

SPAR Initiating Event Data and Results

Initiating Event	Description	Data Source	Data		Industry-average Frequency Distribution (note a)								Comments (see Appendix D for details)	Additional Comments	Effective Date	
			Number of Events	Critical Years (rrrv)	Distribution (note b)	Mean	α	β	Error Factor	Rounded Mean (note c)	Rounded α (note c)	β (note d)				Error Factor
IE-LLOCA (BWR)	Large Loss-of-Coolant Accident (BWRs)	[69]			Gamma (EE, EE)	6.78E-06	0.470	6.932E+04	9.1	7.0E-06	0.5	7.14E+04	8.4			Feb-07
IE-LLOCA (PWR)	Large Loss-of-Coolant Accident (PWRs)	[69]			Gamma (EE, EE)	1.33E-06	0.420	3.158E+05	10.7	1.2E-06	0.4	3.33E+05	11.5			Feb-07
IE-LOAC	Loss of Vital AC Bus	IEDB	8	965.8	Gamma (Jeffreys, Jeffreys)	8.80E-03	8.500	9.658E+02	1.7	9.0E-03	8.0	8.89E+02	1.7	Review of events to remove those not applicable based on SPAR modeling	EB failed but indicated little plant variation. No plants had more than 1 event.	Feb-07
IE-LOCCW	Total Loss of Component Cooling Water	IEDB	0	1282.4	Gamma (Jeffreys, SCNID)	3.90E-04	0.500	1.282E+03	8.4	4.0E-04	0.5	1.25E+03	8.4	No failures (but some ASP events have been closed to complete loss of CCW)	No events	Feb-07
IE-LOCHS (BWR)	Total Loss of Condenser Heat Sink (BWRs)	IEDB	41	208.6	Gamma (EB/PL/KS, EB/PL/KS)	1.97E-01	11.080	5.638E+01	1.6	2.0E-01	12.0	6.00E+01	1.6		EB worked. 3 plants had 3, 4, and 5 events.	Feb-07
IE-LOCHS (PWR)	Total Loss of Condenser Heat Sink (PWRs)	IEDB	38	475.0	Gamma (Jeffreys, Jeffreys)	8.11E-02	38.500	4.750E+02	1.3	8.0E-02	40.0	5.00E+02	1.3		EB failed but indicated little plant variation. No plants had more than 2 events.	Feb-07
IE-LODC	Loss of Vital DC Bus	IEDB	1	1282.4	Gamma (Jeffreys, SCNID)	1.17E-03	0.500	4.275E+02	8.4	1.2E-03	0.5	4.17E+02	8.4	Review of events to remove those not applicable based on SPAR modeling	1 event	Feb-07
IE-LOIA (BWR)	Total Loss of Instrument Air (BWRs)	IEDB	3	343.3	Gamma (Jeffreys, Jeffreys)	1.02E-02	3.500	3.433E+02	2.2	1.0E-02	3.0	3.00E+02	2.4	Review of events to remove those not applicable based on SPAR modeling	EB failed but indicated little plant variation. Of 3 events, no plant had more than 1.	Feb-07
IE-LOIA (PWR)	Total Loss of Instrument Air (PWRs)	IEDB	3	356.9	Gamma (Jeffreys, SCNID)	9.81E-03	0.500	5.099E+01	8.4	1.0E-02	0.5	5.00E+01	8.4	Review of events to remove those not applicable based on SPAR modeling	EB failed. Of 3 events, 2 were at 1 plant.	Feb-07
IE-LOMFW	Total Loss of Main Feedwater	IEDB	84	881.9	Gamma (EB/PL/KS, EB/PL/KS)	9.59E-02	1.326	1.383E+01	3.6	1.0E-01	1.2	1.20E+01	3.8		EB worked. Of 84 events, 5 plants had 3, 1 had 4, and 1 had 5.	Feb-07
IE-LOOP	Total Loss of Offsite Power	[68]			Gamma (Jeffreys, Simulation)	3.59E-02	1.580	4.402E+01	3.2	4.0E-02	1.5	3.75E+01	3.3		Rest had no more than 2 events.	Feb-07
	Plant Centered Contribution to LOOF	IEDB	1	724.3												Feb-07
	Switchyard Centered Contribution to LOOP	IEDB	7	724.3												Feb-07
	Grid Related Contribution to LOOF	IEDB	13	724.3												Feb-07
	Weather Related Contribution to LOOF	IEDB	3	724.3												Feb-07
IE-LOESW	Total Loss of Emergency Service Water	IEDB	0	1269.4	Gamma (Jeffreys, SCNID)	3.94E-04	0.500	1.269E+03	8.4	4.0E-04	0.5	1.25E+03	8.4	The Harris event in the database involves complete failure of the NSW, not the ESW	No events	Feb-07
IE-MLOCA (BWR)	Medium Loss-of-Coolant Accident (BWRs)	[69]			Gamma (EE, EE)	1.04E-04	0.610	5.865E+03	6.7	1.0E-04	0.6	6.00E+03	6.8			Feb-07
IE-MLOCA (PWR)	Medium Loss-of-Coolant Accident (PWRs)	[69]			Gamma (EE, EE)	5.10E-04	0.440	8.627E+02	10.0	5.0E-04	0.4	8.00E+02	11.5			Feb-07
IE-PLOCCW	Partial Loss of Component Cooling Water	IEDB	1	1282.4	Gamma (Jeffreys, SCNID)	1.17E-03	0.500	4.275E+02	8.4	1.2E-03	0.5	4.17E+02	8.4	Review of events to remove those not applicable based on SPAR modeling	1 event	Feb-07
IE-PLOESW	Partial Loss of Emergency Service Water	IEDB	2	1282.4	Gamma (Jeffreys, SCNID)	1.95E-03	0.500	2.565E+02	8.4	2.0E-03	0.5	2.50E+02	8.4	Review of events to remove those not applicable based on SPAR modeling	2 events, not at same plant	Feb-07
IE-SGTR (PWR)	Steam Generator Tube Rupture (PWRs)	IEDB	2	706.4	Gamma (Jeffreys, SCNID)	3.54E-03	0.500	1.413E+02	8.4	4.0E-03	0.5	1.25E+02	8.4		2 events, not at same plant	Feb-07
IE-SLOCA (BWR)	Small Loss-of-Coolant Accident (BWRs)	[69]			Gamma (EE, EE)	5.00E-04	0.780	1.560E+03	5.3	5.0E-04	0.8	1.60E+03	5.2			Feb-07
IE-SLOCA (PWR)	Small Loss-of-Coolant Accident (PWRs)	IEDB	0	866.6	Gamma (Jeffreys, SCNID)	5.77E-04	0.500	8.666E+02	8.4	6.0E-04	0.5	8.33E+02	8.4	No failures, but there were events in the early 1980s (RCP seal LOCAs)	No events	Feb-07
IE-SORV (BWR)	Stuck Open Safety/Relief Valve (BWRs)	IEDB	6	291.7	Gamma (Jeffreys, Jeffreys)	2.23E-02	6.500	2.917E+02	1.8	2.0E-02	6.0	3.00E+02	1.9		EB failed but indicated little plant variation. 6 events. No plant had more than 1 event.	Feb-07
IE-SORV (PWR)	Stuck Open Safety/Relief Valve (PWRs)	IEDB	2	866.6	Gamma (Jeffreys, SCNID)	2.88E-03	0.500	1.733E+02	8.4	3.0E-03	0.5	1.67E+02	8.4		2 events, not at same plant	Feb-07
IE-TRAN (BWR)	General Transient (BWRs)	IEDB	149	180.2	Gamma (Jeffreys, Jeffreys)	8.30E-01	149.500	1.802E+02	1.1	8.0E-01	150.0	1.88E+02	1.1		EB failed but indicated little plant variation. Expected number is 4.4 per plant. 3 plants had 8 events and 1 had 9.	Feb-07
IE-TRAN (PWR)	General Transient (PWRs)	IEDB	228	304.0	Gamma (EB/PL/KS, EB/PL/KS)	7.51E-01	17.772	2.366E+01	1.4	8.0E-01	20.0	2.50E+01	1.4		EB worked. Expected number is 3.3 per plant. 4 plants had 8 events and 2 had 6.	Feb-07
IE-VSLOCA	Very Small Loss-of-Coolant Accident	IEDB	1	965.8	Gamma (Jeffreys, SCNID)	1.55E-03	0.500	3.219E+02	8.4	1.50E-03	0.5	3.33E+02	8.4		1 event	Feb-07

Acronyms - ASP (accident sequence precursor), BWR (boiling water reactor), CCW (component cooling water), EB (empirical Bayes), EE (expert elicitation), ESW (emergency service water), IE (initiating event), IEDB (initiating events database), KS (Kass-Steffey),

Note a - If these distributions are to be used as priors in Bayesian updates using plant-specific data, then a check for consistency between the prior and the data should be performed first, as suggested in supporting requirement DA-D4c in Reference 59 in NUREG/CR-

Note b - The format for the distributions is the following: distribution type (source for mean, source for α factor)

Note c - The value is rounded to 1.0, 1.2, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, or 9.0 times the appropriate power of ten.

Note d - The β factor is determined from the mean and α . The β factor is presented to three significant figures to preserve the mean of the distribution