E-04	6.34E-03	5.836E-01	3.337E+02	1.279

CCCG = 8, Gamma = 0.088

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9195990	0.9378508	0.9384086	0.9541991	4.904E+02	3.250E+01	--
α_2	6.13E-03	1.26E-02	1.20E-02	2.09E-02	7.527E+00	5.904E+02	0.851
α_3	5.78E-03	1.23E-02	1.17E-02	2.08E-02	6.946E+00	5.576E+02	0.901
α_4	5.57E-03	1.23E-02	1.17E-02	2.11E-02	6.441E+00	5.180E+02	0.970
α_5	4.60E-03	1.11E-02	1.04E-02	1.98E-02	5.422E+00	4.832E+02	1.041
α_6	3.11E-03	8.98E-03	8.27E-03	1.73E-02	4.051E+00	4.468E+02	1.128
α_7	6.83E-04	4.35E-03	3.58E-03	1.06E-02	1.817E+00	4.163E+02	1.216
α_8	4.85E-08	5.51E-04	1.30E-04	2.54E-03	2.937E-01	5.329E+02	0.954

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	8.74E-01	8.89E-01	8.97E-01	9.11E-01	9.21E-01	9.31E-01	9.38E-01
α_2	1.26E-01	5.34E-02	4.39E-02	3.03E-02	2.14E-02	1.56E-02	1.26E-02
α_3		5.72E-02	3.42E-02	2.55E-02	2.25E-02	1.61E-02	1.23E-02
α_4			2.46E-02	2.27E-02	1.72E-02	1.47E-02	1.23E-02
α_5				1.00E-02	1.41E-02	1.27E-02	1.11E-02
α_6					4.03E-03	7.87E-03	8.98E-03
α_7						1.75E-03	4.35E-03
α_8							5.51E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	8.74E-01	8.89E-01	8.97E-01	9.11E-01	9.21E-01	9.31E-01	9.38E-01
Beta	1.26E-01	1.11E-01	1.03E-01	8.86E-02	7.92E-02	6.87E-02	6.21E-02
Gamma		5.17E-01	5.73E-01	6.58E-01	7.30E-01	7.73E-01	7.97E-01
Delta			4.18E-01	5.63E-01	6.11E-01	6.97E-01	7.52E-01
Epsilon				3.06E-01	5.12E-01	6.03E-01	6.70E-01
Mu					2.23E-01	4.30E-01	5.56E-01
Omega						1.82E-01	3.53E-01
Sigma							1.13E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	79.35	119.03	158.70	198.38	238.06	277.73	317.41
N_1	8.8803	8.2455	6.3586	5.5372	4.6326	4.2456	3.7519
N_2	13.0598	8.0750	8.7030	7.8428	6.9487	6.3171	5.9442
N_3		8.3682	6.7146	6.2664	6.5046	5.5733	4.9602

N₄			4.5020	5.4893	4.9869	5.0918	4.7687
N₅				2.2500	3.9601	4.3614	4.4110
N₆					1.1250	2.6127	3.4801
N₇						0.5625	1.6360
N₈							0.2813

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 585.0

Total Number of Common-Cause Failure Events: 12

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.272

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9749570	0.9871597	0.9882284	0.9957109	2.955E+02	3.843E+00	--
α_2	4.29E-03	1.28E-02	1.18E-02	2.50E-02	3.843E+00	2.955E+02	0.997

CCCG = 3, Gamma = 0.273

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9767498	0.9864514	0.9871261	0.9938496	4.702E+02	6.458E+00	--
α_2	3.14E-03	8.75E-03	8.09E-03	1.66E-02	4.284E+00	4.855E+02	0.961
α_3	9.46E-04	4.80E-03	4.09E-03	1.11E-02	2.174E+00	4.505E+02	1.039

CCCG = 4, Gamma = 0.273

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9792131	0.9870866	0.9875655	0.9933253	6.651E+02	8.701E+00	--
α_2	2.68E-03	6.91E-03	6.45E-03	1.27E-02	4.850E+00	6.968E+02	0.936
α_3	1.02E-03	4.12E-03	3.63E-03	8.89E-03	2.704E+00	6.538E+02	1.000
α_4	1.33E-04	1.88E-03	1.38E-03	5.37E-03	1.148E+00	6.084E+02	1.077

CCCG = 5, Gamma = 0.274

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9819435	0.9883304	0.9886852	0.9935062	9.021E+02	1.065E+01	--
α_2	1.81E-03	4.75E-03	4.42E-03	8.80E-03	4.717E+00	9.889E+02	0.893
α_3	1.12E-03	3.70E-03	3.35E-03	7.49E-03	3.388E+00	9.125E+02	0.968
α_4	4.27E-04	2.43E-03	2.04E-03	5.78E-03	1.979E+00	8.118E+02	1.090
α_5	5.81E-06	7.91E-04	4.00E-04	2.90E-03	5.675E-01	7.169E+02	1.236

CCCG = 6, Gamma = 0.274

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9838676	0.9893285	0.9896151	0.9938111	1.121E+03	1.209E+01	--
α_2	1.36E-03	3.65E-03	3.38E-03	6.83E-03	4.542E+00	1.241E+03	0.874
α_3	8.64E-04	2.90E-03	2.62E-03	5.90E-03	3.331E+00	1.146E+03	0.948
α_4	5.84E-04	2.45E-03	2.14E-03	5.35E-03	2.601E+00	1.061E+03	1.024
α_5	1.19E-04	1.34E-03	1.01E-03	3.66E-03	1.286E+00	9.612E+02	1.132
α_6	8.53E-08	3.46E-04	9.78E-05	1.53E-03	3.301E-01	9.541E+02	1.141

CCCG = 7, Gamma = 0.274

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9855478	0.9901957	0.9904242	0.9940635	1.410E+03	1.396E+01	--
α_2	1.11E-03	2.93E-03	2.72E-03	5.44E-03	4.678E+00	1.593E+03	0.846
α_3	6.54E-04	2.22E-03	2.00E-03	4.53E-03	3.292E+00	1.482E+03	0.911
α_4	5.97E-04	2.19E-03	1.95E-03	4.59E-03	3.001E+00	1.368E+03	0.987
α_5	2.81E-04	1.59E-03	1.33E-03	3.76E-03	1.994E+00	1.255E+03	1.076
α_6	2.21E-05	7.24E-04	4.62E-04	2.32E-03	8.285E-01	1.143E+03	1.182
α_7	1.36E-11	1.61E-04	1.04E-05	8.62E-04	1.701E-01	1.057E+03	1.279

CCCG = 8, Gamma = 0.274

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9865864	0.9907846	0.9909841	0.9943018	1.619E+03	1.506E+01	--
α_2	9.70E-04	2.56E-03	2.38E-03	4.76E-03	4.684E+00	1.826E+03	0.851
α_3	4.68E-04	1.72E-03	1.54E-03	3.62E-03	2.980E+00	1.726E+03	0.901
α_4	4.82E-04	1.81E-03	1.61E-03	3.84E-03	2.914E+00	1.603E+03	0.970
α_5	3.71E-04	1.64E-03	1.43E-03	3.66E-03	2.461E+00	1.494E+03	1.041
α_6	9.98E-05	9.93E-04	7.65E-04	2.67E-03	1.371E+00	1.379E+03	1.128
α_7	1.73E-06	3.98E-04	1.84E-04	1.52E-03	5.094E-01	1.280E+03	1.216
α_8	9.42E-14	8.29E-05	2.29E-06	4.65E-04	1.354E-01	1.633E+03	0.954

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.87E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01	9.90E-01	9.91E-01
α_2	1.28E-02	8.75E-03	6.91E-03	4.75E-03	3.65E-03	2.93E-03	2.56E-03
α_3		4.80E-03	4.12E-03	3.70E-03	2.90E-03	2.22E-03	1.72E-03
α_4			1.88E-03	2.43E-03	2.45E-03	2.19E-03	1.81E-03
α_5				7.91E-04	1.34E-03	1.59E-03	1.64E-03
α_6					3.46E-04	7.24E-04	9.93E-04
α_7						1.61E-04	3.98E-04
α_8							8.29E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.87E-01	9.86E-01	9.87E-01	9.88E-01	9.89E-01	9.90E-01	9.91E-01
Beta	1.28E-02	1.35E-02	1.29E-02	1.17E-02	1.07E-02	9.80E-03	9.22E-03
Gamma		3.54E-01	4.65E-01	5.93E-01	6.58E-01	7.01E-01	7.22E-01
Delta			3.14E-01	4.66E-01	5.87E-01	6.78E-01	7.41E-01
Epsilon				2.45E-01	4.07E-01	5.30E-01	6.32E-01
Mu					2.06E-01	3.58E-01	4.73E-01
Omega						1.82E-01	3.26E-01
Sigma							1.73E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	265.26	397.89	530.53	663.16	795.79	928.42	1061.05
N_1	5.2813	4.9482	4.7395	4.9289	5.0479	5.3057	5.5428
N_2	3.3727	3.4738	3.5376	3.0331	2.8276	2.5725	2.4550
N_3		1.8814	2.2728	2.4458	2.2232	1.9719	1.7205

N₄			0.9383	1.5974	1.9503	2.0040	1.8717
N₅				0.4689	1.0319	1.4691	1.6984
N₆					0.2344	0.6329	1.0441
N₇						0.1172	0.3750
N₈							0.0586

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 257.3

Total Number of Common-Cause Failure Events: 2

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9817341	0.9927241	0.9941047	0.9989939	2.265E+02	1.660E+00	--
α_2	1.01E-03	7.28E-03	5.90E-03	1.83E-02	1.660E+00	2.265E+02	0.997

CCCG = 3, Gamma = 0.118

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9867624	0.9939642	0.9947212	0.9985787	4.215E+02	2.560E+00	--
α_2	2.19E-04	2.74E-03	2.04E-03	7.67E-03	1.214E+00	4.411E+02	0.961
α_3	3.20E-04	3.29E-03	2.53E-03	8.88E-03	1.346E+00	4.075E+02	1.039

CCCG = 4, Gamma = 0.119

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9891973	0.9943746	0.9948184	0.9980357	7.273E+02	4.115E+00	--
α_2	7.75E-04	3.31E-03	2.89E-03	7.28E-03	2.549E+00	7.670E+02	0.936
α_3	1.15E-08	3.67E-04	7.18E-05	1.75E-03	2.646E-01	7.199E+02	1.000
α_4	1.78E-04	1.95E-03	1.48E-03	5.31E-03	1.301E+00	6.673E+02	1.077

CCCG = 5, Gamma = 0.119

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9930894	0.9958697	0.9960545	0.9980187	1.766E+03	7.325E+00	--
α_2	8.12E-04	2.26E-03	2.09E-03	4.30E-03	4.299E+00	1.897E+03	0.893
α_3	1.36E-04	9.63E-04	7.81E-04	2.41E-03	1.687E+00	1.751E+03	0.968
α_4	1.38E-05	5.11E-04	3.20E-04	1.66E-03	7.961E-01	1.556E+03	1.090
α_5	2.35E-06	3.95E-04	1.93E-04	1.47E-03	5.424E-01	1.372E+03	1.236

CCCG = 6, Gamma = 0.119

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931206	0.9959374	0.9961294	0.9980988	1.700E+03	6.936E+00	--
α_2	5.44E-04	1.81E-03	1.64E-03	3.68E-03	3.359E+00	1.850E+03	0.874
α_3	1.42E-04	9.95E-04	8.09E-04	2.49E-03	1.701E+00	1.708E+03	0.948
α_4	1.89E-05	5.46E-04	3.56E-04	1.72E-03	8.642E-01	1.581E+03	1.024
α_5	4.51E-06	4.30E-04	2.30E-04	1.53E-03	6.155E-01	1.431E+03	1.132
α_6	2.66E-07	2.78E-04	9.95E-05	1.16E-03	3.951E-01	1.419E+03	1.141

CCCG = 7, Gamma = 0.119

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9947852	0.9965789	0.9966756	0.9980427	3.395E+03	1.165E+01	--
α_2	5.56E-04	1.39E-03	1.30E-03	2.52E-03	5.147E+00	3.707E+03	0.846
α_3	2.74E-04	9.41E-04	8.46E-04	1.93E-03	3.244E+00	3.446E+03	0.911
α_4	7.96E-05	5.44E-04	4.43E-04	1.35E-03	1.731E+00	3.183E+03	0.987
α_5	1.21E-05	3.09E-04	2.05E-04	9.60E-04	9.022E-01	2.918E+03	1.076
α_6	6.48E-07	1.84E-04	8.23E-05	7.13E-04	4.896E-01	2.657E+03	1.182
α_7	1.23E-13	5.69E-05	1.79E-06	3.17E-04	1.396E-01	2.456E+03	1.279

CCCG = 8, Gamma = 0.120

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9946163	0.9966294	0.9967506	0.9982288	2.705E+03	9.148E+00	--
α_2	3.05E-04	1.07E-03	9.56E-04	2.20E-03	3.178E+00	2.979E+03	0.851
α_3	1.80E-04	8.36E-04	7.22E-04	1.89E-03	2.355E+00	2.813E+03	0.901
α_4	7.03E-05	5.83E-04	4.62E-04	1.51E-03	1.525E+00	2.614E+03	0.970
α_5	1.35E-05	3.64E-04	2.40E-04	1.14E-03	8.863E-01	2.436E+03	1.041
α_6	1.86E-06	2.53E-04	1.28E-04	9.27E-04	5.678E-01	2.248E+03	1.128
α_7	1.14E-08	1.40E-04	3.25E-05	6.45E-04	2.914E-01	2.085E+03	1.216
α_8	4.59E-08	1.30E-04	3.91E-05	5.67E-04	3.452E-01	2.659E+03	0.954

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.93E-01	9.94E-01	9.94E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
α_2	7.28E-03	2.74E-03	3.31E-03	2.26E-03	1.81E-03	1.39E-03	1.07E-03
α_3		3.29E-03	3.67E-04	9.63E-04	9.95E-04	9.41E-04	8.36E-04
α_4			1.95E-03	5.11E-04	5.46E-04	5.44E-04	5.83E-04
α_5				3.95E-04	4.30E-04	3.09E-04	3.64E-04
α_6					2.78E-04	1.84E-04	2.53E-04
α_7						5.69E-05	1.40E-04
α_8							1.30E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.93E-01	9.94E-01	9.94E-01	9.96E-01	9.96E-01	9.97E-01	9.97E-01
Beta	7.28E-03	6.04E-03	5.63E-03	4.13E-03	4.06E-03	3.42E-03	3.37E-03
Gamma		5.45E-01	4.11E-01	4.53E-01	5.54E-01	5.95E-01	6.84E-01
Delta			8.41E-01	4.85E-01	5.58E-01	5.38E-01	6.37E-01
Epsilon				4.36E-01	5.65E-01	5.03E-01	6.03E-01
Mu					3.93E-01	4.38E-01	5.89E-01
Omega						2.36E-01	5.16E-01
Sigma							4.82E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	116.67	175.01	233.34	291.68	350.01	408.35	466.68
N_1	0.6667	0.5000	0.0000	0.0000	0.0000	0.0000	0.0000
N_2	1.1667	0.5000	1.0000	0.6667	0.4444	0.2963	0.1975
N_3		1.0000	0.0000	0.3333	0.4444	0.4444	0.3951

N₄			1.0000	0.5000	0.3611	0.3472	0.3588
N₅				0.5000	0.5000	0.4120	0.3488
N₆					0.2500	0.3750	0.3873
N₇						0.1250	0.2500
N₈							0.0625

3.1.3 CCF Prior Distributions

3.1.3.1 CCF Prior: CCF with No Data (Prior Only)

Generic CCF Parameters

Prior: Default 2015

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9202127	0.9795237	0.9909751	0.9999381	0.0000000	2.241E+01	4.685E-01
α_2	5.83E-05	2.05E-02	9.02E-03	7.98E-02	0.00E+00	4.685E-01	2.241E+01

CCCG = 3

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9457174	0.9809153	0.9860142	0.9986769	0.0000000	5.798E+01	1.128E+00
α_2	4.84E-04	1.44E-02	9.41E-03	4.54E-02	0.00E+00	8.512E-01	5.826E+01
α_3	2.34E-07	4.68E-03	1.00E-03	2.20E-02	0.00E+00	2.768E-01	5.883E+01

CCCG = 4

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9510776	0.9795438	0.9828910	0.9965680	0.0000000	9.068E+01	1.894E+00
α_2	1.18E-03	1.36E-02	1.03E-02	3.74E-02	0.00E+00	1.260E+00	9.131E+01
α_3	4.73E-06	4.35E-03	1.60E-03	1.80E-02	0.00E+00	4.024E-01	9.217E+01
α_4	1.74E-08	2.50E-03	3.73E-04	1.24E-02	0.00E+00	2.315E-01	9.234E+01

CCCG = 5

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9645377	0.9823331	0.9839596	0.9945673	0.0000000	1.908E+02	3.432E+00
α_2	1.69E-03	9.90E-03	8.28E-03	2.37E-02	0.00E+00	1.924E+00	1.923E+02
α_3	3.13E-04	5.40E-03	3.83E-03	1.59E-02	0.00E+00	1.049E+00	1.932E+02
α_4	1.50E-06	1.97E-03	6.78E-04	8.30E-03	0.00E+00	3.822E-01	1.939E+02
α_5	3.43E-20	3.95E-04	3.68E-07	2.30E-03	0.00E+00	7.674E-02	1.942E+02

CCCG = 6

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9673747	0.9832576	0.9846419	0.9944035	0.0000000	2.252E+02	3.835E+00
α_2	1.06E-03	7.43E-03	6.05E-03	1.85E-02	0.00E+00	1.701E+00	2.274E+02
α_3	4.16E-04	5.27E-03	3.92E-03	1.47E-02	0.00E+00	1.207E+00	2.278E+02
α_4	2.39E-05	2.60E-03	1.37E-03	9.37E-03	0.00E+00	5.960E-01	2.285E+02
α_5	3.78E-09	9.65E-04	1.29E-04	4.84E-03	0.00E+00	2.211E-01	2.288E+02
α_6	3.77E-15	4.79E-04	4.85E-06	2.76E-03	0.00E+00	1.098E-01	2.289E+02

CCCG = 7

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9731763	0.9847771	0.9856229	0.9934781	0.0000000	3.718E+02	5.747E+00
α_2	1.22E-03	5.94E-03	5.09E-03	1.36E-02	0.00E+00	2.243E+00	3.753E+02
α_3	5.79E-04	4.32E-03	3.48E-03	1.09E-02	0.00E+00	1.630E+00	3.759E+02
α_4	1.78E-04	2.87E-03	2.05E-03	8.34E-03	0.00E+00	1.083E+00	3.765E+02
α_5	1.08E-05	1.50E-03	7.55E-04	5.50E-03	0.00E+00	5.654E-01	3.770E+02
α_6	2.79E-10	5.07E-04	4.69E-05	2.64E-03	0.00E+00	1.916E-01	3.774E+02
α_7	6.31E-41	9.22E-05	3.43E-12	4.04E-04	0.00E+00	3.480E-02	3.775E+02

CCCG = 8

Alpha Factor	5th%	Mean	Median	95th%	MLE	a	b
α_1	0.9744830	0.9855322	0.9863403	0.9938201	0.0000000	3.900E+02	5.726E+00
α_2	9.19E-04	5.10E-03	4.29E-03	1.20E-02	0.00E+00	2.018E+00	3.937E+02
α_3	3.63E-04	3.51E-03	2.72E-03	9.37E-03	0.00E+00	1.391E+00	3.944E+02
α_4	1.60E-04	2.68E-03	1.91E-03	7.86E-03	0.00E+00	1.062E+00	3.947E+02
α_5	3.13E-05	1.78E-03	1.04E-03	6.03E-03	0.00E+00	7.026E-01	3.950E+02
α_6	3.47E-07	8.84E-04	2.71E-04	3.84E-03	0.00E+00	3.497E-01	3.954E+02
α_7	1.33E-15	2.72E-04	2.50E-06	1.57E-03	0.00E+00	1.078E-01	3.956E+02
α_8	2.79E-17	2.39E-04	1.01E-06	1.39E-03	0.00E+00	9.469E-02	3.957E+02

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.80E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
α_2	2.05E-02	1.44E-02	1.36E-02	9.90E-03	7.43E-03	5.94E-03	5.10E-03
α_3		4.68E-03	4.35E-03	5.40E-03	5.27E-03	4.32E-03	3.51E-03
α_4			2.50E-03	1.97E-03	2.60E-03	2.87E-03	2.68E-03
α_5				3.95E-04	9.65E-04	1.50E-03	1.78E-03
α_6					4.79E-04	5.07E-04	8.84E-04
α_7						9.22E-05	2.72E-04
α_8							2.39E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.80E-01	9.81E-01	9.80E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01
Beta	2.05E-02	1.91E-02	2.05E-02	1.77E-02	1.67E-02	1.52E-02	1.45E-02
Gamma		2.45E-01	3.35E-01	4.39E-01	5.56E-01	6.10E-01	6.48E-01
Delta			3.65E-01	3.04E-01	4.34E-01	5.35E-01	6.25E-01
Epsilon				1.67E-01	3.57E-01	4.22E-01	5.42E-01
Mu					3.32E-01	2.86E-01	4.40E-01
Omega						1.54E-01	3.67E-01
Sigma							4.68E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00

N₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Component Causal CCF Parameters

Cause Group: Component

Prior: Component

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9577947	0.9890938	0.9951178	0.9999636	4.384E+01	4.834E-01	--
α_2	3.64E-05	1.09E-02	4.88E-03	4.22E-02	4.834E-01	4.384E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9740015	0.9906390	0.9929914	0.9992351	1.297E+02	1.226E+00	--
α_2	3.63E-04	7.46E-03	5.15E-03	2.25E-02	9.769E-01	1.299E+02	--
α_3	3.04E-08	1.90E-03	3.30E-04	9.21E-03	2.487E-01	1.307E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9738389	0.9888180	0.9905346	0.9979275	1.819E+02	2.057E+00	--
α_2	8.66E-04	7.84E-03	6.14E-03	2.06E-02	1.442E+00	1.825E+02	--
α_3	2.80E-06	2.24E-03	8.40E-04	9.19E-03	4.114E-01	1.835E+02	--
α_4	1.45E-09	1.11E-03	1.21E-04	5.68E-03	2.036E-01	1.838E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9794739	0.9896042	0.9905106	0.9966374	3.506E+02	3.683E+00	--
α_2	1.30E-03	6.33E-03	5.43E-03	1.44E-02	2.243E+00	3.520E+02	--
α_3	1.41E-04	2.80E-03	1.94E-03	8.40E-03	9.912E-01	3.533E+02	--
α_4	7.24E-07	1.06E-03	3.59E-04	4.51E-03	3.765E-01	3.539E+02	--
α_5	1.77E-21	2.04E-04	1.16E-07	1.18E-03	7.237E-02	3.542E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9804087	0.9897661	0.9905619	0.9964048	4.003E+02	4.139E+00	--
α_2	1.01E-03	5.26E-03	4.47E-03	1.22E-02	2.128E+00	4.023E+02	--
α_3	1.93E-04	2.80E-03	2.04E-03	8.03E-03	1.134E+00	4.033E+02	--
α_4	8.94E-06	1.37E-03	6.78E-04	5.07E-03	5.533E-01	4.039E+02	--
α_5	2.13E-09	5.46E-04	7.29E-05	2.74E-03	2.210E-01	4.042E+02	--
α_6	3.23E-16	2.54E-04	1.77E-06	1.47E-03	1.027E-01	4.043E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9839119	0.9906447	0.9911162	0.9957676	6.811E+02	6.432E+00	--
α_2	1.07E-03	4.13E-03	3.66E-03	8.79E-03	2.840E+00	6.847E+02	--
α_3	3.77E-04	2.54E-03	2.08E-03	6.28E-03	1.746E+00	6.858E+02	--
α_4	9.82E-05	1.58E-03	1.13E-03	4.59E-03	1.084E+00	6.864E+02	--
α_5	4.45E-06	7.82E-04	3.79E-04	2.93E-03	5.376E-01	6.870E+02	--
α_6	2.53E-10	2.88E-04	2.91E-05	1.49E-03	1.979E-01	6.873E+02	--
α_7	8.65E-53	3.86E-05	3.87E-15	1.32E-04	2.656E-02	6.875E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9845230	0.9911057	0.9915776	0.9960771	6.811E+02	6.112E+00	--
α_2	7.44E-04	3.44E-03	2.97E-03	7.74E-03	2.364E+00	6.848E+02	--
α_3	2.62E-04	2.20E-03	1.74E-03	5.71E-03	1.512E+00	6.857E+02	--
α_4	9.01E-05	1.54E-03	1.09E-03	4.51E-03	1.056E+00	6.862E+02	--
α_5	1.49E-05	9.82E-04	5.59E-04	3.38E-03	6.745E-01	6.865E+02	--
α_6	6.01E-08	4.48E-04	1.14E-04	2.03E-03	3.076E-01	6.869E+02	--
α_7	1.11E-15	1.59E-04	1.57E-06	9.17E-04	1.093E-01	6.871E+02	--
α_8	2.00E-18	1.29E-04	3.59E-07	7.54E-04	8.885E-02	6.871E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
α_2	1.09E-02	7.46E-03	7.84E-03	6.33E-03	5.26E-03	4.13E-03	3.44E-03
α_3		1.90E-03	2.24E-03	2.80E-03	2.80E-03	2.54E-03	2.20E-03
α_4			1.11E-03	1.06E-03	1.37E-03	1.58E-03	1.54E-03
α_5				2.04E-04	5.46E-04	7.82E-04	9.82E-04
α_6					2.54E-04	2.88E-04	4.48E-04
α_7						3.86E-05	1.59E-04
α_8							1.29E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.89E-01	9.91E-01	9.89E-01	9.90E-01	9.90E-01	9.91E-01	9.91E-01
Beta	1.09E-02	9.36E-03	1.12E-02	1.04E-02	1.02E-02	9.36E-03	8.89E-03
Gamma		2.03E-01	2.99E-01	3.91E-01	4.86E-01	5.58E-01	6.13E-01
Delta			3.31E-01	3.12E-01	4.36E-01	5.14E-01	5.97E-01
Epsilon				1.61E-01	3.69E-01	4.13E-01	5.28E-01
Mu					3.17E-01	2.95E-01	4.29E-01
Omega						1.18E-01	3.92E-01
Sigma							4.48E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Design Causal CCF Parameters

Cause Group: Design

Prior: Design

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8746184	0.9681214	0.9862644	0.9999269	1.366E+01	4.498E-01	--
α_2	7.31E-05	3.19E-02	1.37E-02	1.25E-01	4.498E-01	1.366E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9083194	0.9670390	0.9753031	0.9974628	3.457E+01	1.178E+00	--
α_2	1.18E-03	2.63E-02	1.81E-02	7.94E-02	9.387E-01	3.481E+01	--
α_3	7.09E-08	6.70E-03	1.09E-03	3.29E-02	2.396E-01	3.551E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9137123	0.9636241	0.9693866	0.9938030	5.029E+01	1.898E+00	--
α_2	2.24E-03	2.46E-02	1.88E-02	6.68E-02	1.285E+00	5.090E+01	--
α_3	6.98E-06	7.52E-03	2.70E-03	3.14E-02	3.927E-01	5.180E+01	--
α_4	1.63E-08	4.23E-03	5.68E-04	2.12E-02	2.207E-01	5.197E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9362159	0.9678690	0.9706888	0.9898800	1.056E+02	3.506E+00	--
α_2	3.27E-03	1.83E-02	1.54E-02	4.30E-02	1.992E+00	1.071E+02	--
α_3	6.13E-04	9.88E-03	7.09E-03	2.87E-02	1.078E+00	1.080E+02	--
α_4	1.75E-06	3.33E-03	1.08E-03	1.43E-02	3.632E-01	1.087E+02	--
α_5	6.14E-21	6.64E-04	3.85E-07	3.85E-03	7.248E-02	1.090E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9416569	0.9691910	0.9714601	0.9889696	1.321E+02	4.199E+00	--
α_2	2.46E-03	1.42E-02	1.19E-02	3.39E-02	1.941E+00	1.344E+02	--
α_3	9.38E-04	9.77E-03	7.50E-03	2.64E-02	1.332E+00	1.350E+02	--
α_4	4.87E-05	4.53E-03	2.45E-03	1.61E-02	6.181E-01	1.357E+02	--
α_5	1.17E-08	1.70E-03	2.52E-04	8.41E-03	2.313E-01	1.361E+02	--
α_6	5.14E-20	5.64E-04	5.31E-07	3.28E-03	7.684E-02	1.362E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9501188	0.9710466	0.9724968	0.9870208	2.087E+02	6.223E+00	--
α_2	3.03E-03	1.23E-02	1.09E-02	2.67E-02	2.654E+00	2.123E+02	--
α_3	1.04E-03	7.65E-03	6.19E-03	1.93E-02	1.645E+00	2.133E+02	--
α_4	3.46E-04	5.19E-03	3.76E-03	1.49E-02	1.115E+00	2.138E+02	--
α_5	2.72E-05	2.81E-03	1.49E-03	1.01E-02	6.034E-01	2.143E+02	--
α_6	1.47E-10	8.28E-04	6.17E-05	4.40E-03	1.780E-01	2.147E+02	--
α_7	6.93E-51	1.27E-04	2.61E-14	4.49E-04	2.734E-02	2.149E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9516558	0.9719225	0.9733262	0.9873945	2.162E+02	6.246E+00	--
α_2	2.60E-03	1.13E-02	9.83E-03	2.48E-02	2.504E+00	2.199E+02	--
α_3	6.84E-04	6.38E-03	4.97E-03	1.69E-02	1.419E+00	2.210E+02	--
α_4	2.54E-04	4.62E-03	3.24E-03	1.37E-02	1.027E+00	2.214E+02	--
α_5	6.80E-05	3.30E-03	1.98E-03	1.10E-02	7.337E-01	2.217E+02	--
α_6	1.78E-06	1.79E-03	6.45E-04	7.44E-03	3.975E-01	2.220E+02	--
α_7	3.47E-20	3.46E-04	3.32E-07	2.01E-03	7.703E-02	2.224E+02	--
α_8	3.65E-18	3.93E-04	9.83E-07	2.29E-03	8.749E-02	2.224E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
α_2	3.19E-02	2.63E-02	2.46E-02	1.83E-02	1.42E-02	1.23E-02	1.13E-02
α_3		6.70E-03	7.52E-03	9.88E-03	9.77E-03	7.65E-03	6.38E-03
α_4			4.23E-03	3.33E-03	4.53E-03	5.19E-03	4.62E-03
α_5				6.64E-04	1.70E-03	2.81E-03	3.30E-03
α_6					5.64E-04	8.28E-04	1.79E-03
α_7						1.27E-04	3.46E-04
α_8							3.93E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.68E-01	9.67E-01	9.64E-01	9.68E-01	9.69E-01	9.71E-01	9.72E-01
Beta	3.19E-02	3.30E-02	3.64E-02	3.21E-02	3.08E-02	2.90E-02	2.81E-02
Gamma		2.03E-01	3.23E-01	4.32E-01	5.38E-01	5.73E-01	5.99E-01
Delta			3.60E-01	2.88E-01	4.10E-01	5.39E-01	6.21E-01
Epsilon				1.66E-01	3.33E-01	4.20E-01	5.58E-01
Mu					2.49E-01	2.54E-01	4.34E-01
Omega						1.33E-01	2.93E-01
Sigma							5.32E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Environment Causal CCF Parameters

Cause Group: Environment

Prior: Environment

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7129438	0.9299239	0.9730163	0.9999416	5.044E+00	3.801E-01	--
α_2	5.84E-05	7.01E-02	2.70E-02	2.87E-01	3.801E-01	5.044E+00	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.7930045	0.9292035	0.9493057	0.9964788	1.260E+01	9.600E-01	--
α_2	7.61E-04	4.92E-02	2.92E-02	1.66E-01	6.673E-01	1.289E+01	--
α_3	1.93E-06	2.16E-02	5.29E-03	9.92E-02	2.927E-01	1.327E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8215905	0.9264685	0.9387443	0.9892215	2.103E+01	1.669E+00	--
α_2	2.70E-03	4.58E-02	3.32E-02	1.32E-01	1.039E+00	2.166E+01	--
α_3	1.51E-05	1.71E-02	6.17E-03	7.14E-02	3.887E-01	2.231E+01	--
α_4	1.24E-07	1.06E-02	1.77E-03	5.21E-02	2.414E-01	2.246E+01	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8819755	0.9400015	0.9450020	0.9809143	5.463E+01	3.487E+00	--
α_2	4.84E-03	3.08E-02	2.56E-02	7.47E-02	1.791E+00	5.633E+01	--
α_3	1.66E-03	2.08E-02	1.56E-02	5.77E-02	1.207E+00	5.691E+01	--
α_4	1.33E-05	7.47E-03	3.00E-03	3.01E-02	4.340E-01	5.768E+01	--
α_5	2.10E-26	9.45E-04	3.37E-08	5.21E-03	5.493E-02	5.806E+01	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.8970315	0.9461989	0.9502610	0.9814714	6.867E+01	3.905E+00	--
α_2	1.79E-03	1.84E-02	1.42E-02	4.94E-02	1.335E+00	7.124E+01	--
α_3	2.60E-03	2.11E-02	1.69E-02	5.40E-02	1.531E+00	7.104E+01	--
α_4	1.92E-04	9.91E-03	5.91E-03	3.32E-02	7.191E-01	7.186E+01	--
α_5	4.98E-08	3.40E-03	5.83E-04	1.65E-02	2.467E-01	7.233E+01	--
α_6	1.10E-20	1.00E-03	6.04E-07	5.82E-03	7.279E-02	7.250E+01	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9169989	0.9523800	0.9548533	0.9793089	1.154E+02	5.770E+00	--
α_2	1.60E-03	1.28E-02	1.02E-02	3.27E-02	1.549E+00	1.196E+02	--
α_3	2.93E-03	1.64E-02	1.38E-02	3.87E-02	1.989E+00	1.192E+02	--
α_4	9.56E-04	1.06E-02	8.08E-03	2.90E-02	1.287E+00	1.199E+02	--
α_5	9.53E-05	5.71E-03	3.31E-03	1.95E-02	6.913E-01	1.205E+02	--
α_6	1.42E-08	1.92E-03	2.89E-04	9.50E-03	2.327E-01	1.209E+02	--
α_7	1.18E-64	1.74E-04	2.64E-17	4.39E-04	2.112E-02	1.211E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9276522	0.9566942	0.9585632	0.9793513	1.550E+02	7.016E+00	--
α_2	1.26E-03	9.77E-03	7.84E-03	2.49E-02	1.583E+00	1.604E+02	--
α_3	2.18E-03	1.23E-02	1.03E-02	2.90E-02	1.986E+00	1.600E+02	--
α_4	1.45E-03	1.03E-02	8.39E-03	2.58E-02	1.672E+00	1.603E+02	--
α_5	3.31E-04	6.24E-03	4.36E-03	1.86E-02	1.011E+00	1.610E+02	--
α_6	2.67E-05	3.52E-03	1.79E-03	1.29E-02	5.709E-01	1.614E+02	--
α_7	2.56E-10	1.12E-03	8.75E-05	5.90E-03	1.809E-01	1.618E+02	--
α_8	1.11E-107	7.68E-05	2.32E-27	5.76E-05	1.245E-02	1.620E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
α_2	7.01E-02	4.92E-02	4.58E-02	3.08E-02	1.84E-02	1.28E-02	9.77E-03
α_3		2.16E-02	1.71E-02	2.08E-02	2.11E-02	1.64E-02	1.23E-02
α_4			1.06E-02	7.47E-03	9.91E-03	1.06E-02	1.03E-02
α_5				9.45E-04	3.40E-03	5.71E-03	6.24E-03
α_6					1.00E-03	1.92E-03	3.52E-03
α_7						1.74E-04	1.12E-03
α_8							7.68E-05

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.30E-01	9.29E-01	9.26E-01	9.40E-01	9.46E-01	9.52E-01	9.57E-01
Beta	7.01E-02	7.08E-02	7.35E-02	6.00E-02	5.38E-02	4.76E-02	4.33E-02
Gamma		3.05E-01	3.78E-01	4.86E-01	6.58E-01	7.32E-01	7.74E-01
Delta			3.83E-01	2.88E-01	4.04E-01	5.29E-01	6.34E-01
Epsilon				1.12E-01	3.08E-01	4.23E-01	5.15E-01
Mu					2.28E-01	2.69E-01	4.31E-01
Omega						8.32E-02	2.53E-01
Sigma							6.44E-02

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Human Causal CCF Parameters

Cause Group: Human

Prior: Human

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9254105	0.9808392	0.9915376	0.9999442	2.409E+01	4.706E-01	--
α_2	5.58E-05	1.92E-02	8.46E-03	7.46E-02	4.706E-01	2.409E+01	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9492792	0.9823211	0.9871539	0.9988381	6.126E+01	1.103E+00	--
α_2	3.76E-04	1.30E-02	8.28E-03	4.17E-02	8.104E-01	6.155E+01	--
α_3	3.95E-07	4.68E-03	1.10E-03	2.16E-02	2.921E-01	6.207E+01	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9595678	0.9829546	0.9856771	0.9970284	1.126E+02	1.953E+00	--
α_2	1.07E-03	1.15E-02	8.76E-03	3.10E-02	1.312E+00	1.132E+02	--
α_3	6.33E-06	3.76E-03	1.49E-03	1.52E-02	4.307E-01	1.141E+02	--
α_4	3.65E-09	1.83E-03	2.17E-04	9.33E-03	2.099E-01	1.143E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9696218	0.9852970	0.9867994	0.9958370	2.082E+02	3.107E+00	--
α_2	1.13E-03	7.97E-03	6.48E-03	1.99E-02	1.684E+00	2.096E+02	--
α_3	1.97E-04	4.46E-03	3.03E-03	1.36E-02	9.426E-01	2.104E+02	--
α_4	1.36E-06	1.81E-03	6.21E-04	7.62E-03	3.816E-01	2.109E+02	--
α_5	1.87E-16	4.67E-04	2.56E-06	2.72E-03	9.865E-02	2.112E+02	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9733376	0.9863454	0.9874863	0.9954551	2.761E+02	3.822E+00	--
α_2	8.87E-04	6.12E-03	4.99E-03	1.52E-02	1.714E+00	2.782E+02	--
α_3	2.60E-04	3.96E-03	2.86E-03	1.14E-02	1.108E+00	2.788E+02	--
α_4	3.07E-05	2.33E-03	1.30E-03	8.12E-03	6.509E-01	2.793E+02	--
α_5	1.79E-08	9.06E-04	1.63E-04	4.37E-03	2.536E-01	2.797E+02	--
α_6	5.54E-17	3.42E-04	1.55E-06	1.99E-03	9.572E-02	2.798E+02	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9771222	0.9873350	0.9881185	0.9948722	4.050E+02	5.195E+00	--
α_2	9.74E-04	5.13E-03	4.35E-03	1.20E-02	2.105E+00	4.081E+02	--
α_3	3.02E-04	3.22E-03	2.46E-03	8.74E-03	1.320E+00	4.089E+02	--
α_4	1.24E-04	2.43E-03	1.68E-03	7.28E-03	9.967E-01	4.092E+02	--
α_5	6.47E-06	1.28E-03	6.08E-04	4.83E-03	5.249E-01	4.097E+02	--
α_6	3.54E-10	4.77E-04	4.66E-05	2.47E-03	1.956E-01	4.100E+02	--
α_7	3.68E-28	1.29E-04	2.92E-09	7.00E-04	5.291E-02	4.101E+02	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9787229	0.9878938	0.9885625	0.9947813	4.759E+02	5.832E+00	--
α_2	9.39E-04	4.63E-03	3.96E-03	1.06E-02	2.229E+00	4.795E+02	--
α_3	2.24E-04	2.62E-03	1.97E-03	7.22E-03	1.260E+00	4.805E+02	--
α_4	1.23E-04	2.16E-03	1.53E-03	6.38E-03	1.042E+00	4.807E+02	--
α_5	3.72E-05	1.58E-03	9.69E-04	5.22E-03	7.626E-01	4.810E+02	--
α_6	1.55E-07	6.79E-04	1.90E-04	3.02E-03	3.271E-01	4.814E+02	--
α_7	2.70E-13	2.79E-04	7.48E-06	1.57E-03	1.344E-01	4.816E+02	--
α_8	1.44E-20	1.59E-04	1.50E-07	9.26E-04	7.682E-02	4.817E+02	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
α_2	1.92E-02	1.30E-02	1.15E-02	7.97E-03	6.12E-03	5.13E-03	4.63E-03
α_3		4.68E-03	3.76E-03	4.46E-03	3.96E-03	3.22E-03	2.62E-03
α_4			1.83E-03	1.81E-03	2.33E-03	2.43E-03	2.16E-03
α_5				4.67E-04	9.06E-04	1.28E-03	1.58E-03
α_6					3.42E-04	4.77E-04	6.79E-04
α_7						1.29E-04	2.79E-04
α_8							1.59E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.81E-01	9.82E-01	9.83E-01	9.85E-01	9.86E-01	9.87E-01	9.88E-01
Beta	1.92E-02	1.77E-02	1.70E-02	1.47E-02	1.37E-02	1.27E-02	1.21E-02
Gamma		2.65E-01	3.28E-01	4.58E-01	5.52E-01	5.95E-01	6.18E-01
Delta			3.28E-01	3.38E-01	4.74E-01	5.73E-01	6.50E-01
Epsilon				2.05E-01	3.49E-01	4.37E-01	5.55E-01
Mu					2.74E-01	3.21E-01	4.14E-01
Omega						2.13E-01	3.92E-01
Sigma							3.64E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

Other/Unknown Causal CCF Parameters

Cause Group: Other, Unknown

Prior: Other

Total Number of Independent Failure Events: 0.0

Total Number of Common-Cause Failure Events: 0

ALPHA FACTOR DISTRIBUTIONS

CCCG = 2, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9825656	0.9954749	0.9979545	0.9999833	1.085E+02	4.932E-01	--
α_2	1.67E-05	4.53E-03	2.05E-03	1.74E-02	4.932E-01	1.085E+02	--

CCCG = 3, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9874844	0.9957271	0.9969638	0.9997469	2.469E+02	1.059E+00	--
α_2	5.38E-05	2.88E-03	1.70E-03	9.71E-03	7.137E-01	2.472E+02	--
α_3	5.02E-07	1.39E-03	4.22E-04	6.09E-03	3.458E-01	2.476E+02	--

CCCG = 4, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9898532	0.9956383	0.9962982	0.9991679	4.827E+02	2.115E+00	--
α_2	3.96E-04	3.20E-03	2.54E-03	8.22E-03	1.549E+00	4.833E+02	--
α_3	1.70E-08	5.46E-04	1.07E-04	2.60E-03	2.646E-01	4.846E+02	--
α_4	6.86E-08	6.21E-04	1.52E-04	2.84E-03	3.010E-01	4.845E+02	--

CCCG = 5, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9931681	0.9962058	0.9964388	0.9984478	1.398E+03	5.325E+00	--
α_2	8.25E-04	2.59E-03	2.36E-03	5.14E-03	3.632E+00	1.400E+03	--
α_3	9.48E-05	9.65E-04	7.41E-04	2.60E-03	1.354E+00	1.402E+03	--
α_4	2.00E-08	2.11E-04	5.04E-05	9.69E-04	2.961E-01	1.403E+03	--
α_5	9.00E-35	3.02E-05	3.33E-11	1.50E-04	4.243E-02	1.403E+03	--

CCCG = 6, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9928595	0.9961073	0.9963649	0.9984754	1.263E+03	4.936E+00	--
α_2	6.12E-04	2.30E-03	2.04E-03	4.86E-03	2.915E+00	1.265E+03	--
α_3	8.46E-05	9.91E-04	7.45E-04	2.74E-03	1.257E+00	1.267E+03	--
α_4	1.61E-06	3.97E-04	1.82E-04	1.52E-03	5.031E-01	1.267E+03	--
α_5	2.64E-15	9.11E-05	1.20E-06	5.22E-04	1.155E-01	1.268E+03	--
α_6	5.35E-13	1.14E-04	4.19E-06	6.34E-04	1.451E-01	1.268E+03	--

CCCG = 7, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
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α_1	0.9944155	0.9964657	0.9965861	0.9981049	2.722E+03	9.654E+00	--
α_2	6.88E-04	1.78E-03	1.66E-03	3.27E-03	4.851E+00	2.727E+03	--
α_3	2.63E-04	1.03E-03	9.06E-04	2.19E-03	2.800E+00	2.729E+03	--
α_4	5.18E-05	5.07E-04	3.91E-04	1.36E-03	1.384E+00	2.730E+03	--
α_5	6.35E-07	1.79E-04	8.02E-05	6.94E-04	4.902E-01	2.731E+03	--
α_6	9.98E-16	4.20E-05	5.32E-07	2.41E-04	1.146E-01	2.732E+03	--
α_7	2.82E-93	5.36E-06	5.70E-25	6.37E-06	1.464E-02	2.732E+03	--

CCCG = 8, Gamma = 0.000

Alpha Factor	5th%	Mean	Median	95th%	a	b	Norm. Factor
α_1	0.9941852	0.9965437	0.9967024	0.9983604	2.061E+03	7.148E+00	--
α_2	3.91E-04	1.44E-03	1.28E-03	3.03E-03	2.980E+00	2.065E+03	--
α_3	1.64E-04	9.48E-04	7.93E-04	2.26E-03	1.960E+00	2.066E+03	--
α_4	4.12E-05	5.64E-04	4.13E-04	1.60E-03	1.166E+00	2.067E+03	--
α_5	1.48E-06	2.60E-04	1.26E-04	9.73E-04	5.375E-01	2.068E+03	--
α_6	1.93E-11	8.73E-05	6.77E-06	4.61E-04	1.805E-01	2.068E+03	--
α_7	1.03E-35	2.00E-05	1.50E-11	9.79E-05	4.139E-02	2.068E+03	--
α_8	8.34E-09	1.37E-04	3.01E-05	6.37E-04	2.827E-01	2.068E+03	--

ALPHA FACTOR and MGL PARAMETERS

Alpha Factor	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
α_1	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
α_2	4.53E-03	2.88E-03	3.20E-03	2.59E-03	2.30E-03	1.78E-03	1.44E-03
α_3		1.39E-03	5.46E-04	9.65E-04	9.91E-04	1.03E-03	9.48E-04
α_4			6.21E-04	2.11E-04	3.97E-04	5.07E-04	5.64E-04
α_5				3.02E-05	9.11E-05	1.79E-04	2.60E-04
α_6					1.14E-04	4.20E-05	8.73E-05
α_7						5.36E-06	2.00E-05
α_8							1.37E-04

MGL	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
1-Beta	9.95E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.96E-01	9.97E-01
Beta	4.53E-03	4.27E-03	4.36E-03	3.79E-03	3.89E-03	3.53E-03	3.46E-03
Gamma		3.26E-01	2.67E-01	3.18E-01	4.09E-01	4.98E-01	5.83E-01
Delta			5.32E-01	2.00E-01	3.78E-01	4.17E-01	5.30E-01
Epsilon				1.25E-01	3.41E-01	3.09E-01	4.72E-01
Mu					5.57E-01	2.09E-01	4.84E-01
Omega						1.13E-01	6.42E-01
Sigma							8.72E-01

Avg. Impact Vector	CCCG=2	CCCG=3	CCCG=4	CCCG=5	CCCG=6	CCCG=7	CCCG=8
Adj. Ind	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N ₁	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₂	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N ₃		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

N₄			0.0000	0.0000	0.0000	0.0000	0.0000
N₅				0.0000	0.0000	0.0000	0.0000
N₆					0.0000	0.0000	0.0000
N₇						0.0000	0.0000
N₈							0.0000

4. GLOSSARY

Adjusted Independent Events. The equivalent number of independent events that would be observed from target systems of a specific size, given the available data on independent events in different-sized systems.

Alpha Factor. The fraction of the total frequency of failure events that occur in the system involving the failure of k components in a system of m components, due to a common cause.

Application. A particular set of CCF events selected from the CCF database for use in a specific study.

Available. A component is considered available if it is capable of performing its function according to a specified success criterion.

Average Impact Vector. An averaging of the impact vectors for different hypotheses regarding the number of components failed in an event.

Basic Event. An event in a reliability logic model that represents the state in which a component or group of components is unavailable, and does not require further development in terms of contributing causes.

Causal Alpha Factor. The fraction of the total frequency of failure events that occur in the system involving the failure of k components in a system of m components—all due to the same specific failure cause i (e.g., design, environment, or human).

Common-Cause Basic Event. In system modeling, this is a basic event that represents the unavailability of a specific set of components because of shared causes not explicitly represented in the system logic model as other basic events.

Common-Cause Component Group. A group of (usually similar [in mission, manufacturer, maintenance, environment, etc.]) components considered to have a high potential for failure due to the same cause or causes.

Common-Cause Event. A dependent failure in which two or more component fault states exist simultaneously, or within a short time interval, and are a direct result of a shared cause. ASME/ANS PRA standard ASME/ANS RA-Sa-2009 defines *common cause failure* as a failure of two or more components during a short period of time as a result of a single shared cause.

Common-Cause Failure Model. The basis for quantifying the frequency of common-cause events. Examples include the beta factor, alpha factor, basic parameter, and the binomial failure rate models.

Complete Common-Cause Failure. A CCF in which all redundant components are failed simultaneously as a direct result of a shared cause, with the component degradation value being equal to 1.0 for all components, and both the timing factor and the shared cause factor being equal to 1.0.

Component. An element of plant hardware designed to provide a particular function.

Component Boundary. Encompasses the set of piece parts that are considered to form the component.

Component Degradation Value (p). The assessed probability ($0.0 \leq p \leq 1.0$) that a functionally or physically degraded component would fail to complete the mission.

Component State. Defines the component status in regard to its intended function. Two general categories of component states are defined as available and unavailable.

Coupling Factor. The condition or mechanism through which failures of multiple components are coupled.

Defense. Any operational, maintenance, and design measures taken to diminish the frequency and/or consequences of CCFs.

Degraded. The component is in such a state that it exhibits reduced performance, yet the degradation is insufficient to declare the component unavailable according to the specified success criterion.

Exposed Population. The set of components within the plant that are potentially affected by the CCF being considered.

Failure. The component is incapable of performing its specified operation according to a specific success criterion.

Failure Mechanism. The history describing the events and influences leading to a given failure.

Failure Mode. A description of component failure in terms of the component function that was actually or potentially unavailable.

Failure Mode Applicability. The analyst's estimated probability that the specified component failure mode for a given event is appropriate to the particular application.

Functionally Unavailable. The component is capable of operation, but the function normally provided by the component is unavailable due to lack of proper input, lack of support function from a source outside the component (e.g., motive power, actuation signal), maintenance, testing, improper interference of a person, etc.

Impact Vector. An assessment of the impact an event would have on a common-cause component group. The impact is usually measured as the number of failed components out of a set of similar components in the common-cause component group.

Incipient. The component is in a condition that, if left unremedied, could ultimately lead to a degraded or unavailable state.

Independent Events. Two basic events, A and B, are statistically independent if, and only if, $P[A \cap B] = P[A]P[B]$, where $P[X]$ denotes the probability of event X.

Mapping. The impact vector of an event must be "mapped up" or "mapped down" when the exposed population of the target plant is higher or lower than that of the original plant that experienced the CCF. The end result of mapping an impact vector is an adjusted impact vector applicable to the target plant.

Mapping-Down Factor. A factor used to adjust the impact vector of an event when the exposed population of the target plant is lower than that of the original plant that experienced the CCF.

Mapping-Up Factor. A factor used to adjust the impact vector of an event when the exposed population of the target plant is higher than that of the original plant that experienced the CCF.

Multiple Greek Letter. For a system of m redundant components and for each given failure mode, m different parameters are defined. Each parameter represents the conditional probability that the common cause of a component failure will be shared by n or more additional components.

Potential Common Cause Failure. Any common-cause event in which at least one component degradation value is less than 1.0.

Potentially Unavailable. The component is capable of performing its function according to a specific success criterion, but an incipient or degraded condition exists. (N.B., potentially unavailable is not synonymous with hypothetical.)

Proximate Cause. A characterization of the condition that is readily identified as leading to failure of the component. It might alternatively be characterized as a symptom.

Reliability Logic Model. A logical representation of the combinations of component states that could lead to system failure. A fault tree is an example of a system logic model.

Root Cause. The most basic reason for a component failure, which, if corrected, could prevent recurrence. The identified root cause may vary depending on the particular defensive strategy adopted against the failure mechanism.

Shared-Cause Factor (c). A number that reflects the analyst's uncertainty ($0.0 \leq c \leq 1.0$) regarding the existence of coupling among the failures of two or more components (i.e., whether a shared cause of failure can be clearly identified).

Shared-Cause Factor/Mechanism. A set of causes and factors characterizing why and how a failure is systematically induced in multiple components.

Shock. An event that occurs at a random point in time and acts on the system (i.e., all components in the system simultaneously). There are two kinds of shocks, as distinguished by the potential impact of the shock event: lethal and non-lethal.

System. The entity that encompasses an interacting collection of components to provide a particular function or functions.

Timing Factor (q). The probability ($0.0 \leq q \leq 1.0$) that two or more component failures (or degraded states) separated in time represent a CCF. This can be viewed as an indication of the strength-of-coupling in synchronizing failure times.

Unavailable. The component is unavailable if the component is unable to perform its intended function according to a stated success criterion. Two subsets of unavailable states are failure and functionally unavailable.

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