

**SPAR Initiating Event Data and Results**  
**2010 Parameter Estimation Update**

	Initiating Event	Description	DataSource	Data			Industry-average Frequency Distribution (note a)				Comments(se BaselinePeriod	EffectiveDate
				Number of Events	Critical Years (rcry)	Distribution (note b)	Mean	$\alpha$	$\beta$	Error Factor		
PRIMARY / SECONDARY INVENTORY CONTROL and/or HEAT REMOVAL	High Energy Line Breaks											
	IE-FWLB (BWR)	Feedwater Line Break (BWR)	IEDB	0	672.874	Gamma	7.43E-04	0.5	672.9	8.4	1988 - 2010	Feb-2012
	IE-FWLB (PWR)	Feedwater Line Break (PWR)	IEDB	2	1362.787	Gamma	1.83E-03	2.5	1362.8	2.5	1988 - 2010	Feb-2012
	IE-SLBIC (PWR)	Steamline Break Inside Containment (PWR)	IEDB	0	1362.787	Gamma	3.67E-04	0.5	1362.8	8.4	1988 - 2010	Feb-2012
	IE-SLBOC (BWR)	Steamline Break Outside Containment (BWR)	IEDB	2	672.874	Gamma	3.72E-03	2.5	672.9	2.5	1988 - 2010	Feb-2012
	IE-SLBOC (PWR)	Steamline Break Outside Containment (PWR)	IEDB	10	1362.787	Gamma	7.70E-03	10.5	1362.8	1.6	1988 - 2010	Feb-2012
	Steam Generator Tube Rupture											
	IE-SGTR (PWR)	Steam Generator Tube Rupture (PWR)	IEDB	2	1805.624	Gamma	1.38E-03	2.5	1805.6	2.5	1991 - 2010	Feb-2012
	Loss of Coolant Accidents											
	IE-LLOCA (BWR)	Large Loss-of-Coolant Accident (BWR)	NUREG-1829			Gamma (EE, EE)	6.78E-06	0.5	69321.5	9.1		Feb-2012
	IE-LLOCA (PWR)	Large Loss-of-Coolant Accident (PWR)	NUREG-1829			Gamma (EE, EE)	1.33E-06	0.4	315789.5	10.7		Feb-2012
	IE-MLOCA (BWR)	Medium Loss-of-Coolant Accident (BWR)	NUREG-1829			Gamma (EE, EE)	1.04E-04	0.6	5865.4	6.7		Feb-2012
	IE-MLOCA (PWR)	Medium Loss-of-Coolant Accident (PWR)	NUREG-1829			Gamma (EE, EE)	5.10E-04	0.4	862.7	10.0		Feb-2012
	IE-SLOCA (BWR)	Small Loss-of-Coolant Accident (BWR)	IEDB	0	672.874	Gamma	5.00E-04	0.8	1560.0	8.4	1988 - 2010	Feb-2012
	IE-SLOCA (PWR)	Small Loss-of-Coolant Accident (PWR)	IEDB	0	1362.787	Gamma	3.67E-04	0.5	1362.8	5.3	No failures, bu 1988 - 2010	Feb-2012
	IE-VSLOCA (BWR)	Very Small Loss-of-Coolant Accident (BWR)	IEDB	2	574.048	Gamma	4.36E-03	2.5	574.0	2.5	1992 - 2010	Feb-2012
	IE-VSLOCA (PWR)	Very Small Loss-of-Coolant Accident (PWR)	IEDB	0	1148.306	Gamma	4.35E-04	0.5	1148.3	8.4	1992 - 2010	Feb-2012
	IE-SORV1 (BWR)	Stuck Open Safety/Relief Valve-1 (BWR)	IEDB	9	548.825	Gamma	1.63E-02	0.9	55.8	4.6	1993 - 2010	Feb-2012
	IE-SORV1 (PWR)	Stuck Open Safety/Relief Valve-1 (PWR)	IEDB	2	1362.787	Gamma	1.83E-03	2.5	1362.8	2.5	1988 - 2010	Feb-2012
	IE-SORV2 (BWR)	Stuck Open Safety/Relief Valves-2 (BWR)	IEDB	0	548.825	Gamma	9.11E-04	0.5	548.8	8.5	1993 - 2010	Feb-2012
	IE-SORV2 (PWR)	Stuck Open Safety/Relief Valves-2 (PWR)	IEDB	0	1362.787	Gamma	3.67E-04	0.5	1362.8	8.4	1988 - 2010	Feb-2012
IE-ISLOCA (BWR)	Interfacing System LOCA (BWR)	IEDB	0	672.874	Gamma	7.43E-04	0.5	672.9	8.4	1988 - 2010	Feb-2012	
IE-ISLOCA (PWR)	Interfacing System LOCA (PWR)	IEDB	0	1362.787	Gamma	3.67E-04	0.5	1362.8	8.4	1988 - 2010	Feb-2012	
TRANSIENTS	Loss of Feedwater											
	IE-LOMFW	Loss of Main Feedwater	IEDB	113	1638.768	Gamma	6.89E-02	2.2	32.2	2.7	1993 - 2010	Feb-2012
	General Transients											
	IE-TRANS (BWR)	General Transient (BWR)	IEDB	332	437.264	Gamma	7.62E-01	21.0	27.6	1.4	1997 - 2010	Feb-2012
IE-TRANS (PWR)	General Transient (PWR)	IEDB	553	803.884	Gamma	6.90E-01	8.2	11.9	1.7	1998 - 2010	Feb-2012	
Loss of Condenser Heat Sink												
IE-LOCHS (BWR)	Loss of Condenser Heat Sink (BWR)	IEDB	65	465.633	Gamma	1.39E-01	2.9	20.9	2.4	1996 - 2010	Feb-2012	
IE-LOCHS (PWR)	Loss of Condenser Heat Sink (PWR)	IEDB	57	974.689	Gamma	5.86E-02	3.7	63.8	2.2	1995 - 2010	Feb-2012	
HEAT SINK	Loss of Support Systems											
	Loss of Cooling Water											
	IE-LOSWS	Loss of Service Water System	IEDB	0	2035.66	Gamma	2.46E-04	0.5	2035.7	8.4	1988 - 2010	Feb-2012
	IE-PLOSWS	Partial Loss of Service Water System	IEDB	3	2035.66	Gamma	1.72E-03	3.5	2035.7	2.2	1988 - 2010	Feb-2012
	IE-LOCCW	Loss of Component Cooling Water	IEDB	0	2035.66	Gamma	2.46E-04	0.5	2035.7	8.4	1988 - 2010	Feb-2012
IE-PLOCCW	Partial Loss of Component Cooling Water	IEDB	4	2035.66	Gamma	2.21E-03	4.5	2035.7	2.0	1988 - 2010	Feb-2012	
LOIA	Loss of Instrument Air											
	IE-LOIA (BWR)	Loss of Instrument Air (BWR)	IEDB	4	600.403	Gamma	7.49E-03	4.5	600.4	2.0	1991 - 2010	Feb-2012
	IE-LOIA (PWR)	Loss of Instrument Air (PWR)	IEDB	7	856.757	Gamma	8.22E-03	0.4	46.6	12.2	1997 - 2010	Feb-2012
ELECTRICAL POWER	Loss of Electrical Bus											
	IE-LOAC	Loss of AC Bus	IEDB	11	1722.354	Gamma	6.68E-03	11.5	1722.4	1.6	1992 - 2010	Feb-2012
	IE-LOAC 4160V	Loss of 4160V AC Bus	IEDB	7	1722.354	Gamma	4.35E-03	7.5	1722.4	1.7	1992 - 2010	Feb-2012
	IE-LOAC LOWV	Loss of Low Voltage AC Bus	IEDB	4	1722.354	Gamma	2.61E-03	4.5	1722.4	2.0	1992 - 2010	Feb-2012
	IE-LOAC-Calc					Gamma	3.34E-03	0.3	89.8	18.8	Adjusted for initiation by 2-busses	Feb-2012
	IE-LODC	Loss of DC Bus	IEDB	1	2035.66	Gamma	7.37E-04	1.5	2035.7	3.3	1988 - 2010	Feb-2012
	IE-LODC-Calc					Gamma	3.69E-04	0.3	814.1	18.8	Adjusted for in	Feb-2012
	Loss of Offsite Power											
	Critical Operation											
	IE-LOOP	Loss of Offsite Power	IEDB	37	1421.4	Gamma	6.14E-02	1.6	25.7	3.0		Feb-2012
	IE-LOOPGR	Grid Related Contribution to LOOP	IEDB	14	1294	Gamma	1.22E-02	0.4	32.4	11.6	1997-2010	Feb-2012
	IE-LOOPPC	Plant Centered Contribution to LOOP	IEDB	2	1294	Gamma	1.93E-03	2.5	1294.0	2.5	1997-2010	Feb-2012
	IE-LOOPSC	Switchyard Centered Contribution to LOOP	IEDB	13	1294	Gamma	1.04E-02	13.5	1294.0	1.5	1997-2010	Feb-2012
	IE-LOOPWR	Weather Related Contribution to LOOP	IEDB	8	2171.4	Gamma	3.91E-03	8.5	2171.4	1.7	1986-2010	Feb-2012
	Shutdown Operation											
	IE-SD-LOOP	Loss of Offsite Power	IEDB	54	316.6	Gamma	1.69E-01	4.2	24.9	2.2		Feb-2012
IE-SD-LOOPGR	Grid Related Contribution to LOOP	IEDB	5	435.9	Gamma	1.26E-02	5.5	435.9	1.9	1986-2010	Feb-2012	
IE-SD-LOOPPC	Plant Centered Contribution to LOOP	IEDB	23	435.9	Gamma	5.16E-02	1.0	18.8	4.4	1986-2010	Feb-2012	
IE-SD-LOOPSC	Switchyard Centered Contribution to LOOP	IEDB	10	156.5	Gamma	6.71E-02	10.5	156.5	1.6	1997-2010	Feb-2012	
IE-SD-LOOPWR	Weather Related Contribution to LOOP	IEDB	16	435.9	Gamma	4.02E-02	0.6	14.2	7.2	1986-2010	Feb-2012	

Acronyms - BWR (boiling water reactor), EB (empirical Bayes), EE (expert elicitation), IE (initiating event), IEDB (initiating events database - <http://mrcoc.inl.gov>), PWR (pressurized water reactor)

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-6928 and outlined in Section 6.2.3.5 in Reference 17 in NUREG/CR-6928.

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