

Appendix F

Fault Tree Quantification Results

Appendix F Fault Tree Quantification Results

F. Introduction

This appendix presents the SAPHIRE cut sets, importance rankings, and basic event reports from the quantification of the Combustion Engineering RPS fault trees. Two separate cases of results are presented for each RPS design group.

The first case assumes that the basic event value for the operator failing to initiate a scram (CEX-XHE-HE-SCRAM) is TRUE (i.e., failure probability is 1.0). The second case assumes that the basic event value for the operator failing to initiate a scram (CEX-XHE-XE-SCRAM) is 0.01. The RPS fault tree cut sets were generated with no truncation level specified.

The cut sets contain some basic events with a “/” in front of them. A “/” as the first character in a basic event name indicates a complemented event (Success = 1-Failure). For example, the basic event for reactor low water level trip signal channel A in test and maintenance (T&M) is CEX-RPS-TM-CHA (Failure = 1.6E-2). Thus, the basic event name for channel A not in T&M is /CEX-RPS-TM-CHA (Success = 9.8E-1). The event description for complemented events remains the same as the description used for the failure event.

Table F-1. RPS CE Group 1 top 50 cutsets (no manual scram).	F-3
Table F-2. Importance measures sorted on Fussell-Vesely for case (CE Group 1, no manual scram). .	F-6
Table F-3. Importance measures sorted on Risk Increase for case (CE Group 1, no manual scram). ...	F-8
Table F-4. Importance measures sorted on Birnbaum for case (CE Group 1, no manual scram).	F-10
Table F-5. RPS CE Group 1 top 50 cutsets (manual scram).	F-12
Table F-6. Importance measures sorted on Fussell-Vesely for case (CE Group 1, manual scram).	F-16
Table F-7. Importance measures sorted on Risk Increase for case (CE Group 1, manual scram).	F-18
Table F-8. Importance measures sorted on Birnbaum for case (CE Group 1, manual scram).	F-20
Table F-9. RPS CE Group 2 top 50 cutsets (no manual scram).	F-22
Table F-10. Importance measures sorted on Fussell-Vesely for case (CE Group 2, no manual scram).F-25	
Table F-11. Importance measures sorted on Risk Increase for case (CE Group 2, no manual scram).F-27	
Table F-12. Importance measures sorted on Birnbaum for case (CE Group 2, no manual scram).	F-29
Table F-13. RPS CE Group 2 top 50 cutsets (manual scram).	F-31
Table F-14. Importance measures sorted on Fussell-Vesely for case (CE Group 2, manual scram). ..	F-34
Table F-15. Importance measures sorted on Risk Increase for (CE Group 2, manual scram).	F-36
Table F-16. Importance measures sorted on Birnbaum for case (CE Group 2, manual scram).	F-38
Table F-17. RPS CE Group 3 top 50 cutsets (no manual scram).	F-40
Table F-18. Importance measures sorted on Fussell-Vesely for case (CE Group 3, no manual scram).F-43	
Table F-19. Importance measures sorted on Risk Increase for case (CE Group 3, no manual scram).F-45	
Table F-20. Importance measures sorted on Birnbaum for case (CE Group 3, no manual scram).	F-47
Table F-21. RPS CE Group 3 top 50 cutsets (manual scram).	F-49
Table F-22. Importance measures sorted on Fussell-Vesely for case (CE Group 3, manual scram). ..	F-52
Table F-23. Importance measures sorted on Risk Increase for case (CE Group 3, manual scram).	F-54
Table F-24. Importance measures sorted on Birnbaum for case (CE Group 3, manual scram).	F-56
Table F-25. RPS CE Group 4 top 50 cutsets (no manual scram).	F-58
Table F-26. Importance measures sorted on Fussell-Vesely for case (CE Group 4, no manual scram).F-61	
Table F-27. Importance measures sorted on Risk Increase for case (CE Group 4, no manual scram).F-63	
Table F-28. Importance measures sorted on Birnbaum for case (CE Group 4, no manual scram).	F-65
Table F-29. RPS CE Group 4 top 50 cutsets (manual scram).	F-67
Table F-30. Importance measures sorted on Fussell-Vesely for case (CE Group 4, manual scram). ..	F-70
Table F-31. Importance measures sorted on Risk Increase for case (CE Group 4, manual scram).	F-72
Table F-32. Importance measures sorted on Birnbaum for case (CE Group 4, manual scram).	F-74

Table F-1. RPS CE Group 1 top 50 cutsets (no manual scram).

Cut Set	Cut Set %	Cut Set Prob.	Basic Event *	Description	Prob.
1	73.8	4.80E-06	CE1-RYT-CF-2OF4	CCF 2 OF 4 (1-OUT-OF-2 TWICE) TRIP CONTACTORS	4.80E-06
2	13	8.40E-07	CE1-ROD-CF-RODS	CCF 20% OR MORE CRD/RODS FAIL TO INSERT	8.40E-07
3	11.6	7.50E-07	CE1-CBI-CF-6OF8	CCF SPECIFIC 6 OF 8 BISTABLE TRIP UNITS	7.70E-07
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
4	0.7	4.20E-08	CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-RYL-CF-LM12OF24	CCF SPECIFIC 12 OF 24 LOGIC MATRIX OUTPUT RELAYS	4.30E-08
5	0.4	2.80E-08	CE1-CBI-CF-4OF6TM	CCF SPECIFIC 4 OF 6 BISTABLE TRIP UNITS (CH A T&M)	1.70E-06
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
6	0.2	1.40E-08	CE1-RYT-FF-ICM1	TRIP CONTACTOR M1 RELAY FAILS	1.20E-04
			CE1-RYT-FF-ICM2	TRIP CONTACTOR M2 RELAY FAILS	1.20E-04
7	0.2	1.40E-08	CE1-RYT-FF-ICM3	TRIP CONTACTOR M3 RELAY FAILS	1.20E-04
			CE1-RYT-FF-ICM4	TRIP CONTACTOR M4 RELAY FAILS	1.20E-04
8	0	2.50E-09	CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-RYL-CF-LM6OF12TM	CCF SPECIFIC 6 OF 12 LOGIC MATRIX OUTPUT RELAYS (CH A T&M)	1.60E-07
9	0	1.20E-09	CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE1-CPA-CF-T3OF4	CCF 3 OF 4 CORE PROTECTION CALCULATORS	1.70E-04
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
10	0	2.50E-10	CE1-CPA-CF-T3OF4	CCF 3 OF 4 CORE PROTECTION CALCULATORS	1.70E-04
			CE1-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
11	0	7.20E-11	CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE1-CTP-CF-CT3OF4	CCF 3 OF 4 COLD LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
12	0	7.20E-11	CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE1-CTP-CF-HT3OF4	CCF 3 OF 4 HOT LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
13	0	5.10E-11	CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE1-CBI-CF-T3OF4	CCF OF 3 OF 4 TEMPERATURE BISTABLES	7.20E-06
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
14	0	3.00E-11	CE1-CPA-CF-T2OF3TM	CCF 2 OF 3 CORE PROTECTION CALCULATORS (CH A T&M)	3.80E-04
			CE1-CPR-CF-P2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
15	0	2.40E-11	CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-RYL-CF-1LM6OF6	CCF 6 OF 6 M1 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			CE1-RYT-FF-ICM2	TRIP CONTACTOR M2 RELAY FAILS	1.20E-04
16	0	2.40E-11	CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-RYL-CF-2LM6OF6	CCF 6 OF 6 M2 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			CE1-RYT-FF-ICM1	TRIP CONTACTOR M1 RELAY FAILS	1.20E-04
17	0	2.40E-11	CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-RYL-CF-3LM6OF6	CCF 6 OF 6 M3 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			CE1-RYT-FF-ICM4	TRIP CONTACTOR M4 RELAY FAILS	1.20E-04
18	0	2.40E-11	CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-RYL-CF-4LM6OF6	CCF 6 OF 6 M4 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			CE1-RYT-FF-ICM3	TRIP CONTACTOR M3 RELAY FAILS	1.20E-04
19	0	1.50E-11	CE1-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
			CE1-CTP-CF-CT3OF4	CCF 3 OF 4 COLD LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
20	0	1.50E-11	CE1-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
			CE1-CTP-CF-HT3OF4	CCF 3 OF 4 HOT LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
21	0	1.10E-11	CE1-CBI-CF-T3OF4	CCF OF 3 OF 4 TEMPERATURE BISTABLES	7.20E-06
			CE1-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
22	0	4.70E-12	CE1-CPA-FF-TB	CHANNEL B ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPA-FF-TC	CHANNELC ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPR-CF-P2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
23	0	4.70E-12	CE1-CPA-FF-TB	CHANNEL B ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPA-FF-TD	CHANNELD ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPR-CF-P2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
24	0	4.70E-12	CE1-CPA-FF-TC	CHANNELC ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03

Appendix F

Table F-1. (Continued)

Cut Set	Cut Set %	Cut Set Prob.	Basic Event *	Description	Prob.
25	0	3.10E-12	CE1-CPA-FF-TD	CHANNELD ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPR-CF-P2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE1-CPA-FF-TA	CHANNEL A ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
26	0	3.10E-12	CE1-CPA-FF-TB	CHANNEL B ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPA-FF-TC	CHANNELC ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE1-CPA-FF-TA	CHANNEL A ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
27	0	3.10E-12	CE1-CPA-FF-TB	CHANNEL B ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPA-FF-TD	CHANNELD ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE1-CPA-FF-TA	CHANNEL A ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
28	0	3.10E-12	CE1-CPA-FF-TC	CHANNELC ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPA-FF-TD	CHANNELD ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE1-CPA-FF-TB	CHANNEL B ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
29	0	3.00E-12	CE1-CPA-FF-TC	CHANNELC ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPA-FF-TD	CHANNELD ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-CPR-CF-P2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE1-CTP-CF-CT2OF3TM	CCF 2 OF 3 COLD LEG TEMPERATURE SENSORS/TRANSMITTERS	3.70E-05
30	0	3.00E-12	CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-CPR-CF-P2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE1-CTP-CF-HT2OF3TM	CCF 2 OF 3 HOT LEG TEMPERATURE SENSORS/TRANSMITTERS	3.70E-05
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-CBI-CF-P2OF3TM	CCF 2 OF 3 PRESSURE BISTABLES (CH A T&M)	2.60E-07
31	0	1.50E-12	CE1-CPA-CF-T2OF3TM	CCF 2 OF 3 CORE PROTECTION CALCULATORS (CH A T&M)	3.80E-04
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-CBI-FF-PB	CHANNEL B PRESSURE BISTABLE FAILS	5.00E-04
			CE1-CBI-FF-PC	CHANNEL C PRESSURE BISTABLE FAILS	5.00E-04
			CE1-CPA-CF-T2OF3TM	CCF 2 OF 3 CORE PROTECTION CALCULATORS (CH A T&M)	3.80E-04
32	0	1.50E-12	CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-CBI-FF-PB	CHANNEL B PRESSURE BISTABLE FAILS	5.00E-04
			CE1-CBI-FF-PD	CHANNEL D PRESSURE BISTABLE FAILS	5.00E-04
			CE1-CPA-CF-T2OF3TM	CCF 2 OF 3 CORE PROTECTION CALCULATORS (CH A T&M)	3.80E-04
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
33	0	1.50E-12	CE1-CBI-FF-PB	CHANNEL B PRESSURE BISTABLE FAILS	5.00E-04
			CE1-CBI-FF-PD	CHANNEL D PRESSURE BISTABLE FAILS	5.00E-04
			CE1-CPA-CF-T2OF3TM	CCF 2 OF 3 CORE PROTECTION CALCULATORS (CH A T&M)	3.80E-04
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-CBI-FF-PC	CHANNEL C PRESSURE BISTABLE FAILS	5.00E-04
34	0	1.50E-12	CE1-CBI-FF-PD	CHANNEL D PRESSURE BISTABLE FAILS	5.00E-04
			CE1-CPA-CF-T2OF3TM	CCF 2 OF 3 CORE PROTECTION CALCULATORS (CH A T&M)	3.80E-04
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-RYL-CF-1LM3OF3TM	CCF 3 OF 3 M1 LOGIC MATRIC RELAY OUTPUTS (CH A T&M)	4.70E-07
			CE1-RYT-FF-ICM2	TRIP CONTACTOR M2 RELAY FAILS	1.20E-04
35	0	9.00E-13	CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-RYL-CF-2LM3OF3TM	CCF 3 OF 3 M2 LOGIC MATRIC RELAY OUTPUTS (CH A T&M)	4.70E-07
			CE1-RYT-FF-ICM1	TRIP CONTACTOR M1 RELAY FAILS	1.20E-04
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-RYL-CF-3LM3OF3TM	CCF 3 OF 3 M3 LOGIC MATRIC RELAY OUTPUTS (CH A T&M)	4.70E-07
36	0	9.00E-13	CE1-RYT-FF-ICM4	TRIP CONTACTOR M4 RELAY FAILS	1.20E-04
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-RYL-CF-4LM3OF3TM	CCF 3 OF 3 M4 LOGIC MATRIC RELAY OUTPUTS (CH A T&M)	4.70E-07
			CE1-RYT-FF-ICM3	TRIP CONTACTOR M3 RELAY FAILS	1.20E-04
			CE1-CPA-FF-TA	CHANNEL A ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
37	0	9.00E-13	CE1-CPA-FF-TB	CHANNEL B ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPA-FF-TC	CHANNELC ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-CPA-FF-TA	CHANNEL A ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
38	0	9.00E-13	CE1-CPA-FF-TB	CHANNEL B ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPA-FF-TD	CHANNELD ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-CPA-FF-TA	CHANNEL A ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
39	0	6.50E-13	CE1-CPA-FF-TB	CHANNEL B ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPA-FF-TC	CHANNELC ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-CPA-FF-TA	CHANNEL A ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
40	0	6.50E-13	CE1-CPA-FF-TB	CHANNEL B ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPA-FF-TD	CHANNELD ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-CPA-FF-TA	CHANNEL A ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
41	0	6.50E-13	CE1-CPA-FF-TA	CHANNEL A ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03

Table F-1. (Continued)

Cut Set	Cut Set %	Cut Set Prob.	Basic Event ^a	Description	Prob.
42	0	6.50E-13	CE1-CPA-FF-TC	CHANNELC ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPA-FF-TD	CHANNELD ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
43	0	5.10E-13	CE1-CPA-FF-TB	CHANNEL B ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPA-FF-TC	CHANNELC ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPA-FF-TD	CHANNELD ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
44	0	5.10E-13	/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-CPA-FF-TB	CHANNEL B ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPR-CF-P2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE1-CTP-FF-CTC	CHANNEL C COLD LEG TEMPERATURE SENSOR/TRANSMITTER FAILS	8.40E-04
45	0	5.10E-13	CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-CPA-FF-TB	CHANNEL B ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPR-CF-P2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE1-CTP-FF-HTC	CHANNELC HOT LEG TEMPERATURE SENSOR/TRANSMITTER FAILS	8.40E-04
46	0	5.10E-13	CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-CPA-FF-TB	CHANNEL B ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPR-CF-P2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE1-CTP-FF-HTD	CHANNELD HOT LEG TEMPERATURE SENSOR/TRANSMITTER FAILS	8.40E-04
47	0	5.10E-13	CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-CPA-FF-TC	CHANNELC ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPR-CF-P2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE1-CTP-FF-CTB	CHANNEL B COLD LEG TEMPERATURE SENSOR/TRANSMITTER FAILS	8.40E-04
48	0	5.10E-13	CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-CPA-FF-TC	CHANNELC ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPR-CF-P2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE1-CTP-FF-CTD	CHANNEL D COLD LEG TEMPERATURE SENSOR/TRANSMITTER FAILS	8.40E-04
49	0	5.10E-13	CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-CPA-FF-TC	CHANNELC ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPR-CF-P2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE1-CTP-FF-HTB	CHANNEL B HOT LEG TEMPERATURE SENSOR/TRANSMITTER FAILS	8.40E-04
50	0	5.10E-13	CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-CPA-FF-TC	CHANNELC ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPR-CF-P2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE1-CTP-FF-HTD	CHANNELD HOT LEG TEMPERATURE SENSOR/TRANSMITTER FAILS	8.40E-04
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02

- a. A / as the first character in a basic event name indicates a complemented event (Success = 1 - Failure). For example, the basic event for channel A in test and maintenance (T&M) is CEx-RPS-TM-CHA (Failure = 1.60E-02). Thus, the basic event name for channel A not in T&M is /CEX-RPS-TM-CHA (Success = 9.84E-01). The event description for complemented events remains the same as the description used for the failure event

Appendix F

Table F-2. Importance measures sorted on Fussell-Vesely for case (CE Group 1, no manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE1-RYT-CF-2OF4	4.78E-06	7.38E-01	3.82E+00	1.54E+05	1.00E+00
CE1-ROD-CF-RODS	8.40E-07	1.30E-01	1.15E+00	1.54E+05	1.00E+00
CE1-CBI-CF-6OF8	7.66E-07	1.16E-01	1.13E+00	1.52E+05	9.84E-01
CE1-RYL-CF-LM12OF24	4.29E-08	6.52E-03	1.01E+00	1.52E+05	9.84E-01
CE1-CBI-CF-4OF6TM	1.72E-06	4.25E-03	1.00E+00	2.47E+03	1.60E-02
CE1-RPS-TM-CHA	1.60E-02	2.65E-03	1.00E+00	1.16E+00	1.07E-06
CE1-RYT-FF-ICM1	1.20E-04	2.23E-03	1.00E+00	1.96E+01	1.20E-04
CE1-RYT-FF-ICM2	1.20E-04	2.23E-03	1.00E+00	1.96E+01	1.20E-04
CE1-RYT-FF-ICM3	1.20E-04	2.23E-03	1.00E+00	1.96E+01	1.20E-04
CE1-RYT-FF-ICM4	1.20E-04	2.23E-03	1.00E+00	1.96E+01	1.20E-04
CE1-RYL-CF-LM6OF12TM	1.58E-07	3.90E-04	1.00E+00	2.47E+03	1.60E-02
CE1-CPA-CF-T3OF4	1.65E-04	2.19E-04	1.00E+00	2.33E+00	8.58E-06
CE1-CBI-CF-P3OF4	7.21E-06	2.15E-04	1.00E+00	3.08E+01	1.93E-04
CE1-CPR-CF-P3OF4	1.51E-06	4.50E-05	1.00E+00	3.08E+01	1.93E-04
CE1-CTP-CF-HT3OF4	1.02E-05	1.35E-05	1.00E+00	2.33E+00	8.58E-06
CE1-CTP-CF-CT3OF4	1.02E-05	1.35E-05	1.00E+00	2.33E+00	8.58E-06
CE1-CBI-CF-T3OF4	7.21E-06	9.55E-06	1.00E+00	2.33E+00	8.58E-06
CE1-CPR-CF-P2OF3TM	5.03E-06	9.18E-06	1.00E+00	2.83E+00	1.18E-05
CE1-CPA-CF-T2OF3TM	3.77E-04	5.96E-06	1.00E+00	1.02E+00	1.02E-07
CE1-CPA-FF-TC	7.60E-03	4.97E-06	1.00E+00	1.00E+00	4.23E-09
CE1-CPA-FF-TD	7.60E-03	4.97E-06	1.00E+00	1.00E+00	4.23E-09
CE1-CPA-FF-TB	7.60E-03	4.97E-06	1.00E+00	1.00E+00	4.23E-09
CE1-RYL-CF-1LM6OF6	2.02E-07	3.69E-06	1.00E+00	1.93E+01	1.18E-04
CE1-RYL-CF-2LM6OF6	2.02E-07	3.69E-06	1.00E+00	1.93E+01	1.18E-04
CE1-RYL-CF-3LM6OF6	2.02E-07	3.69E-06	1.00E+00	1.93E+01	1.18E-04
CE1-RYL-CF-4LM6OF6	2.02E-07	3.69E-06	1.00E+00	1.93E+01	1.18E-04
CE1-CPA-FF-TA	7.60E-03	2.89E-06	1.00E+00	1.00E+00	2.46E-09
CE1-CBI-FF-PC	5.00E-04	8.41E-07	1.00E+00	1.00E+00	1.09E-08
CE1-CBI-FF-PB	5.00E-04	8.41E-07	1.00E+00	1.00E+00	1.09E-08
CE1-CBI-FF-PD	5.00E-04	8.41E-07	1.00E+00	1.00E+00	1.09E-08
CE1-CTP-CF-CT2OF3TM	3.73E-05	5.90E-07	1.00E+00	1.02E+00	1.02E-07
CE1-CTP-CF-HT2OF3TM	3.73E-05	5.90E-07	1.00E+00	1.02E+00	1.02E-07
CE1-CTP-FF-CTB	8.40E-04	5.45E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CTP-FF-CTC	8.40E-04	5.45E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CTP-FF-HTB	8.40E-04	5.45E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CTP-FF-HTD	8.40E-04	5.45E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CTP-FF-CTD	8.40E-04	5.45E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CTP-FF-HTC	8.40E-04	5.45E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CBI-CF-P2OF3TM	2.55E-07	4.66E-07	1.00E+00	2.83E+00	1.18E-05
CE1-CBI-FF-TB	5.00E-04	3.24E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CBI-FF-TD	5.00E-04	3.24E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CBI-FF-TC	5.00E-04	3.24E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CTP-FF-HTA	8.40E-04	3.17E-07	1.00E+00	1.00E+00	2.44E-09
CE1-CTP-FF-CTA	8.40E-04	3.17E-07	1.00E+00	1.00E+00	2.44E-09
CE1-CBI-FF-TA	5.00E-04	1.88E-07	1.00E+00	1.00E+00	2.44E-09
CE1-CPR-FF-PB	1.10E-04	1.82E-07	1.00E+00	1.00E+00	1.07E-08
CE1-CPR-FF-PC	1.10E-04	1.82E-07	1.00E+00	1.00E+00	1.07E-08
CE1-CPR-FF-PD	1.10E-04	1.82E-07	1.00E+00	1.00E+00	1.07E-08
CE1-RYL-CF-2LM3OF3TM	4.66E-07	1.39E-07	1.00E+00	1.30E+00	1.93E-06
CE1-RYL-CF-1LM3OF3TM	4.66E-07	1.39E-07	1.00E+00	1.30E+00	1.93E-06
CE1-RYL-CF-3LM3OF3TM	4.66E-07	1.39E-07	1.00E+00	1.30E+00	1.93E-06
CE1-RYL-CF-4LM3OF3TM	4.66E-07	1.39E-07	1.00E+00	1.30E+00	1.93E-06
CE1-CBI-FF-PA	5.00E-04	1.47E-08	1.00E+00	1.00E+00	1.90E-10
CE1-CBI-CF-T2OF3TM	2.55E-07	3.79E-09	1.00E+00	1.02E+00	9.66E-08
CE1-CPR-FF-PA	1.10E-04	2.06E-09	1.00E+00	1.00E+00	1.22E-10
CE1-RYL-FF-LBC1	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LBC2	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11

Table F-2. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE1-RYL-FF-LBC3	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LBC4	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LBD1	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LBD2	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LBD3	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LBD4	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LCD1	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LCD2	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LCD3	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LCD4	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11

Appendix F

Table F-3. Importance measures sorted on Risk Increase for case (CE Group 1, no manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE1-RYT-CF-2OF4	4.78E-06	7.38E-01	3.82E+00	1.54E+05	1.00E+00
CE1-ROD-CF-RODS	8.40E-07	1.30E-01	1.15E+00	1.54E+05	1.00E+00
CE1-CBI-CF-6OF8	7.66E-07	1.16E-01	1.13E+00	1.52E+05	9.84E-01
CE1-RYL-CF-LM12OF24	4.29E-08	6.52E-03	1.01E+00	1.52E+05	9.84E-01
CE1-CBI-CF-4OF6TM	1.72E-06	4.25E-03	1.00E+00	2.47E+03	1.60E-02
CE1-RYL-CF-LM6OF12TM	1.58E-07	3.90E-04	1.00E+00	2.47E+03	1.60E-02
CE1-CBI-CF-P3OF4	7.21E-06	2.15E-04	1.00E+00	3.08E+01	1.93E-04
CE1-CPR-CF-P3OF4	1.51E-06	4.50E-05	1.00E+00	3.08E+01	1.93E-04
CE1-RYT-FF-ICM1	1.20E-04	2.23E-03	1.00E+00	1.96E+01	1.20E-04
CE1-RYT-FF-ICM2	1.20E-04	2.23E-03	1.00E+00	1.96E+01	1.20E-04
CE1-RYT-FF-ICM3	1.20E-04	2.23E-03	1.00E+00	1.96E+01	1.20E-04
CE1-RYT-FF-ICM4	1.20E-04	2.23E-03	1.00E+00	1.96E+01	1.20E-04
CE1-RYL-CF-1LM6OF6	2.02E-07	3.69E-06	1.00E+00	1.93E+01	1.18E-04
CE1-RYL-CF-2LM6OF6	2.02E-07	3.69E-06	1.00E+00	1.93E+01	1.18E-04
CE1-RYL-CF-3LM6OF6	2.02E-07	3.69E-06	1.00E+00	1.93E+01	1.18E-04
CE1-RYL-CF-4LM6OF6	2.02E-07	3.69E-06	1.00E+00	1.93E+01	1.18E-04
CE1-CPR-CF-P2OF3TM	5.03E-06	9.18E-06	1.00E+00	2.83E+00	1.18E-05
CE1-CBI-CF-P2OF3TM	2.55E-07	4.66E-07	1.00E+00	2.83E+00	1.18E-05
CE1-CPA-CF-T3OF4	1.65E-04	2.19E-04	1.00E+00	2.33E+00	8.58E-06
CE1-CTP-CF-HT3OF4	1.02E-05	1.35E-05	1.00E+00	2.33E+00	8.58E-06
CE1-CTP-CF-CT3OF4	1.02E-05	1.35E-05	1.00E+00	2.33E+00	8.58E-06
CE1-CBI-CF-T3OF4	7.21E-06	9.55E-06	1.00E+00	2.33E+00	8.58E-06
CE1-RYL-CF-2LM3OF3TM	4.66E-07	1.39E-07	1.00E+00	1.30E+00	1.93E-06
CE1-RYL-CF-1LM3OF3TM	4.66E-07	1.39E-07	1.00E+00	1.30E+00	1.93E-06
CE1-RYL-CF-3LM3OF3TM	4.66E-07	1.39E-07	1.00E+00	1.30E+00	1.93E-06
CE1-RYL-CF-4LM3OF3TM	4.66E-07	1.39E-07	1.00E+00	1.30E+00	1.93E-06
CE1-RPS-TM-CHA	1.60E-02	2.65E-03	1.00E+00	1.16E+00	1.07E-06
CE1-CPA-CF-T2OF3TM	3.77E-04	5.96E-06	1.00E+00	1.02E+00	1.02E-07
CE1-CTP-CF-CT2OF3TM	3.73E-05	5.90E-07	1.00E+00	1.02E+00	1.02E-07
CE1-CTP-CF-HT2OF3TM	3.73E-05	5.90E-07	1.00E+00	1.02E+00	1.02E-07
CE1-CBI-CF-T2OF3TM	2.55E-07	3.79E-09	1.00E+00	1.02E+00	9.66E-08
CE1-CPA-FF-TC	7.60E-03	4.97E-06	1.00E+00	1.00E+00	4.23E-09
CE1-CPA-FF-TD	7.60E-03	4.97E-06	1.00E+00	1.00E+00	4.23E-09
CE1-CPA-FF-TB	7.60E-03	4.97E-06	1.00E+00	1.00E+00	4.23E-09
CE1-CPA-FF-TA	7.60E-03	2.89E-06	1.00E+00	1.00E+00	2.46E-09
CE1-CBI-FF-PC	5.00E-04	8.41E-07	1.00E+00	1.00E+00	1.09E-08
CE1-CBI-FF-PB	5.00E-04	8.41E-07	1.00E+00	1.00E+00	1.09E-08
CE1-CBI-FF-PD	5.00E-04	8.41E-07	1.00E+00	1.00E+00	1.09E-08
CE1-CTP-FF-CTB	8.40E-04	5.45E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CTP-FF-CTC	8.40E-04	5.45E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CTP-FF-HTB	8.40E-04	5.45E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CTP-FF-HTD	8.40E-04	5.45E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CTP-FF-CTD	8.40E-04	5.45E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CTP-FF-HTC	8.40E-04	5.45E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CBI-FF-TB	5.00E-04	3.24E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CBI-FF-TD	5.00E-04	3.24E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CBI-FF-TC	5.00E-04	3.24E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CTP-FF-HTA	8.40E-04	3.17E-07	1.00E+00	1.00E+00	2.44E-09
CE1-CTP-FF-CTA	8.40E-04	3.17E-07	1.00E+00	1.00E+00	2.44E-09
CE1-CBI-FF-TA	5.00E-04	1.88E-07	1.00E+00	1.00E+00	2.44E-09
CE1-CPR-FF-PB	1.10E-04	1.82E-07	1.00E+00	1.00E+00	1.07E-08
CE1-CPR-FF-PC	1.10E-04	1.82E-07	1.00E+00	1.00E+00	1.07E-08
CE1-CPR-FF-PD	1.10E-04	1.82E-07	1.00E+00	1.00E+00	1.07E-08
CE1-CBI-FF-PA	5.00E-04	1.47E-08	1.00E+00	1.00E+00	1.90E-10
CE1-CPR-FF-PA	1.10E-04	2.06E-09	1.00E+00	1.00E+00	1.22E-10
CE1-RYL-FF-LBC1	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LBC2	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11

Table F-3. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE1-RYL-FF-LBC3	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LBC4	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LBD1	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LBD2	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LBD3	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LBD4	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LCD1	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LCD2	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LCD3	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LCD4	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11

Appendix F

Table F-4. Importance measures sorted on Birnbaum for case (CE Group 1, no manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE1-RYT-CF-2OF4	4.78E-06	7.38E-01	3.82E+00	1.54E+05	1.00E+00
CE1-ROD-CF-RODS	8.40E-07	1.30E-01	1.15E+00	1.54E+05	1.00E+00
CE1-CBI-CF-6OF8	7.66E-07	1.16E-01	1.13E+00	1.52E+05	9.84E-01
CE1-RYL-CF-LM12OF24	4.29E-08	6.52E-03	1.01E+00	1.52E+05	9.84E-01
CE1-CBI-CF-4OF6TM	1.72E-06	4.25E-03	1.00E+00	2.47E+03	1.60E-02
CE1-RPS-TM-CHA	1.60E-02	2.65E-03	1.00E+00	1.16E+00	1.07E-06
CE1-RYT-FF-ICM1	1.20E-04	2.23E-03	1.00E+00	1.96E+01	1.20E-04
CE1-RYT-FF-ICM2	1.20E-04	2.23E-03	1.00E+00	1.96E+01	1.20E-04
CE1-RYT-FF-ICM3	1.20E-04	2.23E-03	1.00E+00	1.96E+01	1.20E-04
CE1-RYT-FF-ICM4	1.20E-04	2.23E-03	1.00E+00	1.96E+01	1.20E-04
CE1-RYL-CF-LM6OF12TM	1.58E-07	3.90E-04	1.00E+00	2.47E+03	1.60E-02
CE1-CPA-CF-T3OF4	1.65E-04	2.19E-04	1.00E+00	2.33E+00	8.58E-06
CE1-CBI-CF-P3OF4	7.21E-06	2.15E-04	1.00E+00	3.08E+01	1.93E-04
CE1-CPR-CF-P3OF4	1.51E-06	4.50E-05	1.00E+00	3.08E+01	1.93E-04
CE1-CTP-CF-HT3OF4	1.02E-05	1.35E-05	1.00E+00	2.33E+00	8.58E-06
CE1-CTP-CF-CT3OF4	1.02E-05	1.35E-05	1.00E+00	2.33E+00	8.58E-06
CE1-CBI-CF-T3OF4	7.21E-06	9.55E-06	1.00E+00	2.33E+00	8.58E-06
CE1-CPR-CF-P2OF3TM	5.03E-06	9.18E-06	1.00E+00	2.83E+00	1.18E-05
CE1-CPA-CF-T2OF3TM	3.77E-04	5.96E-06	1.00E+00	1.02E+00	1.02E-07
CE1-CPA-FF-TC	7.60E-03	4.97E-06	1.00E+00	1.00E+00	4.23E-09
CE1-CPA-FF-TD	7.60E-03	4.97E-06	1.00E+00	1.00E+00	4.23E-09
CE1-CPA-FF-TB	7.60E-03	4.97E-06	1.00E+00	1.00E+00	4.23E-09
CE1-RYL-CF-1LM6OF6	2.02E-07	3.69E-06	1.00E+00	1.93E+01	1.18E-04
CE1-RYL-CF-2LM6OF6	2.02E-07	3.69E-06	1.00E+00	1.93E+01	1.18E-04
CE1-RYL-CF-3LM6OF6	2.02E-07	3.69E-06	1.00E+00	1.93E+01	1.18E-04
CE1-RYL-CF-4LM6OF6	2.02E-07	3.69E-06	1.00E+00	1.93E+01	1.18E-04
CE1-CPA-FF-TA	7.60E-03	2.89E-06	1.00E+00	1.00E+00	2.46E-09
CE1-CBI-FF-PC	5.00E-04	8.41E-07	1.00E+00	1.00E+00	1.09E-08
CE1-CBI-FF-PB	5.00E-04	8.41E-07	1.00E+00	1.00E+00	1.09E-08
CE1-CBI-FF-PD	5.00E-04	8.41E-07	1.00E+00	1.00E+00	1.09E-08
CE1-CTP-CF-CT2OF3TM	3.73E-05	5.90E-07	1.00E+00	1.02E+00	1.02E-07
CE1-CTP-CF-HT2OF3TM	3.73E-05	5.90E-07	1.00E+00	1.02E+00	1.02E-07
CE1-CTP-FF-CTB	8.40E-04	5.45E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CTP-FF-CTC	8.40E-04	5.45E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CTP-FF-HTB	8.40E-04	5.45E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CTP-FF-HTD	8.40E-04	5.45E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CTP-FF-CTD	8.40E-04	5.45E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CTP-FF-HTC	8.40E-04	5.45E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CBI-CF-P2OF3TM	2.55E-07	4.66E-07	1.00E+00	2.83E+00	1.18E-05
CE1-CBI-FF-TB	5.00E-04	3.24E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CBI-FF-TD	5.00E-04	3.24E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CBI-FF-TC	5.00E-04	3.24E-07	1.00E+00	1.00E+00	4.20E-09
CE1-CTP-FF-HTA	8.40E-04	3.17E-07	1.00E+00	1.00E+00	2.44E-09
CE1-CTP-FF-CTA	8.40E-04	3.17E-07	1.00E+00	1.00E+00	2.44E-09
CE1-CBI-FF-TA	5.00E-04	1.88E-07	1.00E+00	1.00E+00	2.44E-09
CE1-CPR-FF-PB	1.10E-04	1.82E-07	1.00E+00	1.00E+00	1.07E-08
CE1-CPR-FF-PC	1.10E-04	1.82E-07	1.00E+00	1.00E+00	1.07E-08
CE1-CPR-FF-PD	1.10E-04	1.82E-07	1.00E+00	1.00E+00	1.07E-08
CE1-RYL-CF-2LM3OF3TM	4.66E-07	1.39E-07	1.00E+00	1.30E+00	1.93E-06
CE1-RYL-CF-1LM3OF3TM	4.66E-07	1.39E-07	1.00E+00	1.30E+00	1.93E-06
CE1-RYL-CF-3LM3OF3TM	4.66E-07	1.39E-07	1.00E+00	1.30E+00	1.93E-06
CE1-RYL-CF-4LM3OF3TM	4.66E-07	1.39E-07	1.00E+00	1.30E+00	1.93E-06
CE1-CBI-FF-PA	5.00E-04	1.47E-08	1.00E+00	1.00E+00	1.90E-10
CE1-CBI-CF-T2OF3TM	2.55E-07	3.79E-09	1.00E+00	1.02E+00	9.66E-08
CE1-CPR-FF-PA	1.10E-04	2.06E-09	1.00E+00	1.00E+00	1.22E-10
CE1-RYL-FF-LBC1	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LBC2	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11

Table F-4. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE1-RYL-FF-LBC3	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LBC4	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LBD1	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LBD2	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LBD3	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LBD4	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LCD1	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LCD2	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LCD3	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11
CE1-RYL-FF-LCD4	2.60E-04	9.26E-10	1.00E+00	1.00E+00	2.31E-11

Appendix F

Table F-5. RPS CE Group 1 top 50 cutsets (manual scram).

Cut Set	Cut Set %	Cut Set Prob.	Basic Event *	Description	Prob.
1	84.5	4.80E-06	CE1-RYT-CF-2OF4	CCF 2 OF 4 (1-OUT-OF-2 TWICE) TRIP CONTACTORS	4.80E-06
2	14.9	8.40E-07	CE1-ROD-CF-RODS	CCF 20% OR MORE CRD/RODS FAIL TO INSERT	8.40E-07
3	0.3	1.40E-08	CE1-RYT-FF-ICM1	TRIP CONTACTOR M1 RELAY FAILS	1.20E-04
			CE1-RYT-FF-ICM2	TRIP CONTACTOR M2 RELAY FAILS	1.20E-04
4	0.3	1.40E-08	CE1-RYT-FF-ICM3	TRIP CONTACTOR M3 RELAY FAILS	1.20E-04
			CE1-RYT-FF-ICM4	TRIP CONTACTOR M4 RELAY FAILS	1.20E-04
5	0.1	7.50E-09	CE1-CBI-CF-6OF8	CCF SPECIFIC 6 OF 8 BISTABLE TRIP UNITS	7.70E-07
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
6	0	4.20E-10	/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-RYL-CF-LM12OF24	CCF SPECIFIC 12 OF 24 LOGIC MATRIX OUTPUT RELAYS	4.30E-08
			CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
7	0	2.80E-10	CE1-CBI-CF-4OF6TM	CCF SPECIFIC 4 OF 6 BISTABLE TRIP UNITS (CH A T&M)	1.70E-06
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
8	0	9.80E-11	CE1-CBI-CF-6OF8	CCF SPECIFIC 6 OF 8 BISTABLE TRIP UNITS	7.70E-07
			CE1-MSW-FF-MT1	MANUAL SWITCH 1 FAILS	1.30E-04
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
9	0	9.80E-11	CE1-CBI-CF-6OF8	CCF SPECIFIC 6 OF 8 BISTABLE TRIP UNITS	7.70E-07
			CE1-MSW-FF-MT2	MANUAL SWITCH 2 FAILS	1.30E-04
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
10	0	2.50E-11	CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-RYL-CF-LM6OF12TM	CCF SPECIFIC 6 OF 12 LOGIC MATRIX OUTPUT RELAYS (CH A T&M)	1.60E-07
			CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
11	0	1.20E-11	CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE1-CPA-CF-T3OF4	CCF 3 OF 4 CORE PROTECTION CALCULATORS	1.70E-04
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
12	0	5.50E-12	CE1-MSW-FF-MT1	MANUAL SWITCH 1 FAILS	1.30E-04
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-RYL-CF-LM12OF24	CCF SPECIFIC 12 OF 24 LOGIC MATRIX OUTPUT RELAYS	4.30E-08
13	0	5.50E-12	CE1-MSW-FF-MT2	MANUAL SWITCH 2 FAILS	1.30E-04
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-RYL-CF-LM12OF24	CCF SPECIFIC 12 OF 24 LOGIC MATRIX OUTPUT RELAYS	4.30E-08
14	0	3.60E-12	CE1-CBI-CF-4OF6TM	CCF SPECIFIC 4 OF 6 BISTABLE TRIP UNITS (CH A T&M)	1.70E-06
			CE1-MSW-FF-MT1	MANUAL SWITCH 1 FAILS	1.30E-04
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
15	0	3.60E-12	CE1-CBI-CF-4OF6TM	CCF SPECIFIC 4 OF 6 BISTABLE TRIP UNITS (CH A T&M)	1.70E-06
			CE1-MSW-FF-MT2	MANUAL SWITCH 2 FAILS	1.30E-04
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
16	0	2.50E-12	CE1-CPA-CF-T3OF4	CCF 3 OF 4 CORE PROTECTION CALCULATORS	1.70E-04
			CE1-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
17	0	7.20E-13	CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE1-CTP-CF-CT3OF4	CCF 3 OF 4 COLD LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
18	0	7.20E-13	CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE1-CTP-CF-HT3OF4	CCF 3 OF 4 HOT LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
19	0	5.10E-13	CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE1-CBI-CF-T3OF4	CCF OF 3 OF 4 TEMPERATURE BISTABLES	7.20E-06
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
20	0	3.30E-13	CE1-MSW-FF-MT1	MANUAL SWITCH 1 FAILS	1.30E-04
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-RYL-CF-LM6OF12TM	CCF SPECIFIC 6 OF 12 LOGIC MATRIX OUTPUT RELAYS (CH A T&M)	1.60E-07
21	0	3.30E-13	CE1-MSW-FF-MT2	MANUAL SWITCH 2 FAILS	1.30E-04
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-RYL-CF-LM6OF12TM	CCF SPECIFIC 6 OF 12 LOGIC MATRIX OUTPUT RELAYS (CH A T&M)	1.60E-07

Table F-5. (Continued)

Cut Set	Cut Set %	Cut Set Prob.	Basic Event *	Description	Prob.
22	0	3.00E-13	CE1-CPA-CF-T2OF3TM CE1-CPR-CF-P2OF3TM CE1-RPS-TM-CHA CE1-XHE-XE-SCRAM	T&M) CCF 2 OF 3 CORE PROTECTION CALCULATORS (CH A T&M) CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M) RPS CHANNEL A IN TEST AND MAINTENANCE OPERATOR FAILS TO INITIATE MANUAL SCRAM	3.80E-04 5.00E-06 1.60E-02 1.00E-02
23	0	2.40E-13	/CE1-RPS-TM-CHA CE1-RYL-CF-1LM6OF6 CE1-RYT-FF-ICM2 CE1-XHE-XE-SCRAM	RPS CHANNEL A IN TEST AND MAINTENANCE CCF 6 OF 6 M1 LOGIC MATRIC RELAY OUTPUTS TRIP CONTACTOR M2 RELAY FAILS OPERATOR FAILS TO INITIATE MANUAL SCRAM	9.80E-01 2.00E-07 1.20E-04 1.00E-02
24	0	2.40E-13	/CE1-RPS-TM-CHA CE1-RYL-CF-2LM6OF6 CE1-RYT-FF-ICM1 CE1-XHE-XE-SCRAM	RPS CHANNEL A IN TEST AND MAINTENANCE CCF 6 OF 6 M2 LOGIC MATRIC RELAY OUTPUTS TRIP CONTACTOR M1 RELAY FAILS OPERATOR FAILS TO INITIATE MANUAL SCRAM	9.80E-01 2.00E-07 1.20E-04 1.00E-02
25	0	2.40E-13	/CE1-RPS-TM-CHA CE1-RYL-CF-3LM6OF6 CE1-RYT-FF-ICM4 CE1-XHE-XE-SCRAM	RPS CHANNEL A IN TEST AND MAINTENANCE CCF 6 OF 6 M3 LOGIC MATRIC RELAY OUTPUTS TRIP CONTACTOR M4 RELAY FAILS OPERATOR FAILS TO INITIATE MANUAL SCRAM	9.80E-01 2.00E-07 1.20E-04 1.00E-02
26	0	2.40E-13	/CE1-RPS-TM-CHA CE1-RYL-CF-4LM6OF6 CE1-RYT-FF-ICM3 CE1-XHE-XE-SCRAM	RPS CHANNEL A IN TEST AND MAINTENANCE CCF 6 OF 6 M4 LOGIC MATRIC RELAY OUTPUTS TRIP CONTACTOR M3 RELAY FAILS OPERATOR FAILS TO INITIATE MANUAL SCRAM	9.80E-01 2.00E-07 1.20E-04 1.00E-02
27	0	1.50E-13	CE1-CBI-CF-P3OF4 CE1-CPA-CF-T3OF4 CE1-MSW-FF-MT1 /CE1-RPS-TM-CHA	CCF 3 OF 4 PRESSURE BISTABLES CCF 3 OF 4 CORE PROTECTION CALCULATORS MANUAL SWITCH 1 FAILS RPS CHANNEL A IN TEST AND MAINTENANCE	7.20E-06 1.70E-04 1.30E-04 9.80E-01
28	0	1.50E-13	CE1-CBI-CF-P3OF4 CE1-CPA-CF-T3OF4 CE1-MSW-FF-MT2 /CE1-RPS-TM-CHA	CCF 3 OF 4 PRESSURE BISTABLES CCF 3 OF 4 CORE PROTECTION CALCULATORS MANUAL SWITCH 2 FAILS RPS CHANNEL A IN TEST AND MAINTENANCE	7.20E-06 1.70E-04 1.30E-04 9.80E-01
29	0	1.50E-13	CE1-CPR-CF-P3OF4 CE1-CTP-CF-CT3OF4 /CE1-RPS-TM-CHA CE1-XHE-XE-SCRAM	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS CCF 3 OF 4 COLD LEG TEMPERATURE SENSORS/TRANSMITTERS RPS CHANNEL A IN TEST AND MAINTENANCE OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.50E-06 1.00E-05 9.80E-01 1.00E-02
30	0	1.50E-13	CE1-CPR-CF-P3OF4 CE1-CTP-CF-HT3OF4 /CE1-RPS-TM-CHA CE1-XHE-XE-SCRAM	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS CCF 3 OF 4 HOT LEG TEMPERATURE SENSORS/TRANSMITTERS RPS CHANNEL A IN TEST AND MAINTENANCE OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.50E-06 1.00E-05 9.80E-01 1.00E-02
31	0	1.10E-13	CE1-CBI-CF-T3OF4 CE1-CPR-CF-P3OF4 /CE1-RPS-TM-CHA CE1-XHE-XE-SCRAM	CCF OF 3 OF 4 TEMPERATURE BISTABLES CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS RPS CHANNEL A IN TEST AND MAINTENANCE OPERATOR FAILS TO INITIATE MANUAL SCRAM	7.20E-06 1.50E-06 9.80E-01 1.00E-02
32	0	4.70E-14	CE1-CPA-FF-TB CE1-CPA-FF-TC CE1-CPR-CF-P2OF3TM CE1-RPS-TM-CHA CE1-XHE-XE-SCRAM	CHANNEL B ANALOG CORE PROTECTION CALCULATOR FAILS CHANNELC ANALOG CORE PROTECTION CALCULATOR FAILS CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M) RPS CHANNEL A IN TEST AND MAINTENANCE OPERATOR FAILS TO INITIATE MANUAL SCRAM	7.60E-03 7.60E-03 5.00E-06 1.60E-02 1.00E-02
33	0	4.70E-14	CE1-CPA-FF-TB CE1-CPA-FF-TD CE1-CPR-CF-P2OF3TM CE1-RPS-TM-CHA CE1-XHE-XE-SCRAM	CHANNEL B ANALOG CORE PROTECTION CALCULATOR FAILS CHANNELD ANALOG CORE PROTECTION CALCULATOR FAILS CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M) RPS CHANNEL A IN TEST AND MAINTENANCE OPERATOR FAILS TO INITIATE MANUAL SCRAM	7.60E-03 7.60E-03 5.00E-06 1.60E-02 1.00E-02
34	0	4.70E-14	CE1-CPA-FF-TC CE1-CPA-FF-TD CE1-CPR-CF-P2OF3TM CE1-RPS-TM-CHA CE1-XHE-XE-SCRAM	CHANNELC ANALOG CORE PROTECTION CALCULATOR FAILS CHANNELD ANALOG CORE PROTECTION CALCULATOR FAILS CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M) RPS CHANNEL A IN TEST AND MAINTENANCE OPERATOR FAILS TO INITIATE MANUAL SCRAM	7.60E-03 7.60E-03 5.00E-06 1.60E-02 1.00E-02
35	0	3.20E-14	CE1-CPA-CF-T3OF4 CE1-CPR-CF-P3OF4 CE1-MSW-FF-MT1 /CE1-RPS-TM-CHA	CCF 3 OF 4 CORE PROTECTION CALCULATORS CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS MANUAL SWITCH 1 FAILS RPS CHANNEL A IN TEST AND MAINTENANCE	1.70E-04 1.50E-06 1.30E-04 9.80E-01
36	0	3.20E-14	CE1-CPA-CF-T3OF4 CE1-CPR-CF-P3OF4 CE1-MSW-FF-MT2 /CE1-RPS-TM-CHA	CCF 3 OF 4 CORE PROTECTION CALCULATORS CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS MANUAL SWITCH 2 FAILS RPS CHANNEL A IN TEST AND MAINTENANCE	1.70E-04 1.50E-06 1.30E-04 9.80E-01
37	0	3.10E-14	CE1-CBI-CF-P3OF4 CE1-CPA-FF-TA CE1-CPA-FF-TB	CCF 3 OF 4 PRESSURE BISTABLES CHANNEL A ANALOG CORE PROTECTION CALCULATOR FAILS CHANNEL B ANALOG CORE PROTECTION CALCULATOR FAILS	7.20E-06 7.60E-03 7.60E-03

Appendix F

Table F-5. (Continued)

Cut Set	Cut Set %	Cut Set Prob.	Basic Event *	Description	Prob.
38	0	3.10E-14	CE1-CPA-FF-TC	CHANNELC ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
			CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE1-CPA-FF-TA	CHANNEL A ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
39	0	3.10E-14	CE1-CPA-FF-TB	CHANNEL B ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPA-FF-TD	CHANNELD ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
			CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
40	0	3.10E-14	CE1-CPA-FF-TA	CHANNEL A ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPA-FF-TC	CHANNELC ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPA-FF-TD	CHANNELD ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
41	0	3.00E-14	CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE1-CPA-FF-TB	CHANNEL B ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPA-FF-TC	CHANNELC ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			CE1-CPA-FF-TD	CHANNELD ANALOG CORE PROTECTION CALCULATOR FAILS	7.60E-03
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
42	0	3.00E-14	CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
			CE1-CPR-CF-P2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE1-CTP-CF-CT2OF3TM	CCF 2 OF 3 COLD LEG TEMPERATURE SENSORS/TRANSMITTERS	3.70E-05
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
43	0	1.50E-14	CE1-CPR-CF-P2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE1-CTP-CF-HT2OF3TM	CCF 2 OF 3 HOT LEG TEMPERATURE SENSORS/TRANSMITTERS	3.70E-05
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
			CE1-CBI-CF-P2OF3TM	CCF 2 OF 3 PRESSURE BISTABLES (CH A T&M)	2.60E-07
44	0	1.50E-14	CE1-CPA-CF-T2OF3TM	CCF 2 OF 3 CORE PROTECTION CALCULATORS (CH A T&M)	3.80E-04
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
			CE1-CBI-FF-PB	CHANNEL B PRESSURE BISTABLE FAILS	5.00E-04
			CE1-CBI-FF-PC	CHANNEL C PRESSURE BISTABLE FAILS	5.00E-04
45	0	1.50E-14	CE1-CPA-CF-T2OF3TM	CCF 2 OF 3 CORE PROTECTION CALCULATORS (CH A T&M)	3.80E-04
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
			CE1-CBI-FF-PB	CHANNEL B PRESSURE BISTABLE FAILS	5.00E-04
			CE1-CBI-FF-PD	CHANNEL D PRESSURE BISTABLE FAILS	5.00E-04
46	0	1.50E-14	CE1-CPA-CF-T2OF3TM	CCF 2 OF 3 CORE PROTECTION CALCULATORS (CH A T&M)	3.80E-04
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
			CE1-CBI-FF-PC	CHANNEL C PRESSURE BISTABLE FAILS	5.00E-04
			CE1-CBI-FF-PD	CHANNEL D PRESSURE BISTABLE FAILS	5.00E-04
47	0	9.40E-15	CE1-CPA-CF-T2OF3TM	CCF 2 OF 3 CORE PROTECTION CALCULATORS (CH A T&M)	3.80E-04
			CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE1-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
			CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE1-CTP-CF-CT3OF4	CCF 3 OF 4 COLD LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
48	0	9.40E-15	CE1-MSW-FF-MT1	MANUAL SWITCH 1 FAILS	1.30E-04
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE1-CTP-CF-CT3OF4	CCF 3 OF 4 COLD LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			CE1-MSW-FF-MT2	MANUAL SWITCH 2 FAILS	1.30E-04
49	0	9.40E-15	/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE1-CTP-CF-HT3OF4	CCF 3 OF 4 HOT LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			CE1-MSW-FF-MT1	MANUAL SWITCH 1 FAILS	1.30E-04
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
50	0	9.40E-15	CE1-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE1-CTP-CF-HT3OF4	CCF 3 OF 4 HOT LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			CE1-MSW-FF-MT2	MANUAL SWITCH 2 FAILS	1.30E-04
			/CE1-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01

- a. A / as the first character in a basic event name indicates a complemented event (Success = 1 - Failure). For example, the basic event for channel A in test and maintenance (T&M) is CEX-RPS-TM-CHA (Failure = 1.60E-02). Thus, the basic event name for channel A not in

T&M is /CEX-RPS-TM-CHA (Success = 9.84E-01). The event description for complemented events remains the same as the description used for the failure event

Appendix F

Table F-6. Importance measures sorted on Fussell-Vesely for case (CE Group 1, manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE2-BME-CF-TB2OF8	9.97E-07	5.26E-01	2.11E+00	5.28E+05	1.00E+00
CE2-ROD-CF-RODS	8.40E-07	4.43E-01	1.80E+00	5.28E+05	1.00E+00
CE2-XHE-XE-SCRAM	1.00E-02	2.98E-02	1.03E+00	3.95E+00	5.65E-06
CE2-RYT-CF-2OF4	4.78E-06	2.52E-02	1.03E+00	5.28E+03	1.00E-02
CE2-CBI-CF-6OF8	7.66E-07	3.98E-03	1.00E+00	5.19E+03	9.85E-03
CE2-BUV-CF-TB2OF8	5.43E-05	3.81E-04	1.00E+00	8.02E+00	1.33E-05
CE2-BSN-CF-TB2OF8	1.06E-05	3.32E-04	1.00E+00	3.23E+01	5.93E-05
CE2-RYL-CF-LM12OF24	4.29E-08	2.23E-04	1.00E+00	5.19E+03	9.85E-03
CE2-BME-FO-TB7	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB8	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB5	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB6	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB4	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB3	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB2	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB1	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-CBI-CF-4OF6TM	1.72E-06	1.45E-04	1.00E+00	8.54E+01	1.60E-04
CE2-RYT-FF-ICK4	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYT-FF-ICK3	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYT-FF-ICK1	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYT-FF-ICK2	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RPS-TM-CHA	1.60E-02	9.07E-05	1.00E+00	1.01E+00	1.08E-08
CE2-PWR-CF-TB2OF4	2.51E-06	7.85E-05	1.00E+00	3.23E+01	5.93E-05
CE2-MSW-CF-2OF4	4.95E-06	1.48E-05	1.00E+00	3.98E+00	5.65E-06
CE2-RYL-CF-LM6OF12TM	1.58E-07	1.33E-05	1.00E+00	8.54E+01	1.60E-04
CE2-BUV-FO-TB6	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB3	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB8	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB7	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB5	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB4	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB1	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB2	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-CPA-CF-T3OF4	1.65E-04	8.30E-06	1.00E+00	1.05E+00	9.54E-08
CE2-CBI-CF-P3OF4	7.21E-06	7.33E-06	1.00E+00	2.02E+00	1.93E-06
CE2-BSN-FO-TB3	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB8	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB2	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB7	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB6	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB4	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB1	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB5	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-CPR-CF-P3OF4	2.48E-06	2.52E-06	1.00E+00	2.02E+00	1.93E-06
CE2-PWR-FF-TB15	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-PWR-FF-TB26	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-PWR-FF-TB37	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-PWR-FF-TB48	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-CTP-CF-CT3OF4	1.02E-05	5.13E-07	1.00E+00	1.05E+00	9.54E-08
CE2-CTP-CF-HT3OF4	1.02E-05	5.13E-07	1.00E+00	1.05E+00	9.54E-08
CE2-CPR-CF-P2OF3TM	8.23E-06	5.03E-07	1.00E+00	1.06E+00	1.16E-07
CE2-CBI-CF-T3OF4	7.21E-06	3.63E-07	1.00E+00	1.05E+00	9.54E-08
CE2-MSW-FF-MT3	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-MSW-FF-MT2	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-MSW-FF-MT1	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-MSW-FF-MT4	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-CPA-CF-T2OF3TM	3.77E-04	3.04E-07	1.00E+00	1.00E+00	1.53E-09

Table F-6. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE2-CPA-FF-TC	7.60E-03	2.10E-07	1.00E+00	1.00E+00	5.24E-11
CE2-CPA-FF-TD	7.60E-03	2.10E-07	1.00E+00	1.00E+00	5.24E-11
CE2-CPA-FF-TB	7.60E-03	2.10E-07	1.00E+00	1.00E+00	5.24E-11
CE2-RYL-CF-4LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-RYL-CF-2LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-RYL-CF-1LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-RYL-CF-3LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-CPA-FF-TA	7.60E-03	1.02E-07	1.00E+00	1.00E+00	2.54E-11
CE2-CTP-CF-CT2OF3TM	3.73E-05	2.90E-08	1.00E+00	1.00E+00	1.48E-09
CE2-CTP-CF-HT2OF3TM	3.73E-05	2.90E-08	1.00E+00	1.00E+00	1.48E-09
CE2-CBI-FF-PD	5.00E-04	2.50E-08	1.00E+00	1.00E+00	9.48E-11
CE2-CBI-FF-PC	5.00E-04	2.50E-08	1.00E+00	1.00E+00	9.48E-11
CE2-CBI-FF-PB	5.00E-04	2.50E-08	1.00E+00	1.00E+00	9.48E-11
CE2-CTP-FF-CTB	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-CTC	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-HTB	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-CTD	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-HTD	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-HTC	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CBI-CF-P2OF3TM	2.55E-07	1.35E-08	1.00E+00	1.05E+00	1.00E-07
CE2-CBI-FF-TD	5.00E-04	8.43E-09	1.00E+00	1.00E+00	3.23E-11
CE2-CBI-FF-TC	5.00E-04	8.43E-09	1.00E+00	1.00E+00	3.23E-11
CE2-CBI-FF-TB	5.00E-04	8.43E-09	1.00E+00	1.00E+00	3.23E-11
CE2-CTP-FF-CTA	8.40E-04	7.38E-09	1.00E+00	1.00E+00	1.65E-11
CE2-CTP-FF-HTA	8.40E-04	7.38E-09	1.00E+00	1.00E+00	1.65E-11
CE2-RYL-CF-4LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-RYL-CF-3LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-RYL-CF-2LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-RYL-CF-1LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-CPR-FF-PC	1.10E-04	3.51E-09	1.00E+00	1.00E+00	6.03E-11
CE2-CPR-FF-PB	1.10E-04	3.51E-09	1.00E+00	1.00E+00	6.03E-11
CE2-CPR-FF-PD	1.10E-04	3.51E-09	1.00E+00	1.00E+00	6.03E-11
CE2-CBI-FF-TA	5.00E-04	3.16E-09	1.00E+00	1.00E+00	1.23E-11

Appendix F

Table F-7. Importance measures sorted on Risk Increase for case (CE Group 1, manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE2-BME-CF-TB2OF8	9.97E-07	5.26E-01	2.11E+00	5.28E+05	1.00E+00
CE2-ROD-CF-RODS	8.40E-07	4.43E-01	1.80E+00	5.28E+05	1.00E+00
CE2-RYT-CF-2OF4	4.78E-06	2.52E-02	1.03E+00	5.28E+03	1.00E-02
CE2-CBI-CF-6OF8	7.66E-07	3.98E-03	1.00E+00	5.19E+03	9.85E-03
CE2-RYL-CF-LM12OF24	4.29E-08	2.23E-04	1.00E+00	5.19E+03	9.85E-03
CE2-CBI-CF-4OF6TM	1.72E-06	1.45E-04	1.00E+00	8.54E+01	1.60E-04
CE2-RYL-CF-LM6OF12TM	1.58E-07	1.33E-05	1.00E+00	8.54E+01	1.60E-04
CE2-BSN-CF-TB2OF8	1.06E-05	3.32E-04	1.00E+00	3.23E+01	5.93E-05
CE2-PWR-CF-TB2OF4	2.51E-06	7.85E-05	1.00E+00	3.23E+01	5.93E-05
CE2-BME-FO-TB7	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB8	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB5	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB6	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB4	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB3	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB2	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB1	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BUV-CF-TB2OF8	5.43E-05	3.81E-04	1.00E+00	8.02E+00	1.33E-05
CE2-MSW-CF-2OF4	4.95E-06	1.48E-05	1.00E+00	3.98E+00	5.65E-06
CE2-XHE-XE-SCRAM	1.00E-02	2.98E-02	1.03E+00	3.95E+00	5.65E-06
CE2-CBI-CF-P3OF4	7.21E-06	7.33E-06	1.00E+00	2.02E+00	1.93E-06
CE2-CPR-CF-P3OF4	2.48E-06	2.52E-06	1.00E+00	2.02E+00	1.93E-06
CE2-RYT-FF-ICK4	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYT-FF-ICK3	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYT-FF-ICK1	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYT-FF-ICK2	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYL-CF-4LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-RYL-CF-2LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-RYL-CF-1LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-RYL-CF-3LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-CPR-CF-P2OF3TM	8.23E-06	5.03E-07	1.00E+00	1.06E+00	1.16E-07
CE2-CPA-CF-T3OF4	1.65E-04	8.30E-06	1.00E+00	1.05E+00	9.54E-08
CE2-CTP-CF-CT3OF4	1.02E-05	5.13E-07	1.00E+00	1.05E+00	9.54E-08
CE2-CTP-CF-HT3OF4	1.02E-05	5.13E-07	1.00E+00	1.05E+00	9.54E-08
CE2-CBI-CF-T3OF4	7.21E-06	3.63E-07	1.00E+00	1.05E+00	9.54E-08
CE2-CBI-CF-P2OF3TM	2.55E-07	1.35E-08	1.00E+00	1.05E+00	1.00E-07
CE2-PWR-FF-TB15	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-PWR-FF-TB26	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-PWR-FF-TB37	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-PWR-FF-TB48	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-BSN-FO-TB3	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB8	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB2	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB7	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB6	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB4	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB1	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB5	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-RPS-TM-CHA	1.60E-02	9.07E-05	1.00E+00	1.01E+00	1.08E-08
CE2-BUV-FO-TB6	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB3	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB8	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB7	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB5	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB4	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB1	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08

Table F-7. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE2-BUV-FO-TB2	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-RYL-CF-4LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-RYL-CF-3LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-RYL-CF-2LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-RYL-CF-1LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-MSW-FF-MT3	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-MSW-FF-MT2	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-MSW-FF-MT1	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-MSW-FF-MT4	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-CPA-CF-T2OF3TM	3.77E-04	3.04E-07	1.00E+00	1.00E+00	1.53E-09
CE2-CPA-FF-TC	7.60E-03	2.10E-07	1.00E+00	1.00E+00	5.24E-11
CE2-CPA-FF-TD	7.60E-03	2.10E-07	1.00E+00	1.00E+00	5.24E-11
CE2-CPA-FF-TB	7.60E-03	2.10E-07	1.00E+00	1.00E+00	5.24E-11
CE2-CPA-FF-TA	7.60E-03	1.02E-07	1.00E+00	1.00E+00	2.54E-11
CE2-CTP-CF-CT2OF3TM	3.73E-05	2.90E-08	1.00E+00	1.00E+00	1.48E-09
CE2-CTP-CF-HT2OF3TM	3.73E-05	2.90E-08	1.00E+00	1.00E+00	1.48E-09
CE2-CBI-FF-PD	5.00E-04	2.50E-08	1.00E+00	1.00E+00	9.48E-11
CE2-CBI-FF-PC	5.00E-04	2.50E-08	1.00E+00	1.00E+00	9.48E-11
CE2-CBI-FF-PB	5.00E-04	2.50E-08	1.00E+00	1.00E+00	9.48E-11
CE2-CTP-FF-CTB	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-CTC	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-HTB	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-CTD	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-HTD	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-HTC	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CBI-FF-TD	5.00E-04	8.43E-09	1.00E+00	1.00E+00	3.23E-11
CE2-CBI-FF-TC	5.00E-04	8.43E-09	1.00E+00	1.00E+00	3.23E-11
CE2-CBI-FF-TB	5.00E-04	8.43E-09	1.00E+00	1.00E+00	3.23E-11
CE2-CTP-FF-CTA	8.40E-04	7.38E-09	1.00E+00	1.00E+00	1.65E-11
CE2-CTP-FF-HTA	8.40E-04	7.38E-09	1.00E+00	1.00E+00	1.65E-11
CE2-CPR-FF-PC	1.10E-04	3.51E-09	1.00E+00	1.00E+00	6.03E-11
CE2-CPR-FF-PB	1.10E-04	3.51E-09	1.00E+00	1.00E+00	6.03E-11
CE2-CPR-FF-PD	1.10E-04	3.51E-09	1.00E+00	1.00E+00	6.03E-11
CE2-CBI-FF-TA	5.00E-04	3.16E-09	1.00E+00	1.00E+00	1.23E-11

Appendix F

Table F-8. Importance measures sorted on Birnbaum for case (CE Group 1, manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE2-BME-CF-TB2OF8	9.97E-07	5.26E-01	2.11E+00	5.28E+05	1.00E+00
CE2-ROD-CF-RODS	8.40E-07	4.43E-01	1.80E+00	5.28E+05	1.00E+00
CE2-RYT-CF-2OF4	4.78E-06	2.52E-02	1.03E+00	5.28E+03	1.00E-02
CE2-CBI-CF-6OF8	7.66E-07	3.98E-03	1.00E+00	5.19E+03	9.85E-03
CE2-RYL-CF-LM12OF24	4.29E-08	2.23E-04	1.00E+00	5.19E+03	9.85E-03
CE2-CBI-CF-4OF6TM	1.72E-06	1.45E-04	1.00E+00	8.54E+01	1.60E-04
CE2-RYL-CF-LM6OF12TM	1.58E-07	1.33E-05	1.00E+00	8.54E+01	1.60E-04
CE2-BSN-CF-TB2OF8	1.06E-05	3.32E-04	1.00E+00	3.23E+01	5.93E-05
CE2-PWR-CF-TB2OF4	2.51E-06	7.85E-05	1.00E+00	3.23E+01	5.93E-05
CE2-BME-FO-TB7	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB8	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB5	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB6	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB4	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB3	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB2	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB1	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BUV-CF-TB2OF8	5.43E-05	3.81E-04	1.00E+00	8.02E+00	1.33E-05
CE2-XHE-XE-SCRAM	1.00E-02	2.98E-02	1.03E+00	3.95E+00	5.65E-06
CE2-MSW-CF-2OF4	4.95E-06	1.48E-05	1.00E+00	3.98E+00	5.65E-06
CE2-CBI-CF-P3OF4	7.21E-06	7.33E-06	1.00E+00	2.02E+00	1.93E-06
CE2-CPR-CF-P3OF4	2.48E-06	2.52E-06	1.00E+00	2.02E+00	1.93E-06
CE2-RYT-FF-ICK4	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYT-FF-ICK3	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYT-FF-ICK1	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYT-FF-ICK2	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYL-CF-4LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-RYL-CF-2LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-RYL-CF-1LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-RYL-CF-3LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-CPR-CF-P2OF3TM	8.23E-06	5.03E-07	1.00E+00	1.06E+00	1.16E-07
CE2-CBI-CF-P2OF3TM	2.55E-07	1.35E-08	1.00E+00	1.05E+00	1.00E-07
CE2-CPA-CF-T3OF4	1.65E-04	8.30E-06	1.00E+00	1.05E+00	9.54E-08
CE2-CTP-CF-CT3OF4	1.02E-05	5.13E-07	1.00E+00	1.05E+00	9.54E-08
CE2-CTP-CF-HT3OF4	1.02E-05	5.13E-07	1.00E+00	1.05E+00	9.54E-08
CE2-CBI-CF-T3OF4	7.21E-06	3.63E-07	1.00E+00	1.05E+00	9.54E-08
CE2-PWR-FF-TB15	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-PWR-FF-TB26	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-PWR-FF-TB37	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-PWR-FF-TB48	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-BSN-FO-TB3	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB8	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB2	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB7	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB6	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB4	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB1	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB5	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-RYL-CF-4LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-RYL-CF-3LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-RYL-CF-2LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-RYL-CF-1LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-BUV-FO-TB6	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB3	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB8	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB7	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08

Table F-8. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE2-BUV-FO-TB5	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB4	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB1	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB2	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-RPS-TM-CHA	1.60E-02	9.07E-05	1.00E+00	1.01E+00	1.08E-08
CE2-MSW-FF-MT3	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-MSW-FF-MT2	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-MSW-FF-MT1	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-MSW-FF-MT4	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-CPA-CF-T2OF3TM	3.77E-04	3.04E-07	1.00E+00	1.00E+00	1.53E-09
CE2-CTP-CF-CT2OF3TM	3.73E-05	2.90E-08	1.00E+00	1.00E+00	1.48E-09
CE2-CTP-CF-HT2OF3TM	3.73E-05	2.90E-08	1.00E+00	1.00E+00	1.48E-09
CE2-CBI-FF-PD	5.00E-04	2.50E-08	1.00E+00	1.00E+00	9.48E-11
CE2-CBI-FF-PC	5.00E-04	2.50E-08	1.00E+00	1.00E+00	9.48E-11
CE2-CBI-FF-PB	5.00E-04	2.50E-08	1.00E+00	1.00E+00	9.48E-11
CE2-CPR-FF-PC	1.10E-04	3.51E-09	1.00E+00	1.00E+00	6.03E-11
CE2-CPR-FF-PB	1.10E-04	3.51E-09	1.00E+00	1.00E+00	6.03E-11
CE2-CPR-FF-PD	1.10E-04	3.51E-09	1.00E+00	1.00E+00	6.03E-11
CE2-CPA-FF-TC	7.60E-03	2.10E-07	1.00E+00	1.00E+00	5.24E-11
CE2-CPA-FF-TD	7.60E-03	2.10E-07	1.00E+00	1.00E+00	5.24E-11
CE2-CPA-FF-TB	7.60E-03	2.10E-07	1.00E+00	1.00E+00	5.24E-11
CE2-CTP-FF-CTB	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-CTC	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-HTB	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-CTD	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-HTD	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-HTC	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CBI-FF-TD	5.00E-04	8.43E-09	1.00E+00	1.00E+00	3.23E-11
CE2-CBI-FF-TC	5.00E-04	8.43E-09	1.00E+00	1.00E+00	3.23E-11
CE2-CBI-FF-TB	5.00E-04	8.43E-09	1.00E+00	1.00E+00	3.23E-11
CE2-CPA-FF-TA	7.60E-03	1.02E-07	1.00E+00	1.00E+00	2.54E-11
CE2-CTP-FF-CTA	8.40E-04	7.38E-09	1.00E+00	1.00E+00	1.65E-11
CE2-CTP-FF-HTA	8.40E-04	7.38E-09	1.00E+00	1.00E+00	1.65E-11
CE2-CBI-FF-TA	5.00E-04	3.16E-09	1.00E+00	1.00E+00	1.23E-11

Appendix F

Table F-9. RPS CE Group 2 top 50 cutsets (no manual scram).

Cut Set	Cut Set %	Cut Set Prob.	Basic Event *	Description	Prob.
1	63.8	4.80E-06	CE2-RYT-CF-2OF4	CCF OF 2 OF 4 TRIP CONTACTORS	4.80E-06
2	13.3	1.00E-06	CE2-BME-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKERS	1.00E-06
3	11.2	8.40E-07	CE2-ROD-CF-RODS	CCF 20% OR MORE CRD/RODS FAIL TO INSERT	8.40E-07
4	10.1	7.50E-07	CE2-CBI-CF-6OF8	CCF SPECIFIC 6 OF 8 BISTABLE TRIP UNITS	7.70E-07
			/CE2-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
5	0.6	4.20E-08	/CE2-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE2-RYL-CF-LM12OF24	CCF OF 12 OF 24 LOGIC MATRIX OUTPUT RELAYS	4.30E-08
6	0.4	2.80E-08	CE2-CBI-CF-4OF6TM	CCF SPECIFIC 4 OF 6 BISTABLE TRIP UNITS (CH A T&M)	1.70E-06
			CE2-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
7	0.2	1.40E-08	CE2-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
			CE2-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
8	0.2	1.40E-08	CE2-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
			CE2-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
9	0	2.50E-09	CE2-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE2-RYL-CF-LM6OF12TM	CCF OF 6 OF 12 LOGIC MATRIX OUTPUT RELAYS (CH A T&M)	1.60E-07
10	0	2.20E-09	CE2-BME-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES	1.80E-05
			CE2-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
11	0	2.20E-09	CE2-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES	1.80E-05
			CE2-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
12	0	2.20E-09	CE2-BME-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES	1.80E-05
			CE2-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
13	0	2.20E-09	CE2-BME-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES	1.80E-05
			CE2-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
14	0	2.20E-09	CE2-BME-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 HARDWARE FAILURES	1.80E-05
			CE2-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
15	0	2.20E-09	CE2-BME-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 HARDWARE FAILURES	1.80E-05
			CE2-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
16	0	2.20E-09	CE2-BME-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 HARDWARE FAILURES	1.80E-05
			CE2-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
17	0	2.20E-09	CE2-BME-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 HARDWARE FAILURES	1.80E-05
			CE2-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
18	0	1.20E-09	CE2-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE2-CPA-CF-T3OF4	CCF 3 OF 4 CORE PROTECTION CALCULATORS	1.70E-04
			/CE2-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
19	0	5.80E-10	CE2-BSN-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-05
			CE2-BUV-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER UNDERVOLTAGE DEVICE	5.40E-05
20	0	4.00E-10	CE2-CPA-CF-T3OF4	CCF 3 OF 4 CORE PROTECTION CALCULATORS	1.70E-04
			CE2-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	2.50E-06
			/CE2-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
21	0	3.20E-10	CE2-BME-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES	1.80E-05
			CE2-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES	1.80E-05
22	0	3.20E-10	CE2-BME-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES	1.80E-05
			CE2-BME-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES	1.80E-05
23	0	3.20E-10	CE2-BME-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 HARDWARE FAILURES	1.80E-05
			CE2-BME-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 HARDWARE FAILURES	1.80E-05
24	0	3.20E-10	CE2-BME-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 HARDWARE FAILURES	1.80E-05
			CE2-BME-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 HARDWARE FAILURES	1.80E-05
25	0	1.40E-10	CE2-BUV-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER UNDERVOLTAGE DEVICE	5.40E-05
			CE2-PWR-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP POWER	2.50E-06
26	0	7.20E-11	CE2-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE2-CTP-CF-CT3OF4	CCF 3 OF 4 COLD LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			/CE2-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
27	0	7.20E-11	CE2-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE2-CTP-CF-HT3OF4	CCF 3 OF 4 HOT LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			/CE2-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
28	0	5.10E-11	CE2-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE2-CBI-CF-T3OF4	CCF 3 OF 4 TEMPERATURE BISTABLES	7.20E-06
			/CE2-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
29	0	5.00E-11	CE2-CPA-CF-T2OF3TM	CCF 2 OF 3 CORE PROTECTION CALCULATORS (CH A T&M)	3.80E-04

Table F-9. (Continued)

Cut Set	Cut Set %	Cut Set Prob.	Basic Event *	Description	Prob.
30	0	2.50E-11	CE2-CPR-CF-P2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	8.20E-06
			CE2-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE2-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	2.50E-06
31	0	2.50E-11	CE2-CTP-CF-CT3OF4	CCF 3 OF 4 COLD LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			/CE2-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE2-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	2.50E-06
32	0	2.40E-11	CE2-CTP-CF-HT3OF4	CCF 3 OF 4 HOT LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			/CE2-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE2-RYL-CF-1LM6OF6	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
33	0	2.40E-11	CE2-RYT-FF-ICK2	CCF 6 OF 6 K1 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			/CE2-RPS-TM-CHA	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
			CE2-RYL-CF-2LM6OF6	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
34	0	2.40E-11	CE2-RYT-FF-ICK1	CCF 6 OF 6 K2 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			/CE2-RPS-TM-CHA	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
			CE2-RYL-CF-3LM6OF6	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
35	0	2.40E-11	CE2-RYT-FF-ICK4	CCF 6 OF 6 K3 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			/CE2-RPS-TM-CHA	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
			CE2-RYL-CF-4LM6OF6	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
36	0	2.00E-11	CE2-RYT-FF-ICK3	CCF 6 OF 6 K4 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			CE2-BSN-FO-TB1	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
			CE2-BUV-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 SHUNT TRIP DEVICE FAILS	1.50E-04
37	0	2.00E-11	CE2-RYT-FF-ICK2	TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-BSN-FO-TB2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
			CE2-BUV-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 SHUNT TRIP DEVICE FAILS	1.50E-04
38	0	2.00E-11	CE2-RYT-FF-ICK1	TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-BSN-FO-TB3	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
			CE2-BUV-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 SHUNT TRIP DEVICE FAILS	1.50E-04
39	0	2.00E-11	CE2-RYT-FF-ICK4	TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-BSN-FO-TB4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
			CE2-BUV-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 SHUNT TRIP DEVICE FAILS	1.50E-04
40	0	2.00E-11	CE2-RYT-FF-ICK3	TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-BSN-FO-TB5	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
			CE2-BUV-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 SHUNT TRIP DEVICE FAILS	1.50E-04
41	0	2.00E-11	CE2-RYT-FF-ICK2	TRIP CIRCUIT BREAKER TCB-5 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-BSN-FO-TB6	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
			CE2-BUV-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 SHUNT TRIP DEVICE FAILS	1.50E-04
42	0	2.00E-11	CE2-RYT-FF-ICK1	TRIP CIRCUIT BREAKER TCB-6 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-BSN-FO-TB7	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
			CE2-BUV-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 SHUNT TRIP DEVICE FAILS	1.50E-04
43	0	2.00E-11	CE2-RYT-FF-ICK4	TRIP CIRCUIT BREAKER TCB-7 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-BSN-FO-TB8	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
			CE2-BUV-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 SHUNT TRIP DEVICE FAILS	1.50E-04
44	0	1.80E-11	CE2-RYT-FF-ICK3	TRIP CIRCUIT BREAKER TCB-8 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-CBI-CF-T3OF4	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
			CE2-CPR-CF-P3OF4	CCF 3 OF 4 TEMPERATURE BISTABLES	7.20E-06
45	0	1.30E-11	/CE2-RPS-TM-CHA	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	2.50E-06
			CE2-BSN-CF-TB2OF8	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE2-BUV-FO-TB1	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-05
46	0	1.30E-11	CE2-BUV-FO-TB2	TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-BSN-CF-TB2OF8	TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-BUV-FO-TB3	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-05
47	0	1.30E-11	CE2-BUV-FO-TB4	TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-BSN-CF-TB2OF8	TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-BUV-FO-TB5	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-05
48	0	1.30E-11	CE2-BUV-FO-TB6	TRIP CIRCUIT BREAKER TCB-5 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-BSN-CF-TB2OF8	TRIP CIRCUIT BREAKER TCB-6 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-BUV-FO-TB7	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-05
49	0	7.90E-12	CE2-BUV-FO-TB8	TRIP CIRCUIT BREAKER TCB-7 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-BUV-FO-TB1	TRIP CIRCUIT BREAKER TCB-8 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-PWR-FF-TB15	TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS	1.10E-03
50	0	7.90E-12	CE2-RYT-FF-ICK2	TCB-1-TCB-5 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05
			CE2-BUV-FO-TB2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
				TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS	1.10E-03

Appendix F

Table F-9. (Continued)

Cut Set	Cut Set %	Cut Set Prob.	Basic Event ^a	Description	Prob.
50	0	1.50E-11	CE2-PWR-FF-TB26	TCB-2-TCB-6 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05
			CE2-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
			CE2-CBI-CF-P2OF3TM	CCF 2 OF 3 PRESSURE BISTABLES (CH A T&M)	2.50E-05
			CE2-CTP-CF-HT2OF3TM	CCF 2 OF 3 HOT LEG TEMPERATURE SENSORS/TRANSMITTERS	3.70E-05
			CE2-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02

a. A / as the first character in a basic event name indicates a complemented event (Success = 1 - Failure). For example, the basic event for channel A in test and maintenance (T&M) is CEx-RPS-TM-CHA (Failure = 1.60E-02). Thus, the basic event name for channel A not in T&M is /CEx-RPS-TM-CHA (Success = 9.84E-01). The event description for complemented events remains the same as the description used for the failure event.

Table F-10. Importance measures sorted on Fussell-Vesely for case (CE Group 2, no manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE2-RYT-CF-2OF4	4.78E-06	6.38E-01	2.76E+00	1.34E+05	1.00E+00
CE2-BME-CF-TB2OF8	9.97E-07	1.33E-01	1.15E+00	1.34E+05	1.00E+00
CE2-ROD-CF-RODS	8.40E-07	1.12E-01	1.13E+00	1.34E+05	1.00E+00
CE2-CBI-CF-6OF8	7.66E-07	1.01E-01	1.11E+00	1.31E+05	9.84E-01
CE2-RYL-CF-LM12OF24	4.29E-08	5.63E-03	1.01E+00	1.31E+05	9.84E-01
CE2-CBI-CF-4OF6TM	1.72E-06	3.67E-03	1.00E+00	2.14E+03	1.60E-02
CE2-RYT-FF-ICK4	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE2-RYT-FF-ICK3	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE2-RYT-FF-ICK2	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE2-RYT-FF-ICK1	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE2-RPS-TM-CHA	1.60E-02	2.29E-03	1.00E+00	1.14E+00	1.07E-06
CE2-RYL-CF-LM6OF12TM	1.58E-07	3.37E-04	1.00E+00	2.14E+03	1.60E-02
CE2-BME-FO-TB3	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB5	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB6	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB7	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB8	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB1	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB2	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB4	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-CPA-CF-T3OF4	1.65E-04	2.10E-04	1.00E+00	2.27E+00	9.54E-06
CE2-CBI-CF-P3OF4	7.21E-06	1.86E-04	1.00E+00	2.68E+01	1.93E-04
CE2-BUV-CF-TB2OF8	5.43E-05	9.77E-05	1.00E+00	2.80E+00	1.35E-05
CE2-BSN-CF-TB2OF8	1.06E-05	8.54E-05	1.00E+00	9.05E+00	6.04E-05
CE2-CPR-CF-P3OF4	2.48E-06	6.39E-05	1.00E+00	2.68E+01	1.93E-04
CE2-PWR-CF-TB2OF4	2.51E-06	2.02E-05	1.00E+00	9.05E+00	6.04E-05
CE2-CPR-CF-P2OF3TM	8.23E-06	1.30E-05	1.00E+00	2.58E+00	1.18E-05
CE2-CTP-CF-CT3OF4	1.02E-05	1.30E-05	1.00E+00	2.27E+00	9.54E-06
CE2-CTP-CF-HT3OF4	1.02E-05	1.30E-05	1.00E+00	2.27E+00	9.54E-06
CE2-CBI-CF-T3OF4	7.21E-06	9.17E-06	1.00E+00	2.27E+00	9.54E-06
CE2-CPA-CF-T2OF3TM	3.77E-04	7.73E-06	1.00E+00	1.02E+00	1.54E-07
CE2-BUV-FO-TB7	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB3	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB1	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB8	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB2	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB6	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB4	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB5	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-CPA-FF-TB	7.60E-03	5.59E-06	1.00E+00	1.00E+00	5.51E-09
CE2-CPA-FF-TC	7.60E-03	5.59E-06	1.00E+00	1.00E+00	5.51E-09
CE2-CPA-FF-TD	7.60E-03	5.59E-06	1.00E+00	1.00E+00	5.51E-09
CE2-RYL-CF-1LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE2-RYL-CF-3LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE2-RYL-CF-4LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE2-RYL-CF-2LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE2-BSN-FO-TB2	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB1	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB3	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB4	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB6	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB7	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB8	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB5	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-CPA-FF-TA	7.60E-03	2.78E-06	1.00E+00	1.00E+00	2.74E-09
CE2-PWR-FF-TB37	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07

Appendix F

Table F-10. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE2-PWR-FF-TB26	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE2-PWR-FF-TB15	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE2-PWR-FF-TB48	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE2-CTP-CF-CT2OF3TM	3.73E-05	7.65E-07	1.00E+00	1.02E+00	1.54E-07
CE2-CTP-CF-HT2OF3TM	3.73E-05	7.65E-07	1.00E+00	1.02E+00	1.54E-07
CE2-CBI-FF-PD	5.00E-04	7.27E-07	1.00E+00	1.00E+00	1.09E-08
CE2-CBI-FF-PB	5.00E-04	7.27E-07	1.00E+00	1.00E+00	1.09E-08
CE2-CBI-FF-PC	5.00E-04	7.27E-07	1.00E+00	1.00E+00	1.09E-08
CE2-CTP-FF-HTC	8.40E-04	6.15E-07	1.00E+00	1.00E+00	5.49E-09
CE2-CTP-FF-CTC	8.40E-04	6.15E-07	1.00E+00	1.00E+00	5.49E-09
CE2-CTP-FF-CTB	8.40E-04	6.15E-07	1.00E+00	1.00E+00	5.49E-09
CE2-CTP-FF-CTD	8.40E-04	6.15E-07	1.00E+00	1.00E+00	5.49E-09
CE2-CTP-FF-HTB	8.40E-04	6.15E-07	1.00E+00	1.00E+00	5.49E-09
CE2-CTP-FF-HTD	8.40E-04	6.15E-07	1.00E+00	1.00E+00	5.49E-09
CE2-CBI-CF-P2OF3TM	2.55E-07	4.02E-07	1.00E+00	2.58E+00	1.18E-05
CE2-CBI-FF-TB	5.00E-04	3.64E-07	1.00E+00	1.00E+00	5.46E-09
CE2-CBI-FF-TC	5.00E-04	3.64E-07	1.00E+00	1.00E+00	5.46E-09
CE2-CBI-FF-TD	5.00E-04	3.64E-07	1.00E+00	1.00E+00	5.46E-09
CE2-CTP-FF-CTA	8.40E-04	3.05E-07	1.00E+00	1.00E+00	2.72E-09
CE2-CTP-FF-HTA	8.40E-04	3.05E-07	1.00E+00	1.00E+00	2.72E-09
CE2-CBI-FF-TA	5.00E-04	1.80E-07	1.00E+00	1.00E+00	2.70E-09
CE2-CPR-FF-PB	1.10E-04	1.57E-07	1.00E+00	1.00E+00	1.07E-08
CE2-CPR-FF-PC	1.10E-04	1.57E-07	1.00E+00	1.00E+00	1.07E-08
CE2-CPR-FF-PD	1.10E-04	1.57E-07	1.00E+00	1.00E+00	1.07E-08
CE2-RYL-CF-4LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE2-RYL-CF-1LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE2-RYL-CF-3LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE2-RYL-CF-2LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE2-CBI-FF-PA	5.00E-04	1.27E-08	1.00E+00	1.00E+00	1.90E-10
CE2-CBI-CF-T2OF3TM	2.55E-07	5.01E-09	1.00E+00	1.02E+00	1.48E-07
CE2-CPR-FF-PA	1.10E-04	1.78E-09	1.00E+00	1.00E+00	1.22E-10
CE2-RYL-FF-LCD2	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LCD4	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LCD3	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBC4	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LCD1	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBD4	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBD3	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBD2	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBD1	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBC3	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBC2	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBC1	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11

Table F-11. Importance measures sorted on Risk Increase for case (CE Group 2, no manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE2-RYT-CF-2OF4	4.78E-06	6.38E-01	2.76E+00	1.34E+05	1.00E+00
CE2-BME-CF-TB2OF8	9.97E-07	1.33E-01	1.15E+00	1.34E+05	1.00E+00
CE2-ROD-CF-RODS	8.40E-07	1.12E-01	1.13E+00	1.34E+05	1.00E+00
CE2-CBI-CF-6OF8	7.66E-07	1.01E-01	1.11E+00	1.31E+05	9.84E-01
CE2-RYL-CF-LM12OF24	4.29E-08	5.63E-03	1.01E+00	1.31E+05	9.84E-01
CE2-CBI-CF-4OF6TM	1.72E-06	3.67E-03	1.00E+00	2.14E+03	1.60E-02
CE2-RYL-CF-LM6OF12TM	1.58E-07	3.37E-04	1.00E+00	2.14E+03	1.60E-02
CE2-CBI-CF-P3OF4	7.21E-06	1.86E-04	1.00E+00	2.68E+01	1.93E-04
CE2-CPR-CF-P3OF4	2.48E-06	6.39E-05	1.00E+00	2.68E+01	1.93E-04
CE2-RYT-FF-ICK4	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE2-RYT-FF-ICK3	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE2-RYT-FF-ICK2	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE2-RYT-FF-ICK1	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE2-RYL-CF-1LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE2-RYL-CF-3LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE2-RYL-CF-4LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE2-RYL-CF-2LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE2-BME-FO-TB3	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB5	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB6	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB7	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB8	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB1	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB2	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB4	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BSN-CF-TB2OF8	1.06E-05	8.54E-05	1.00E+00	9.05E+00	6.04E-05
CE2-PWR-CF-TB2OF4	2.51E-06	2.02E-05	1.00E+00	9.05E+00	6.04E-05
CE2-BUV-CF-TB2OF8	5.43E-05	9.77E-05	1.00E+00	2.80E+00	1.35E-05
CE2-CPR-CF-P2OF3TM	8.23E-06	1.30E-05	1.00E+00	2.58E+00	1.18E-05
CE2-CBI-CF-P2OF3TM	2.55E-07	4.02E-07	1.00E+00	2.58E+00	1.18E-05
CE2-CPA-CF-T3OF4	1.65E-04	2.10E-04	1.00E+00	2.27E+00	9.54E-06
CE2-CTP-CF-CT3OF4	1.02E-05	1.30E-05	1.00E+00	2.27E+00	9.54E-06
CE2-CTP-CF-HT3OF4	1.02E-05	1.30E-05	1.00E+00	2.27E+00	9.54E-06
CE2-CBI-CF-T3OF4	7.21E-06	9.17E-06	1.00E+00	2.27E+00	9.54E-06
CE2-RYL-CF-4LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE2-RYL-CF-1LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE2-RYL-CF-3LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE2-RYL-CF-2LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE2-RPS-TM-CHA	1.60E-02	2.29E-03	1.00E+00	1.14E+00	1.07E-06
CE2-PWR-FF-TB37	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE2-PWR-FF-TB26	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE2-PWR-FF-TB15	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE2-PWR-FF-TB48	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE2-CPA-CF-T2OF3TM	3.77E-04	7.73E-06	1.00E+00	1.02E+00	1.54E-07
CE2-BSN-FO-TB2	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB1	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB3	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB4	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB6	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB7	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB8	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB5	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-CTP-CF-CT2OF3TM	3.73E-05	7.65E-07	1.00E+00	1.02E+00	1.54E-07
CE2-CTP-CF-HT2OF3TM	3.73E-05	7.65E-07	1.00E+00	1.02E+00	1.54E-07
CE2-CBI-CF-T2OF3TM	2.55E-07	5.01E-09	1.00E+00	1.02E+00	1.48E-07
CE2-BUV-FO-TB7	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB3	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08

Appendix F

Table F-11. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE2-BUV-FO-TB1	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB8	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB2	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB6	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB4	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB5	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-CPA-FF-TB	7.60E-03	5.59E-06	1.00E+00	1.00E+00	5.51E-09
CE2-CPA-FF-TC	7.60E-03	5.59E-06	1.00E+00	1.00E+00	5.51E-09
CE2-CPA-FF-TD	7.60E-03	5.59E-06	1.00E+00	1.00E+00	5.51E-09
CE2-CPA-FF-TA	7.60E-03	2.78E-06	1.00E+00	1.00E+00	2.74E-09
CE2-CBI-FF-PD	5.00E-04	7.27E-07	1.00E+00	1.00E+00	1.09E-08
CE2-CBI-FF-PB	5.00E-04	7.27E-07	1.00E+00	1.00E+00	1.09E-08
CE2-CBI-FF-PC	5.00E-04	7.27E-07	1.00E+00	1.00E+00	1.09E-08
CE2-CTP-FF-HTC	8.40E-04	6.15E-07	1.00E+00	1.00E+00	5.49E-09
CE2-CTP-FF-CTC	8.40E-04	6.15E-07	1.00E+00	1.00E+00	5.49E-09
CE2-CTP-FF-CTB	8.40E-04	6.15E-07	1.00E+00	1.00E+00	5.49E-09
CE2-CTP-FF-CTD	8.40E-04	6.15E-07	1.00E+00	1.00E+00	5.49E-09
CE2-CTP-FF-HTB	8.40E-04	6.15E-07	1.00E+00	1.00E+00	5.49E-09
CE2-CTP-FF-HTD	8.40E-04	6.15E-07	1.00E+00	1.00E+00	5.49E-09
CE2-CBI-FF-TB	5.00E-04	3.64E-07	1.00E+00	1.00E+00	5.46E-09
CE2-CBI-FF-TC	5.00E-04	3.64E-07	1.00E+00	1.00E+00	5.46E-09
CE2-CBI-FF-TD	5.00E-04	3.64E-07	1.00E+00	1.00E+00	5.46E-09
CE2-CTP-FF-CTA	8.40E-04	3.05E-07	1.00E+00	1.00E+00	2.72E-09
CE2-CTP-FF-HTA	8.40E-04	3.05E-07	1.00E+00	1.00E+00	2.72E-09
CE2-CBI-FF-TA	5.00E-04	1.80E-07	1.00E+00	1.00E+00	2.70E-09
CE2-CPR-FF-PB	1.10E-04	1.57E-07	1.00E+00	1.00E+00	1.07E-08
CE2-CPR-FF-PC	1.10E-04	1.57E-07	1.00E+00	1.00E+00	1.07E-08
CE2-CPR-FF-PD	1.10E-04	1.57E-07	1.00E+00	1.00E+00	1.07E-08
CE2-CBI-FF-PA	5.00E-04	1.27E-08	1.00E+00	1.00E+00	1.90E-10
CE2-CPR-FF-PA	1.10E-04	1.78E-09	1.00E+00	1.00E+00	1.22E-10
CE2-RYL-FF-LCD2	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LCD4	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LCD3	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBC4	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LCD1	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBD4	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBD3	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBD2	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBD1	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBC3	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBC2	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBC1	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11

Table F-12. Importance measures sorted on Birnbaum for case (CE Group 2, no manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE2-RYT-CF-2OF4	4.78E-06	6.38E-01	2.76E+00	1.34E+05	1.00E+00
CE2-BME-CF-TB2OF8	9.97E-07	1.33E-01	1.15E+00	1.34E+05	1.00E+00
CE2-ROD-CF-RODS	8.40E-07	1.12E-01	1.13E+00	1.34E+05	1.00E+00
CE2-CBI-CF-6OF8	7.66E-07	1.01E-01	1.11E+00	1.31E+05	9.84E-01
CE2-RYL-CF-LM12OF24	4.29E-08	5.63E-03	1.01E+00	1.31E+05	9.84E-01
CE2-CBI-CF-4OF6TM	1.72E-06	3.67E-03	1.00E+00	2.14E+03	1.60E-02
CE2-RYL-CF-LM6OF12TM	1.58E-07	3.37E-04	1.00E+00	2.14E+03	1.60E-02
CE2-CBI-CF-P3OF4	7.21E-06	1.86E-04	1.00E+00	2.68E+01	1.93E-04
CE2-CPR-CF-P3OF4	2.48E-06	6.39E-05	1.00E+00	2.68E+01	1.93E-04
CE2-RYT-FF-ICK4	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE2-RYT-FF-ICK3	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE2-RYT-FF-ICK2	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE2-RYT-FF-ICK1	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE2-RYL-CF-1LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE2-RYL-CF-3LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE2-RYL-CF-4LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE2-RYL-CF-2LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE2-BME-FO-TB3	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB5	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB6	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB7	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB8	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB1	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB2	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BME-FO-TB4	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE2-BSN-CF-TB2OF8	1.06E-05	8.54E-05	1.00E+00	9.05E+00	6.04E-05
CE2-PWR-CF-TB2OF4	2.51E-06	2.02E-05	1.00E+00	9.05E+00	6.04E-05
CE2-BUV-CF-TB2OF8	5.43E-05	9.77E-05	1.00E+00	2.80E+00	1.35E-05
CE2-CPR-CF-P2OF3TM	8.23E-06	1.30E-05	1.00E+00	2.58E+00	1.18E-05
CE2-CBI-CF-P2OF3TM	2.55E-07	4.02E-07	1.00E+00	2.58E+00	1.18E-05
CE2-CPA-CF-T3OF4	1.65E-04	2.10E-04	1.00E+00	2.27E+00	9.54E-06
CE2-CTP-CF-CT3OF4	1.02E-05	1.30E-05	1.00E+00	2.27E+00	9.54E-06
CE2-CTP-CF-HT3OF4	1.02E-05	1.30E-05	1.00E+00	2.27E+00	9.54E-06
CE2-CBI-CF-T3OF4	7.21E-06	9.17E-06	1.00E+00	2.27E+00	9.54E-06
CE2-RYL-CF-4LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE2-RYL-CF-1LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE2-RYL-CF-3LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE2-RYL-CF-2LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE2-RPS-TM-CHA	1.60E-02	2.29E-03	1.00E+00	1.14E+00	1.07E-06
CE2-PWR-FF-TB37	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE2-PWR-FF-TB26	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE2-PWR-FF-TB15	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE2-PWR-FF-TB48	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE2-BSN-FO-TB2	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB1	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB3	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB4	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB6	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB7	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB8	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-BSN-FO-TB5	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE2-CPA-CF-T2OF3TM	3.77E-04	7.73E-06	1.00E+00	1.02E+00	1.54E-07
CE2-CTP-CF-CT2OF3TM	3.73E-05	7.65E-07	1.00E+00	1.02E+00	1.54E-07
CE2-CTP-CF-HT2OF3TM	3.73E-05	7.65E-07	1.00E+00	1.02E+00	1.54E-07
CE2-CBI-CF-T2OF3TM	2.55E-07	5.01E-09	1.00E+00	1.02E+00	1.48E-07
CE2-BUV-FO-TB7	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB3	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08

Appendix F

Table F-12. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE2-BUV-FO-TB1	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB8	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB2	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB6	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB4	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-BUV-FO-TB5	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE2-CBI-FF-PD	5.00E-04	7.27E-07	1.00E+00	1.00E+00	1.09E-08
CE2-CBI-FF-PB	5.00E-04	7.27E-07	1.00E+00	1.00E+00	1.09E-08
CE2-CBI-FF-PC	5.00E-04	7.27E-07	1.00E+00	1.00E+00	1.09E-08
CE2-CPR-FF-PB	1.10E-04	1.57E-07	1.00E+00	1.00E+00	1.07E-08
CE2-CPR-FF-PC	1.10E-04	1.57E-07	1.00E+00	1.00E+00	1.07E-08
CE2-CPR-FF-PD	1.10E-04	1.57E-07	1.00E+00	1.00E+00	1.07E-08
CE2-CPA-FF-TB	7.60E-03	5.59E-06	1.00E+00	1.00E+00	5.51E-09
CE2-CPA-FF-TC	7.60E-03	5.59E-06	1.00E+00	1.00E+00	5.51E-09
CE2-CPA-FF-TD	7.60E-03	5.59E-06	1.00E+00	1.00E+00	5.51E-09
CE2-CTP-FF-HTC	8.40E-04	6.15E-07	1.00E+00	1.00E+00	5.49E-09
CE2-CTP-FF-CTC	8.40E-04	6.15E-07	1.00E+00	1.00E+00	5.49E-09
CE2-CTP-FF-CTB	8.40E-04	6.15E-07	1.00E+00	1.00E+00	5.49E-09
CE2-CTP-FF-CTD	8.40E-04	6.15E-07	1.00E+00	1.00E+00	5.49E-09
CE2-CTP-FF-HTB	8.40E-04	6.15E-07	1.00E+00	1.00E+00	5.49E-09
CE2-CTP-FF-HTD	8.40E-04	6.15E-07	1.00E+00	1.00E+00	5.49E-09
CE2-CBI-FF-TB	5.00E-04	3.64E-07	1.00E+00	1.00E+00	5.46E-09
CE2-CBI-FF-TC	5.00E-04	3.64E-07	1.00E+00	1.00E+00	5.46E-09
CE2-CBI-FF-TD	5.00E-04	3.64E-07	1.00E+00	1.00E+00	5.46E-09
CE2-CPA-FF-TA	7.60E-03	2.78E-06	1.00E+00	1.00E+00	2.74E-09
CE2-CTP-FF-CTA	8.40E-04	3.05E-07	1.00E+00	1.00E+00	2.72E-09
CE2-CTP-FF-HTA	8.40E-04	3.05E-07	1.00E+00	1.00E+00	2.72E-09
CE2-CBI-FF-TA	5.00E-04	1.80E-07	1.00E+00	1.00E+00	2.70E-09
CE2-CBI-FF-PA	5.00E-04	1.27E-08	1.00E+00	1.00E+00	1.90E-10
CE2-CPR-FF-PA	1.10E-04	1.78E-09	1.00E+00	1.00E+00	1.22E-10
CE2-RYL-FF-LCD2	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LCD4	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LCD3	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBC4	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LCD1	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBD4	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBD3	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBD2	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBD1	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBC3	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBC2	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11
CE2-RYL-FF-LBC1	2.60E-04	8.00E-10	1.00E+00	1.00E+00	2.31E-11

Table F-13. RPS CE Group 2 top 50 cutsets (manual scram).

Cut Set	Cut Set %	Cut Set Prob.	Basic Event *	Description	Prob.
1	52.6	1.00E-06	CE2-BME-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKERS	1.00E-06
2	44.3	8.40E-07	CE2-ROD-CF-RODS	CCF 20% OR MORE CRD/RODS FAIL TO INSERT	8.40E-07
3	2.5	4.80E-08	CE2-RYT-CF-2OF4	CCF OF 2 OF 4 TRIP CONTACTORS	4.80E-06
			CE2-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
4	0.4	7.50E-09	CE2-CBI-CF-6OF8	CCF SPECIFIC 6 OF 8 BISTABLE TRIP UNITS	7.70E-07
			/CE2-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE2-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
5	0	5.80E-10	CE2-BSN-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-05
			CE2-BUV-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER UNDERVOLTAGE DEVICE	5.40E-05
6	0	4.20E-10	/CE2-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE2-RYL-CF-LM12OF24	CCF OF 12 OF 24 LOGIC MATRIX OUTPUT RELAYS	4.30E-08
			CE2-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
7	0	3.20E-10	CE2-BME-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES	1.80E-05
			CE2-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES	1.80E-05
8	0	3.20E-10	CE2-BME-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES	1.80E-05
			CE2-BME-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES	1.80E-05
9	0	3.20E-10	CE2-BME-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 HARDWARE FAILURES	1.80E-05
			CE2-BME-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 HARDWARE FAILURES	1.80E-05
10	0	3.20E-10	CE2-BME-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 HARDWARE FAILURES	1.80E-05
			CE2-BME-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 HARDWARE FAILURES	1.80E-05
11	0	2.80E-10	CE2-CBI-CF-4OF6TM	CCF SPECIFIC 4 OF 6 BISTABLE TRIP UNITS (CH A T&M)	1.70E-06
			CE2-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE2-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
12	0	1.40E-10	CE2-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
			CE2-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
			CE2-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
13	0	1.40E-10	CE2-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
			CE2-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
			CE2-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
14	0	1.40E-10	CE2-BUV-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER UNDERVOLTAGE DEVICE	5.40E-05
			CE2-PWR-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP POWER	2.50E-06
15	0	2.50E-11	CE2-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE2-RYL-CF-LM6OF12TM	CCF OF 6 OF 12 LOGIC MATRIX OUTPUT RELAYS (CH A T&M)	1.60E-07
			CE2-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
16	0	2.40E-11	CE2-MSW-CF-2OF4	CCF 2 OF 4 (1-OUT-OF-2 TWICE) MANUAL SWITCHES	4.90E-06
			CE2-RYT-CF-2OF4	CCF OF 2 OF 4 TRIP CONTACTORS	4.80E-06
17	0	2.20E-11	CE2-BME-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES	1.80E-05
			CE2-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
			CE2-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
18	0	2.20E-11	CE2-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES	1.80E-05
			CE2-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
			CE2-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
19	0	2.20E-11	CE2-BME-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES	1.80E-05
			CE2-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
			CE2-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
20	0	2.20E-11	CE2-BME-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES	1.80E-05
			CE2-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
			CE2-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
21	0	2.20E-11	CE2-BME-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 HARDWARE FAILURES	1.80E-05
			CE2-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
			CE2-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
22	0	2.20E-11	CE2-BME-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 HARDWARE FAILURES	1.80E-05
			CE2-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
			CE2-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
23	0	2.20E-11	CE2-BME-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 HARDWARE FAILURES	1.80E-05
			CE2-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
			CE2-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
24	0	2.20E-11	CE2-BME-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 HARDWARE FAILURES	1.80E-05
			CE2-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04

Appendix F

Table F-13. (Continued)

Cut Set	Cut Set %	Cut Set Prob.	Basic Event *	Description	Prob.
25	0	1.30E-11	CE2-XHE-XE-SCRAM CE2-BSN-CF-TB2OF8	OPERATOR FAILS TO INITIATE MANUAL SCRAM CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.00E-02 1.10E-05
26	0	1.30E-11	CE2-BUV-FO-TB1 CE2-BUV-FO-TB2 CE2-BSN-CF-TB2OF8	TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-03 1.10E-03 1.10E-05
27	0	1.30E-11	CE2-BUV-FO-TB3 CE2-BUV-FO-TB4 CE2-BSN-CF-TB2OF8	TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-03 1.10E-03 1.10E-05
28	0	1.30E-11	CE2-BUV-FO-TB5 CE2-BUV-FO-TB6 CE2-BSN-CF-TB2OF8	TRIP CIRCUIT BREAKER TCB-5 UNDERVOLTAGE DEVICE FAILS TRIP CIRCUIT BREAKER TCB-6 UNDERVOLTAGE DEVICE FAILS CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-03 1.10E-03 1.10E-05
29	0	1.20E-11	CE2-BUV-FO-TB7 CE2-BUV-FO-TB8 CE2-CBI-CF-P3OF4 CE2-CPA-CF-T3OF4 /CE2-RPS-TM-CHA	TRIP CIRCUIT BREAKER TCB-7 UNDERVOLTAGE DEVICE FAILS TRIP CIRCUIT BREAKER TCB-8 UNDERVOLTAGE DEVICE FAILS CCF 3 OF 4 PRESSURE BISTABLES CCF 3 OF 4 CORE PROTECTION CALCULATORS RPS CHANNEL A IN TEST AND MAINTENANCE	1.10E-03 1.10E-03 7.20E-06 1.70E-04 9.80E-01
30	0	4.00E-12	CE2-XHE-XE-SCRAM CE2-CPA-CF-T3OF4 CE2-CPR-CF-P3OF4 /CE2-RPS-TM-CHA	OPERATOR FAILS TO INITIATE MANUAL SCRAM CCF 3 OF 4 CORE PROTECTION CALCULATORS CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS RPS CHANNEL A IN TEST AND MAINTENANCE	1.00E-02 1.70E-04 2.50E-06 9.80E-01
31	0	3.70E-12	CE2-XHE-XE-SCRAM CE2-CBI-CF-6OF8 CE2-MSW-CF-2OF4 /CE2-RPS-TM-CHA	OPERATOR FAILS TO INITIATE MANUAL SCRAM CCF SPECIFIC 6 OF 8 BISTABLE TRIP UNITS CCF 2 OF 4 (1-OUT-OF-2 TWICE) MANUAL SWITCHES RPS CHANNEL A IN TEST AND MAINTENANCE	1.00E-02 7.70E-07 4.90E-06 9.80E-01
32	0	3.00E-12	CE2-BUV-FO-TB1 CE2-BUV-FO-TB2 CE2-PWR-CF-TB2OF4	TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP POWER	1.10E-03 1.10E-03 2.50E-06
33	0	3.00E-12	CE2-BUV-FO-TB3 CE2-BUV-FO-TB4 CE2-PWR-CF-TB2OF4	TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP POWER	1.10E-03 1.10E-03 2.50E-06
34	0	3.00E-12	CE2-BUV-FO-TB5 CE2-BUV-FO-TB6 CE2-PWR-CF-TB2OF4	TRIP CIRCUIT BREAKER TCB-5 UNDERVOLTAGE DEVICE FAILS TRIP CIRCUIT BREAKER TCB-6 UNDERVOLTAGE DEVICE FAILS CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP POWER	1.10E-03 1.10E-03 2.50E-06
35	0	3.00E-12	CE2-BUV-FO-TB7 CE2-BUV-FO-TB8 CE2-PWR-CF-TB2OF4	TRIP CIRCUIT BREAKER TCB-7 UNDERVOLTAGE DEVICE FAILS TRIP CIRCUIT BREAKER TCB-8 UNDERVOLTAGE DEVICE FAILS CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP POWER	1.10E-03 1.10E-03 2.50E-06
36	0	3.00E-12	CE2-BME-FO-TB1 CE2-BSN-FO-TB2 CE2-BUV-FO-TB2	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES TRIP CIRCUIT BREAKER TCB-2 SHUNT TRIP DEVICE FAILS TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS	1.80E-05 1.50E-04 1.10E-03
37	0	3.00E-12	CE2-BME-FO-TB2 CE2-BSN-FO-TB1 CE2-BUV-FO-TB1	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES TRIP CIRCUIT BREAKER TCB-1 SHUNT TRIP DEVICE FAILS TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS	1.80E-05 1.50E-04 1.10E-03
38	0	3.00E-12	CE2-BME-FO-TB3 CE2-BSN-FO-TB4 CE2-BUV-FO-TB4	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES TRIP CIRCUIT BREAKER TCB-4 SHUNT TRIP DEVICE FAILS TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS	1.80E-05 1.50E-04 1.10E-03
39	0	3.00E-12	CE2-BME-FO-TB4 CE2-BSN-FO-TB3 CE2-BUV-FO-TB3	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES TRIP CIRCUIT BREAKER TCB-3 SHUNT TRIP DEVICE FAILS TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS	1.80E-05 1.50E-04 1.10E-03
40	0	3.00E-12	CE2-BME-FO-TB5 CE2-BSN-FO-TB6 CE2-BUV-FO-TB6	TRIP CIRCUIT BREAKER TCB-5 HARDWARE FAILURES TRIP CIRCUIT BREAKER TCB-6 SHUNT TRIP DEVICE FAILS TRIP CIRCUIT BREAKER TCB-6 UNDERVOLTAGE DEVICE FAILS	1.80E-05 1.50E-04 1.10E-03
41	0	3.00E-12	CE2-BME-FO-TB6 CE2-BSN-FO-TB5 CE2-BUV-FO-TB5	TRIP CIRCUIT BREAKER TCB-6 HARDWARE FAILURES TRIP CIRCUIT BREAKER TCB-5 SHUNT TRIP DEVICE FAILS TRIP CIRCUIT BREAKER TCB-5 UNDERVOLTAGE DEVICE FAILS	1.80E-05 1.50E-04 1.10E-03
42	0	3.00E-12	CE2-BME-FO-TB7 CE2-BSN-FO-TB8 CE2-BUV-FO-TB8	TRIP CIRCUIT BREAKER TCB-7 HARDWARE FAILURES TRIP CIRCUIT BREAKER TCB-8 SHUNT TRIP DEVICE FAILS TRIP CIRCUIT BREAKER TCB-8 UNDERVOLTAGE DEVICE FAILS	1.80E-05 1.50E-04 1.10E-03
43	0	3.00E-12	CE2-BME-FO-TB8 CE2-BSN-FO-TB7	TRIP CIRCUIT BREAKER TCB-8 HARDWARE FAILURES TRIP CIRCUIT BREAKER TCB-7 SHUNT TRIP DEVICE FAILS	1.80E-05 1.50E-04

Table F-13. (Continued)

Cut Set	Cut Set %	Cut Set Prob.	Basic Event *	Description	Prob.
44	0	1.20E-12	CE2-BUV-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-BSN-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE2-BSN-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE2-BUV-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER UNDERVOLTAGE DEVICE	5.40E-05
45	0	1.20E-12	CE2-BSN-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE2-BSN-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE2-BUV-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER UNDERVOLTAGE DEVICE	5.40E-05
46	0	1.20E-12	CE2-BSN-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE2-BSN-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE2-BUV-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER UNDERVOLTAGE DEVICE	5.40E-05
47	0	1.20E-12	CE2-BSN-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE2-BSN-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE2-BUV-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER UNDERVOLTAGE DEVICE	5.40E-05
48	0	1.20E-12	CE2-BME-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES	1.80E-05
			CE2-BUV-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-PWR-FF-TB26	TCB-2-TCB-6 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05
49	0	1.20E-12	CE2-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES	1.80E-05
			CE2-BUV-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-PWR-FF-TB15	TCB-1-TCB-5 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05
50	0	1.20E-12	CE2-BME-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES	1.80E-05
			CE2-BUV-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE2-PWR-FF-TB48	TCB-4-TCB-8 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05
			CE2-PWR-FF-TB15	TCB-1-TCB-5 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05

- a. A / as the first character in a basic event name indicates a complemented event (Success = 1 - Failure). For example, the basic event for channel A in test and maintenance (T&M) is CEx-RPS-TM-CHA (Failure = 1.60E-02). Thus, the basic event name for channel A not in T&M is /CEx-RPS-TM-CHA (Success = 9.84E-01). The event description for complemented events remains the same as the description used for the failure event

Appendix F

Table F-14. Importance measures sorted on Fussell-Vesely for case (CE Group 2, manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE2-BME-CF-TB2OF8	9.97E-07	5.26E-01	2.11E+00	5.28E+05	1.00E+00
CE2-ROD-CF-RODS	8.40E-07	4.43E-01	1.80E+00	5.28E+05	1.00E+00
CE2-XHE-XE-SCRAM	1.00E-02	2.98E-02	1.03E+00	3.95E+00	5.65E-06
CE2-RYT-CF-2OF4	4.78E-06	2.52E-02	1.03E+00	5.28E+03	1.00E-02
CE2-CBI-CF-6OF8	7.66E-07	3.98E-03	1.00E+00	5.19E+03	9.85E-03
CE2-BUV-CF-TB2OF8	5.43E-05	3.81E-04	1.00E+00	8.02E+00	1.33E-05
CE2-BSN-CF-TB2OF8	1.06E-05	3.32E-04	1.00E+00	3.23E+01	5.93E-05
CE2-RYL-CF-LM12OF24	4.29E-08	2.23E-04	1.00E+00	5.19E+03	9.85E-03
CE2-BME-FO-TB7	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB8	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB5	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB6	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB4	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB3	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB2	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB1	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-CBI-CF-4OF6TM	1.72E-06	1.45E-04	1.00E+00	8.54E+01	1.60E-04
CE2-RYT-FF-ICK4	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYT-FF-ICK3	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYT-FF-ICK1	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYT-FF-ICK2	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RPS-TM-CHA	1.60E-02	9.07E-05	1.00E+00	1.01E+00	1.08E-08
CE2-PWR-CF-TB2OF4	2.51E-06	7.85E-05	1.00E+00	3.23E+01	5.93E-05
CE2-MSW-CF-2OF4	4.95E-06	1.48E-05	1.00E+00	3.98E+00	5.65E-06
CE2-RYL-CF-LM6OF12TM	1.58E-07	1.33E-05	1.00E+00	8.54E+01	1.60E-04
CE2-BUV-FO-TB6	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB3	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB8	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB7	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB5	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB4	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB1	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB2	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-CPA-CF-T3OF4	1.65E-04	8.30E-06	1.00E+00	1.05E+00	9.54E-08
CE2-CBI-CF-P3OF4	7.21E-06	7.33E-06	1.00E+00	2.02E+00	1.93E-06
CE2-BSN-FO-TB3	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB8	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB2	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB7	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB6	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB4	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB1	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB5	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-CPR-CF-P3OF4	2.48E-06	2.52E-06	1.00E+00	2.02E+00	1.93E-06
CE2-PWR-FF-TB15	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-PWR-FF-TB26	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-PWR-FF-TB37	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-PWR-FF-TB48	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-CTP-CF-CT3OF4	1.02E-05	5.13E-07	1.00E+00	1.05E+00	9.54E-08
CE2-CTP-CF-HT3OF4	1.02E-05	5.13E-07	1.00E+00	1.05E+00	9.54E-08
CE2-CPR-CF-P2OF3TM	8.23E-06	5.03E-07	1.00E+00	1.06E+00	1.16E-07
CE2-CBI-CF-T3OF4	7.21E-06	3.63E-07	1.00E+00	1.05E+00	9.54E-08
CE2-MSW-FF-MT3	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-MSW-FF-MT2	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-MSW-FF-MT1	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-MSW-FF-MT4	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09

Table F-14. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE2-CPA-CF-T2OF3TM	3.77E-04	3.04E-07	1.00E+00	1.00E+00	1.53E-09
CE2-CPA-FF-TC	7.60E-03	2.10E-07	1.00E+00	1.00E+00	5.24E-11
CE2-CPA-FF-TD	7.60E-03	2.10E-07	1.00E+00	1.00E+00	5.24E-11
CE2-CPA-FF-TB	7.60E-03	2.10E-07	1.00E+00	1.00E+00	5.24E-11
CE2-RYL-CF-4LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-RYL-CF-2LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-RYL-CF-1LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-RYL-CF-3LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-CPA-FF-TA	7.60E-03	1.02E-07	1.00E+00	1.00E+00	2.54E-11
CE2-CTP-CF-CT2OF3TM	3.73E-05	2.90E-08	1.00E+00	1.00E+00	1.48E-09
CE2-CTP-CF-HT2OF3TM	3.73E-05	2.90E-08	1.00E+00	1.00E+00	1.48E-09
CE2-CBI-FF-PD	5.00E-04	2.50E-08	1.00E+00	1.00E+00	9.48E-11
CE2-CBI-FF-PC	5.00E-04	2.50E-08	1.00E+00	1.00E+00	9.48E-11
CE2-CBI-FF-PB	5.00E-04	2.50E-08	1.00E+00	1.00E+00	9.48E-11
CE2-CTP-FF-CTB	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-CTC	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-HTB	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-CTD	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-HTD	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-HTC	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CBI-CF-P2OF3TM	2.55E-07	1.35E-08	1.00E+00	1.05E+00	1.00E-07
CE2-CBI-FF-TD	5.00E-04	8.43E-09	1.00E+00	1.00E+00	3.23E-11
CE2-CBI-FF-TC	5.00E-04	8.43E-09	1.00E+00	1.00E+00	3.23E-11
CE2-CBI-FF-TB	5.00E-04	8.43E-09	1.00E+00	1.00E+00	3.23E-11
CE2-CTP-FF-CTA	8.40E-04	7.38E-09	1.00E+00	1.00E+00	1.65E-11
CE2-CTP-FF-HTA	8.40E-04	7.38E-09	1.00E+00	1.00E+00	1.65E-11
CE2-RYL-CF-4LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-RYL-CF-3LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-RYL-CF-2LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-RYL-CF-1LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-CPR-FF-PC	1.10E-04	3.51E-09	1.00E+00	1.00E+00	6.03E-11
CE2-CPR-FF-PB	1.10E-04	3.51E-09	1.00E+00	1.00E+00	6.03E-11
CE2-CPR-FF-PD	1.10E-04	3.51E-09	1.00E+00	1.00E+00	6.03E-11
CE2-CBI-FF-TA	5.00E-04	3.16E-09	1.00E+00	1.00E+00	1.23E-11

Appendix F

Table F-15. Importance measures sorted on Risk Increase for (CE Group 2, manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE2-BME-CF-TB2OF8	9.97E-07	5.26E-01	2.11E+00	5.28E+05	1.00E+00
CE2-ROD-CF-RODS	8.40E-07	4.43E-01	1.80E+00	5.28E+05	1.00E+00
CE2-RYT-CF-2OF4	4.78E-06	2.52E-02	1.03E+00	5.28E+03	1.00E-02
CE2-CBI-CF-6OF8	7.66E-07	3.98E-03	1.00E+00	5.19E+03	9.85E-03
CE2-RYL-CF-LM12OF24	4.29E-08	2.23E-04	1.00E+00	5.19E+03	9.85E-03
CE2-CBI-CF-4OF6TM	1.72E-06	1.45E-04	1.00E+00	8.54E+01	1.60E-04
CE2-RYL-CF-LM6OF12TM	1.58E-07	1.33E-05	1.00E+00	8.54E+01	1.60E-04
CE2-BSN-CF-TB2OF8	1.06E-05	3.32E-04	1.00E+00	3.23E+01	5.93E-05
CE2-PWR-CF-TB2OF4	2.51E-06	7.85E-05	1.00E+00	3.23E+01	5.93E-05
CE2-BME-FO-TB7	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB8	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB5	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB6	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB4	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB3	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB2	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB1	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BUV-CF-TB2OF8	5.43E-05	3.81E-04	1.00E+00	8.02E+00	1.33E-05
CE2-MSW-CF-2OF4	4.95E-06	1.48E-05	1.00E+00	3.98E+00	5.65E-06
CE2-XHE-XE-SCRAM	1.00E-02	2.98E-02	1.03E+00	3.95E+00	5.65E-06
CE2-CBI-CF-P3OF4	7.21E-06	7.33E-06	1.00E+00	2.02E+00	1.93E-06
CE2-CPR-CF-P3OF4	2.48E-06	2.52E-06	1.00E+00	2.02E+00	1.93E-06
CE2-RYT-FF-ICK4	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYT-FF-ICK3	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYT-FF-ICK1	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYT-FF-ICK2	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYL-CF-4LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-RYL-CF-2LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-RYL-CF-1LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-RYL-CF-3LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-CPR-CF-P2OF3TM	8.23E-06	5.03E-07	1.00E+00	1.06E+00	1.16E-07
CE2-CPA-CF-T3OF4	1.65E-04	8.30E-06	1.00E+00	1.05E+00	9.54E-08
CE2-CTP-CF-CT3OF4	1.02E-05	5.13E-07	1.00E+00	1.05E+00	9.54E-08
CE2-CTP-CF-HT3OF4	1.02E-05	5.13E-07	1.00E+00	1.05E+00	9.54E-08
CE2-CBI-CF-T3OF4	7.21E-06	3.63E-07	1.00E+00	1.05E+00	9.54E-08
CE2-CBI-CF-P2OF3TM	2.55E-07	1.35E-08	1.00E+00	1.05E+00	1.00E-07
CE2-PWR-FF-TB15	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-PWR-FF-TB26	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-PWR-FF-TB37	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-PWR-FF-TB48	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-BSN-FO-TB3	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB8	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB2	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB7	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB6	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB4	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB1	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB5	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-RPS-TM-CHA	1.60E-02	9.07E-05	1.00E+00	1.01E+00	1.08E-08
CE2-BUV-FO-TB6	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB3	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB8	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB7	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB5	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB4	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB1	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08

Table F-15. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE2-BUV-FO-TB2	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-RYL-CF-4LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-RYL-CF-3LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-RYL-CF-2LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-RYL-CF-1LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-MSW-FF-MT3	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-MSW-FF-MT2	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-MSW-FF-MT1	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-MSW-FF-MT4	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-CPA-CF-T2OF3TM	3.77E-04	3.04E-07	1.00E+00	1.00E+00	1.53E-09
CE2-CPA-FF-TC	7.60E-03	2.10E-07	1.00E+00	1.00E+00	5.24E-11
CE2-CPA-FF-TD	7.60E-03	2.10E-07	1.00E+00	1.00E+00	5.24E-11
CE2-CPA-FF-TB	7.60E-03	2.10E-07	1.00E+00	1.00E+00	5.24E-11
CE2-CPA-FF-TA	7.60E-03	1.02E-07	1.00E+00	1.00E+00	2.54E-11
CE2-CTP-CF-CT2OF3TM	3.73E-05	2.90E-08	1.00E+00	1.00E+00	1.48E-09
CE2-CTP-CF-HT2OF3TM	3.73E-05	2.90E-08	1.00E+00	1.00E+00	1.48E-09
CE2-CBI-FF-PD	5.00E-04	2.50E-08	1.00E+00	1.00E+00	9.48E-11
CE2-CBI-FF-PC	5.00E-04	2.50E-08	1.00E+00	1.00E+00	9.48E-11
CE2-CBI-FF-PB	5.00E-04	2.50E-08	1.00E+00	1.00E+00	9.48E-11
CE2-CTP-FF-CTB	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-CTC	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-HTB	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-CTD	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-HTD	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-HTC	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CBI-FF-TD	5.00E-04	8.43E-09	1.00E+00	1.00E+00	3.23E-11
CE2-CBI-FF-TC	5.00E-04	8.43E-09	1.00E+00	1.00E+00	3.23E-11
CE2-CBI-FF-TB	5.00E-04	8.43E-09	1.00E+00	1.00E+00	3.23E-11
CE2-CTP-FF-CTA	8.40E-04	7.38E-09	1.00E+00	1.00E+00	1.65E-11
CE2-CTP-FF-HTA	8.40E-04	7.38E-09	1.00E+00	1.00E+00	1.65E-11
CE2-CPR-FF-PC	1.10E-04	3.51E-09	1.00E+00	1.00E+00	6.03E-11
CE2-CPR-FF-PB	1.10E-04	3.51E-09	1.00E+00	1.00E+00	6.03E-11
CE2-CPR-FF-PD	1.10E-04	3.51E-09	1.00E+00	1.00E+00	6.03E-11
CE2-CBI-FF-TA	5.00E-04	3.16E-09	1.00E+00	1.00E+00	1.23E-11

Appendix F

Table F-16. Importance measures sorted on Birnbaum for case (CE Group 2, manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE2-BME-CF-TB2OF8	9.97E-07	5.26E-01	2.11E+00	5.28E+05	1.00E+00
CE2-ROD-CF-RODS	8.40E-07	4.43E-01	1.80E+00	5.28E+05	1.00E+00
CE2-RYT-CF-2OF4	4.78E-06	2.52E-02	1.03E+00	5.28E+03	1.00E-02
CE2-CBI-CF-6OF8	7.66E-07	3.98E-03	1.00E+00	5.19E+03	9.85E-03
CE2-RYL-CF-LM12OF24	4.29E-08	2.23E-04	1.00E+00	5.19E+03	9.85E-03
CE2-CBI-CF-4OF6TM	1.72E-06	1.45E-04	1.00E+00	8.54E+01	1.60E-04
CE2-RYL-CF-LM6OF12TM	1.58E-07	1.33E-05	1.00E+00	8.54E+01	1.60E-04
CE2-BSN-CF-TB2OF8	1.06E-05	3.32E-04	1.00E+00	3.23E+01	5.93E-05
CE2-PWR-CF-TB2OF4	2.51E-06	7.85E-05	1.00E+00	3.23E+01	5.93E-05
CE2-BME-FO-TB7	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB8	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB5	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB6	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB4	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB3	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB2	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BME-FO-TB1	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE2-BUV-CF-TB2OF8	5.43E-05	3.81E-04	1.00E+00	8.02E+00	1.33E-05
CE2-XHE-XE-SCRAM	1.00E-02	2.98E-02	1.03E+00	3.95E+00	5.65E-06
CE2-MSW-CF-2OF4	4.95E-06	1.48E-05	1.00E+00	3.98E+00	5.65E-06
CE2-CBI-CF-P3OF4	7.21E-06	7.33E-06	1.00E+00	2.02E+00	1.93E-06
CE2-CPR-CF-P3OF4	2.48E-06	2.52E-06	1.00E+00	2.02E+00	1.93E-06
CE2-RYT-FF-ICK4	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYT-FF-ICK3	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYT-FF-ICK1	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYT-FF-ICK2	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE2-RYL-CF-4LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-RYL-CF-2LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-RYL-CF-1LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-RYL-CF-3LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE2-CPR-CF-P2OF3TM	8.23E-06	5.03E-07	1.00E+00	1.06E+00	1.16E-07
CE2-CBI-CF-P2OF3TM	2.55E-07	1.35E-08	1.00E+00	1.05E+00	1.00E-07
CE2-CPA-CF-T3OF4	1.65E-04	8.30E-06	1.00E+00	1.05E+00	9.54E-08
CE2-CTP-CF-CT3OF4	1.02E-05	5.13E-07	1.00E+00	1.05E+00	9.54E-08
CE2-CTP-CF-HT3OF4	1.02E-05	5.13E-07	1.00E+00	1.05E+00	9.54E-08
CE2-CBI-CF-T3OF4	7.21E-06	3.63E-07	1.00E+00	1.05E+00	9.54E-08
CE2-PWR-FF-TB15	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-PWR-FF-TB26	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-PWR-FF-TB37	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-PWR-FF-TB48	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE2-BSN-FO-TB3	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB8	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB2	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB7	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB6	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB4	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB1	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-BSN-FO-TB5	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE2-RYL-CF-4LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-RYL-CF-3LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-RYL-CF-2LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-RYL-CF-1LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE2-BUV-FO-TB6	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB3	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB8	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB7	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08

Table F-16. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE2-BUV-FO-TB5	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB4	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB1	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-BUV-FO-TB2	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE2-RPS-TM-CHA	1.60E-02	9.07E-05	1.00E+00	1.01E+00	1.08E-08
CE2-MSW-FF-MT3	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-MSW-FF-MT2	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-MSW-FF-MT1	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-MSW-FF-MT4	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE2-CPA-CF-T2OF3TM	3.77E-04	3.04E-07	1.00E+00	1.00E+00	1.53E-09
CE2-CTP-CF-CT2OF3TM	3.73E-05	2.90E-08	1.00E+00	1.00E+00	1.48E-09
CE2-CTP-CF-HT2OF3TM	3.73E-05	2.90E-08	1.00E+00	1.00E+00	1.48E-09
CE2-CBI-FF-PD	5.00E-04	2.50E-08	1.00E+00	1.00E+00	9.48E-11
CE2-CBI-FF-PC	5.00E-04	2.50E-08	1.00E+00	1.00E+00	9.48E-11
CE2-CBI-FF-PB	5.00E-04	2.50E-08	1.00E+00	1.00E+00	9.48E-11
CE2-CPR-FF-PC	1.10E-04	3.51E-09	1.00E+00	1.00E+00	6.03E-11
CE2-CPR-FF-PB	1.10E-04	3.51E-09	1.00E+00	1.00E+00	6.03E-11
CE2-CPR-FF-PD	1.10E-04	3.51E-09	1.00E+00	1.00E+00	6.03E-11
CE2-CPA-FF-TC	7.60E-03	2.10E-07	1.00E+00	1.00E+00	5.24E-11
CE2-CPA-FF-TD	7.60E-03	2.10E-07	1.00E+00	1.00E+00	5.24E-11
CE2-CPA-FF-TB	7.60E-03	2.10E-07	1.00E+00	1.00E+00	5.24E-11
CE2-CTP-FF-CTB	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-CTC	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-HTB	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-CTD	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-HTD	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CTP-FF-HTC	8.40E-04	1.63E-08	1.00E+00	1.00E+00	3.65E-11
CE2-CBI-FF-TD	5.00E-04	8.43E-09	1.00E+00	1.00E+00	3.23E-11
CE2-CBI-FF-TC	5.00E-04	8.43E-09	1.00E+00	1.00E+00	3.23E-11
CE2-CBI-FF-TB	5.00E-04	8.43E-09	1.00E+00	1.00E+00	3.23E-11
CE2-CPA-FF-TA	7.60E-03	1.02E-07	1.00E+00	1.00E+00	2.54E-11
CE2-CTP-FF-CTA	8.40E-04	7.38E-09	1.00E+00	1.00E+00	1.65E-11
CE2-CTP-FF-HTA	8.40E-04	7.38E-09	1.00E+00	1.00E+00	1.65E-11
CE2-CBI-FF-TA	5.00E-04	3.16E-09	1.00E+00	1.00E+00	1.23E-11

Appendix F

Table F-17. RPS CE Group 3 top 50 cutsets (no manual scram).

Cut Set	Cut Set %	Cut Set Prob.	Basic Event *	Description	Prob.
1	63.8	4.80E-06	CE3-RYT-CF-2OF4	CCF 2 OF 4 (1-OUT-OF-2 TWICE) TRIP CONTACTORS	4.80E-06
2	13.3	1.00E-06	CE3-BME-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKERS	1.00E-06
3	11.2	8.40E-07	CE3-ROD-CF-RODS	CCF 20% OR MORE CRD/RODS FAIL TO INSERT	8.40E-07
4	10.1	7.50E-07	CE3-CBI-CF-6OF8	CCF SPECIFIC 6 OF 8 BISTABLE TRIP UNITS	7.70E-07
			/CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
5	0.6	4.20E-08	/CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE3-RYL-CF-LM12OF24	CCF SPECIFIC 12 OF 24 LOGIC MATRIX OUTPUT RELAYS	4.30E-08
6	0.4	2.80E-08	CE3-CBI-CF-4OF6TM	CCF SPECIFIC 4 OF 6 BISTABLE TRIP UNITS (CH A T&M)	1.70E-06
			CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
7	0.2	1.40E-08	CE3-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
			CE3-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
8	0.2	1.40E-08	CE3-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
			CE3-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
9	0	2.50E-09	CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE3-RYL-CF-LM6OF12TM	CCF SPECIFIC 6 OF 12 LOGIC MATRIX OUTPUT RELAYS (CH A T&M)	1.60E-07
10	0	2.20E-09	CE3-BME-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES	1.80E-05
			CE3-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
11	0	2.20E-09	CE3-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES	1.80E-05
			CE3-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
12	0	2.20E-09	CE3-BME-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES	1.80E-05
			CE3-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
13	0	2.20E-09	CE3-BME-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES	1.80E-05
			CE3-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
14	0	2.20E-09	CE3-BME-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 HARDWARE FAILURES	1.80E-05
			CE3-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
15	0	2.20E-09	CE3-BME-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 HARDWARE FAILURES	1.80E-05
			CE3-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
16	0	2.20E-09	CE3-BME-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 HARDWARE FAILURES	1.80E-05
			CE3-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
17	0	2.20E-09	CE3-BME-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 HARDWARE FAILURES	1.80E-05
			CE3-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
18	0	5.80E-10	CE3-BSN-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-05
			CE3-BUV-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER UNDERVOLTAGE DEVICE	5.40E-05
19	0	4.10E-10	CE3-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE3-CPD-CF-T3OF4	CCF 3 OF 4 CORE PROTECTION CALCULATORS	5.70E-05
			/CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
20	0	3.20E-10	CE3-BME-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES	1.80E-05
			CE3-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES	1.80E-05
21	0	3.20E-10	CE3-BME-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES	1.80E-05
			CE3-BME-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES	1.80E-05
22	0	3.20E-10	CE3-BME-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 HARDWARE FAILURES	1.80E-05
			CE3-BME-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 HARDWARE FAILURES	1.80E-05
23	0	3.20E-10	CE3-BME-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 HARDWARE FAILURES	1.80E-05
			CE3-BME-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 HARDWARE FAILURES	1.80E-05
24	0	1.40E-10	CE3-BUV-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER UNDERVOLTAGE DEVICE	5.40E-05
			CE3-PWR-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP POWER	2.50E-06
25	0	8.50E-11	CE3-CPD-CF-T3OF4	CCF 3 OF 4 CORE PROTECTION CALCULATORS	5.70E-05
			CE3-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
			/CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
26	0	7.20E-11	CE3-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE3-CTP-CF-CT3OF4	CCF 3 OF 4 COLD LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			/CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
27	0	7.20E-11	CE3-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE3-CTP-CF-HT3OF4	CCF 3 OF 4 HOT LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			/CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
28	0	5.10E-11	CE3-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE3-CBI-CF-T3OF4	CCF 3 OF 4 TEMPERATURE BISTABLES	7.20E-06
			/CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01

Table F-17. (Continued)

Cut Set	Cut Set %	Cut Set Prob.	Basic Event *	Description	Prob.
29	0	2.40E-11	/CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE3-RYL-CF-1LM6OF6	CCF 6 OF 6 K1 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			CE3-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
30	0	2.40E-11	/CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE3-RYL-CF-2LM6OF6	CCF 6 OF 6 K2 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			CE3-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
31	0	2.40E-11	/CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE3-RYL-CF-3LM6OF6	CCF 6 OF 6 K3 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			CE3-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
32	0	2.40E-11	/CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE3-RYL-CF-4LM6OF6	CCF 6 OF 6 K4 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			CE3-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
33	0	2.00E-11	CE3-BSN-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BUV-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
34	0	2.00E-11	CE3-BSN-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BUV-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
35	0	2.00E-11	CE3-BSN-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BUV-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
36	0	2.00E-11	CE3-BSN-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BUV-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
37	0	2.00E-11	CE3-BSN-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BUV-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
38	0	2.00E-11	CE3-BSN-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BUV-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
39	0	2.00E-11	CE3-BSN-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BUV-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
40	0	2.00E-11	CE3-BSN-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BUV-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
41	0	1.50E-11	CE3-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
			CE3-CTP-CF-CT3OF4	CCF 3 OF 4 COLD LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			/CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
42	0	1.50E-11	CE3-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
			CE3-CTP-CF-HT3OF4	CCF 3 OF 4 HOT LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			/CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
43	0	1.30E-11	CE3-BSN-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-05
			CE3-BUV-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-BUV-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS	1.10E-03
44	0	1.30E-11	CE3-BSN-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-05
			CE3-BUV-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-BUV-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS	1.10E-03
45	0	1.30E-11	CE3-BSN-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-05
			CE3-BUV-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-BUV-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 UNDERVOLTAGE DEVICE FAILS	1.10E-03
46	0	1.30E-11	CE3-BSN-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-05
			CE3-BUV-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-BUV-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 UNDERVOLTAGE DEVICE FAILS	1.10E-03
47	0	1.10E-11	CE3-CPD-CF-T2OF3TM	CCF 2 OF 3 CORE PROTECTION CALCULATORS (CH A T&M)	1.30E-04
			CE3-CPR-CF-P2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
48	0	1.10E-11	CE3-CBI-CF-T3OF4	CCF 3 OF 4 TEMPERATURE BISTABLES	7.20E-06
			CE3-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
			/CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
49	0	7.90E-12	CE3-BUV-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-PWR-FF-TB15	TCB-1-TCB-5 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05
			CE3-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04

Appendix F

Table F-17. (Continued)

Cut Set	Cut Set %	Cut Set Prob.	Basic Event *	Description	Prob.
50	0	7.90E-12	CE3-BUV-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-PWR-FF-TB26	TCB-2-TCB-6 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05
			CE3-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04

- a. A / as the first character in a basic event name indicates a complemented event (Success = 1 - Failure). For example, the basic event for channel A in test and maintenance (T&M) is CEx-RPS-TM-CHA (Failure = 1.60E-02). Thus, the basic event name for channel A not in T&M is /CEx-RPS-TM-CHA (Success = 9.84E-01). The event description for complemented events remains the same as the description used for the failure event

Table F-18. Importance measures sorted on Fussell-Vesely for case (CE Group 3, no manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE3-RYT-CF-2OF4	4.78E-06	6.38E-01	2.76E+00	1.34E+05	1.00E+00
CE3-BME-CF-TB2OF8	9.97E-07	1.33E-01	1.15E+00	1.34E+05	1.00E+00
CE3-ROD-CF-RODS	8.40E-07	1.12E-01	1.13E+00	1.34E+05	1.00E+00
CE3-CBI-CF-6OF8	7.66E-07	1.01E-01	1.11E+00	1.31E+05	9.84E-01
CE3-RYL-CF-LM12OF24	4.29E-08	5.63E-03	1.01E+00	1.31E+05	9.84E-01
CE3-CBI-CF-4OF6TM	1.72E-06	3.67E-03	1.00E+00	2.14E+03	1.60E-02
CE3-RYT-FF-ICK4	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE3-RYT-FF-ICK3	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE3-RYT-FF-ICK2	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE3-RYT-FF-ICK1	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE3-RPS-TM-CHA	1.60E-02	2.29E-03	1.00E+00	1.14E+00	1.07E-06
CE3-RYL-CF-LM6OF12TM	1.58E-07	3.37E-04	1.00E+00	2.14E+03	1.60E-02
CE3-BME-FO-TB8	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB2	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB4	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB3	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB1	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB7	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB6	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB5	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BUV-CF-TB2OF8	5.43E-05	9.77E-05	1.00E+00	2.80E+00	1.35E-05
CE3-BSN-CF-TB2OF8	1.06E-05	8.54E-05	1.00E+00	9.06E+00	6.04E-05
CE3-CBI-CF-P3OF4	7.21E-06	8.08E-05	1.00E+00	1.22E+01	8.40E-05
CE3-CPD-CF-T3OF4	5.73E-05	6.56E-05	1.00E+00	2.15E+00	8.58E-06
CE3-PWR-CF-TB2OF4	2.51E-06	2.02E-05	1.00E+00	9.06E+00	6.04E-05
CE3-CPR-CF-P3OF4	1.51E-06	1.69E-05	1.00E+00	1.22E+01	8.40E-05
CE3-CTP-CF-CT3OF4	1.02E-05	1.17E-05	1.00E+00	2.15E+00	8.58E-06
CE3-CTP-CF-HT3OF4	1.02E-05	1.17E-05	1.00E+00	2.15E+00	8.58E-06
CE3-CBI-CF-T3OF4	7.21E-06	8.26E-06	1.00E+00	2.15E+00	8.58E-06
CE3-BUV-FO-TB8	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB7	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB6	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB5	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB3	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB4	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB1	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB2	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-RYL-CF-1LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE3-RYL-CF-3LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE3-RYL-CF-4LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE3-RYL-CF-2LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE3-BSN-FO-TB4	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB1	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB2	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB3	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB5	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB6	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB7	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB8	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-CPR-CF-P2OF3TM	5.03E-06	3.02E-06	1.00E+00	1.60E+00	4.50E-06
CE3-PWR-FF-TB37	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE3-PWR-FF-TB26	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE3-PWR-FF-TB15	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE3-PWR-FF-TB48	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE3-CPD-CF-T2OF3TM	1.35E-04	1.85E-06	1.00E+00	1.01E+00	1.02E-07
CE3-CPD-FF-TD	2.70E-03	5.39E-07	1.00E+00	1.00E+00	1.50E-09

Appendix F

Table F-18. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE3-CPD-FF-TC	2.70E-03	5.39E-07	1.00E+00	1.00E+00	1.50E-09
CE3-CPD-FF-TB	2.70E-03	5.39E-07	1.00E+00	1.00E+00	1.50E-09
CE3-CTP-CF-CT2OF3TM	3.73E-05	5.10E-07	1.00E+00	1.01E+00	1.02E-07
CE3-CTP-CF-HT2OF3TM	3.73E-05	5.10E-07	1.00E+00	1.01E+00	1.02E-07
CE3-CBI-FF-PD	5.00E-04	3.08E-07	1.00E+00	1.00E+00	4.62E-09
CE3-CBI-FF-PB	5.00E-04	3.08E-07	1.00E+00	1.00E+00	4.62E-09
CE3-CBI-FF-PC	5.00E-04	3.08E-07	1.00E+00	1.00E+00	4.62E-09
CE3-CPD-FF-TA	2.70E-03	2.21E-07	1.00E+00	1.00E+00	6.13E-10
CE3-CTP-FF-HTC	8.40E-04	1.64E-07	1.00E+00	1.00E+00	1.47E-09
CE3-CTP-FF-CTC	8.40E-04	1.64E-07	1.00E+00	1.00E+00	1.47E-09
CE3-CTP-FF-CTB	8.40E-04	1.64E-07	1.00E+00	1.00E+00	1.47E-09
CE3-CTP-FF-CTD	8.40E-04	1.64E-07	1.00E+00	1.00E+00	1.47E-09
CE3-CTP-FF-HTB	8.40E-04	1.64E-07	1.00E+00	1.00E+00	1.47E-09
CE3-CTP-FF-HTD	8.40E-04	1.64E-07	1.00E+00	1.00E+00	1.47E-09
CE3-RYL-CF-4LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE3-RYL-CF-1LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE3-RYL-CF-3LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE3-RYL-CF-2LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE3-CBI-CF-P2OF3TM	2.55E-07	1.53E-07	1.00E+00	1.60E+00	4.50E-06
CE3-CBI-FF-TB	5.00E-04	9.71E-08	1.00E+00	1.00E+00	1.46E-09
CE3-CBI-FF-TC	5.00E-04	9.71E-08	1.00E+00	1.00E+00	1.46E-09
CE3-CBI-FF-TD	5.00E-04	9.71E-08	1.00E+00	1.00E+00	1.46E-09
CE3-CTP-FF-CTA	8.40E-04	6.63E-08	1.00E+00	1.00E+00	5.92E-10
CE3-CTP-FF-HTA	8.40E-04	6.63E-08	1.00E+00	1.00E+00	5.92E-10
CE3-CPR-FF-PB	1.10E-04	6.56E-08	1.00E+00	1.00E+00	4.46E-09
CE3-CPR-FF-PC	1.10E-04	6.56E-08	1.00E+00	1.00E+00	4.46E-09
CE3-CPR-FF-PD	1.10E-04	6.56E-08	1.00E+00	1.00E+00	4.46E-09
CE3-CBI-FF-TA	5.00E-04	3.90E-08	1.00E+00	1.00E+00	5.87E-10
CE3-CBI-FF-PA	5.00E-04	5.02E-09	1.00E+00	1.00E+00	7.60E-11
CE3-CBI-CF-T2OF3TM	2.55E-07	3.28E-09	1.00E+00	1.01E+00	9.66E-08
CE3-CPR-FF-PA	1.10E-04	6.22E-10	1.00E+00	1.00E+00	4.23E-11
CE3-RYL-FF-LCD2	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LCD4	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LCD3	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBC4	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LCD1	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBD4	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBD3	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBD2	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBD1	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBC3	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBC2	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBC1	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12

Table F-19. Importance measures sorted on Risk Increase for case (CE Group 3, no manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE3-RYT-CF-2OF4	4.78E-06	6.38E-01	2.76E+00	1.34E+05	1.00E+00
CE3-BME-CF-TB2OF8	9.97E-07	1.33E-01	1.15E+00	1.34E+05	1.00E+00
CE3-ROD-CF-RODS	8.40E-07	1.12E-01	1.13E+00	1.34E+05	1.00E+00
CE3-CBI-CF-6OF8	7.66E-07	1.01E-01	1.11E+00	1.31E+05	9.84E-01
CE3-RYL-CF-LM12OF24	4.29E-08	5.63E-03	1.01E+00	1.31E+05	9.84E-01
CE3-CBI-CF-4OF6TM	1.72E-06	3.67E-03	1.00E+00	2.14E+03	1.60E-02
CE3-RYL-CF-LM6OF12TM	1.58E-07	3.37E-04	1.00E+00	2.14E+03	1.60E-02
CE3-RYT-FF-ICK4	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE3-RYT-FF-ICK3	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE3-RYT-FF-ICK2	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE3-RYT-FF-ICK1	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE3-RYL-CF-1LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE3-RYL-CF-3LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE3-RYL-CF-4LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE3-RYL-CF-2LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE3-BME-FO-TB8	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB2	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB4	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB3	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB1	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB7	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB6	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB5	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-CBI-CF-P3OF4	7.21E-06	8.08E-05	1.00E+00	1.22E+01	8.40E-05
CE3-CPR-CF-P3OF4	1.51E-06	1.69E-05	1.00E+00	1.22E+01	8.40E-05
CE3-BSN-CF-TB2OF8	1.06E-05	8.54E-05	1.00E+00	9.06E+00	6.04E-05
CE3-PWR-CF-TB2OF4	2.51E-06	2.02E-05	1.00E+00	9.06E+00	6.04E-05
CE3-BUV-CF-TB2OF8	5.43E-05	9.77E-05	1.00E+00	2.80E+00	1.35E-05
CE3-CPD-CF-T3OF4	5.73E-05	6.56E-05	1.00E+00	2.15E+00	8.58E-06
CE3-CTP-CF-CT3OF4	1.02E-05	1.17E-05	1.00E+00	2.15E+00	8.58E-06
CE3-CTP-CF-HT3OF4	1.02E-05	1.17E-05	1.00E+00	2.15E+00	8.58E-06
CE3-CBI-CF-T3OF4	7.21E-06	8.26E-06	1.00E+00	2.15E+00	8.58E-06
CE3-CPR-CF-P2OF3TM	5.03E-06	3.02E-06	1.00E+00	1.60E+00	4.50E-06
CE3-CBI-CF-P2OF3TM	2.55E-07	1.53E-07	1.00E+00	1.60E+00	4.50E-06
CE3-RYL-CF-4LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE3-RYL-CF-1LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE3-RYL-CF-3LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE3-RYL-CF-2LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE3-RPS-TM-CHA	1.60E-02	2.29E-03	1.00E+00	1.14E+00	1.07E-06
CE3-PWR-FF-TB37	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE3-PWR-FF-TB26	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE3-PWR-FF-TB15	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE3-PWR-FF-TB48	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE3-BSN-FO-TB4	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB1	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB2	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB3	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB5	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB6	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB7	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB8	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BUV-FO-TB8	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB7	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB6	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB5	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB3	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB4	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08

Appendix F

Table F-19. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE3-BUV-FO-TB1	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB2	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-CPD-CF-T2OF3TM	1.35E-04	1.85E-06	1.00E+00	1.01E+00	1.02E-07
CE3-CTP-CF-CT2OF3TM	3.73E-05	5.10E-07	1.00E+00	1.01E+00	1.02E-07
CE3-CTP-CF-HT2OF3TM	3.73E-05	5.10E-07	1.00E+00	1.01E+00	1.02E-07
CE3-CBI-CF-T2OF3TM	2.55E-07	3.28E-09	1.00E+00	1.01E+00	9.66E-08
CE3-CPD-FF-TD	2.70E-03	5.39E-07	1.00E+00	1.00E+00	1.50E-09
CE3-CPD-FF-TC	2.70E-03	5.39E-07	1.00E+00	1.00E+00	1.50E-09
CE3-CPD-FF-TB	2.70E-03	5.39E-07	1.00E+00	1.00E+00	1.50E-09
CE3-CBI-FF-PD	5.00E-04	3.08E-07	1.00E+00	1.00E+00	4.62E-09
CE3-CBI-FF-PB	5.00E-04	3.08E-07	1.00E+00	1.00E+00	4.62E-09
CE3-CBI-FF-PC	5.00E-04	3.08E-07	1.00E+00	1.00E+00	4.62E-09
CE3-CPD-FF-TA	2.70E-03	2.21E-07	1.00E+00	1.00E+00	6.13E-10
CE3-CTP-FF-HTC	8.40E-04	1.64E-07	1.00E+00	1.00E+00	1.47E-09
CE3-CTP-FF-CTC	8.40E-04	1.64E-07	1.00E+00	1.00E+00	1.47E-09
CE3-CTP-FF-CTB	8.40E-04	1.64E-07	1.00E+00	1.00E+00	1.47E-09
CE3-CTP-FF-CTD	8.40E-04	1.64E-07	1.00E+00	1.00E+00	1.47E-09
CE3-CTP-FF-HTB	8.40E-04	1.64E-07	1.00E+00	1.00E+00	1.47E-09
CE3-CTP-FF-HTD	8.40E-04	1.64E-07	1.00E+00	1.00E+00	1.47E-09
CE3-CBI-FF-TB	5.00E-04	9.71E-08	1.00E+00	1.00E+00	1.46E-09
CE3-CBI-FF-TC	5.00E-04	9.71E-08	1.00E+00	1.00E+00	1.46E-09
CE3-CBI-FF-TD	5.00E-04	9.71E-08	1.00E+00	1.00E+00	1.46E-09
CE3-CTP-FF-CTA	8.40E-04	6.63E-08	1.00E+00	1.00E+00	5.92E-10
CE3-CTP-FF-HTA	8.40E-04	6.63E-08	1.00E+00	1.00E+00	5.92E-10
CE3-CPR-FF-PB	1.10E-04	6.56E-08	1.00E+00	1.00E+00	4.46E-09
CE3-CPR-FF-PC	1.10E-04	6.56E-08	1.00E+00	1.00E+00	4.46E-09
CE3-CPR-FF-PD	1.10E-04	6.56E-08	1.00E+00	1.00E+00	4.46E-09
CE3-CBI-FF-TA	5.00E-04	3.90E-08	1.00E+00	1.00E+00	5.87E-10
CE3-CBI-FF-PA	5.00E-04	5.02E-09	1.00E+00	1.00E+00	7.60E-11
CE3-CPR-FF-PA	1.10E-04	6.22E-10	1.00E+00	1.00E+00	4.23E-11
CE3-RYL-FF-LCD2	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LCD4	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LCD3	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBC4	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LCD1	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBD4	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBD3	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBD2	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBD1	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBC3	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBC2	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBC1	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12

Table F-20. Importance measures sorted on Birnbaum for case (CE Group 3, no manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE3-RYT-CF-2OF4	4.78E-06	6.38E-01	2.76E+00	1.34E+05	1.00E+00
CE3-BME-CF-TB2OF8	9.97E-07	1.33E-01	1.15E+00	1.34E+05	1.00E+00
CE3-ROD-CF-RODS	8.40E-07	1.12E-01	1.13E+00	1.34E+05	1.00E+00
CE3-CBI-CF-6OF8	7.66E-07	1.01E-01	1.11E+00	1.31E+05	9.84E-01
CE3-RYL-CF-LM12OF24	4.29E-08	5.63E-03	1.01E+00	1.31E+05	9.84E-01
CE3-CBI-CF-4OF6TM	1.72E-06	3.67E-03	1.00E+00	2.14E+03	1.60E-02
CE3-RYL-CF-LM6OF12TM	1.58E-07	3.37E-04	1.00E+00	2.14E+03	1.60E-02
CE3-RYT-FF-ICK4	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE3-RYT-FF-ICK3	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE3-RYT-FF-ICK2	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE3-RYT-FF-ICK1	1.20E-04	2.51E-03	1.00E+00	2.19E+01	1.57E-04
CE3-RYL-CF-1LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE3-RYL-CF-3LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE3-RYL-CF-4LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE3-RYL-CF-2LM6OF6	2.02E-07	4.16E-06	1.00E+00	2.16E+01	1.54E-04
CE3-BME-FO-TB8	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB2	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB4	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB3	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB1	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB7	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB6	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-BME-FO-TB5	1.80E-05	3.33E-04	1.00E+00	1.95E+01	1.39E-04
CE3-CBI-CF-P3OF4	7.21E-06	8.08E-05	1.00E+00	1.22E+01	8.40E-05
CE3-CPR-CF-P3OF4	1.51E-06	1.69E-05	1.00E+00	1.22E+01	8.40E-05
CE3-BSN-CF-TB2OF8	1.06E-05	8.54E-05	1.00E+00	9.06E+00	6.04E-05
CE3-PWR-CF-TB2OF4	2.51E-06	2.02E-05	1.00E+00	9.06E+00	6.04E-05
CE3-BUV-CF-TB2OF8	5.43E-05	9.77E-05	1.00E+00	2.80E+00	1.35E-05
CE3-CPD-CF-T3OF4	5.73E-05	6.56E-05	1.00E+00	2.15E+00	8.58E-06
CE3-CTP-CF-CT3OF4	1.02E-05	1.17E-05	1.00E+00	2.15E+00	8.58E-06
CE3-CTP-CF-HT3OF4	1.02E-05	1.17E-05	1.00E+00	2.15E+00	8.58E-06
CE3-CBI-CF-T3OF4	7.21E-06	8.26E-06	1.00E+00	2.15E+00	8.58E-06
CE3-CPR-CF-P2OF3TM	5.03E-06	3.02E-06	1.00E+00	1.60E+00	4.50E-06
CE3-CBI-CF-P2OF3TM	2.55E-07	1.53E-07	1.00E+00	1.60E+00	4.50E-06
CE3-RYL-CF-4LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE3-RYL-CF-1LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE3-RYL-CF-3LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE3-RYL-CF-2LM3OF3TM	4.66E-07	1.56E-07	1.00E+00	1.34E+00	2.51E-06
CE3-RPS-TM-CHA	1.60E-02	2.29E-03	1.00E+00	1.14E+00	1.07E-06
CE3-PWR-FF-TB37	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE3-PWR-FF-TB26	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE3-PWR-FF-TB15	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE3-PWR-FF-TB48	6.00E-05	2.66E-06	1.00E+00	1.04E+00	3.33E-07
CE3-BSN-FO-TB4	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB1	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB2	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB3	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB5	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB6	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB7	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-BSN-FO-TB8	1.50E-04	3.43E-06	1.00E+00	1.02E+00	1.71E-07
CE3-CPD-CF-T2OF3TM	1.35E-04	1.85E-06	1.00E+00	1.01E+00	1.02E-07
CE3-CTP-CF-CT2OF3TM	3.73E-05	5.10E-07	1.00E+00	1.01E+00	1.02E-07
CE3-CTP-CF-HT2OF3TM	3.73E-05	5.10E-07	1.00E+00	1.01E+00	1.02E-07
CE3-CBI-CF-T2OF3TM	2.55E-07	3.28E-09	1.00E+00	1.01E+00	9.66E-08
CE3-BUV-FO-TB8	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08

Appendix F

Table F-20. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE3-BUV-FO-TB7	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB6	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB5	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB3	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB4	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB1	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-BUV-FO-TB2	1.10E-03	6.65E-06	1.00E+00	1.01E+00	4.53E-08
CE3-CBI-FF-PD	5.00E-04	3.08E-07	1.00E+00	1.00E+00	4.62E-09
CE3-CBI-FF-PB	5.00E-04	3.08E-07	1.00E+00	1.00E+00	4.62E-09
CE3-CBI-FF-PC	5.00E-04	3.08E-07	1.00E+00	1.00E+00	4.62E-09
CE3-CPR-FF-PB	1.10E-04	6.56E-08	1.00E+00	1.00E+00	4.46E-09
CE3-CPR-FF-PC	1.10E-04	6.56E-08	1.00E+00	1.00E+00	4.46E-09
CE3-CPR-FF-PD	1.10E-04	6.56E-08	1.00E+00	1.00E+00	4.46E-09
CE3-CPD-FF-TD	2.70E-03	5.39E-07	1.00E+00	1.00E+00	1.50E-09
CE3-CPD-FF-TC	2.70E-03	5.39E-07	1.00E+00	1.00E+00	1.50E-09
CE3-CPD-FF-TB	2.70E-03	5.39E-07	1.00E+00	1.00E+00	1.50E-09
CE3-CTP-FF-HTC	8.40E-04	1.64E-07	1.00E+00	1.00E+00	1.47E-09
CE3-CTP-FF-CTC	8.40E-04	1.64E-07	1.00E+00	1.00E+00	1.47E-09
CE3-CTP-FF-CTB	8.40E-04	1.64E-07	1.00E+00	1.00E+00	1.47E-09
CE3-CTP-FF-CTD	8.40E-04	1.64E-07	1.00E+00	1.00E+00	1.47E-09
CE3-CTP-FF-HTB	8.40E-04	1.64E-07	1.00E+00	1.00E+00	1.47E-09
CE3-CTP-FF-HTD	8.40E-04	1.64E-07	1.00E+00	1.00E+00	1.47E-09
CE3-CBI-FF-TB	5.00E-04	9.71E-08	1.00E+00	1.00E+00	1.46E-09
CE3-CBI-FF-TC	5.00E-04	9.71E-08	1.00E+00	1.00E+00	1.46E-09
CE3-CBI-FF-TD	5.00E-04	9.71E-08	1.00E+00	1.00E+00	1.46E-09
CE3-CPD-FF-TA	2.70E-03	2.21E-07	1.00E+00	1.00E+00	6.13E-10
CE3-CTP-FF-CTA	8.40E-04	6.63E-08	1.00E+00	1.00E+00	5.92E-10
CE3-CTP-FF-HTA	8.40E-04	6.63E-08	1.00E+00	1.00E+00	5.92E-10
CE3-CBI-FF-TA	5.00E-04	3.90E-08	1.00E+00	1.00E+00	5.87E-10
CE3-CBI-FF-PA	5.00E-04	5.02E-09	1.00E+00	1.00E+00	7.60E-11
CE3-CPR-FF-PA	1.10E-04	6.22E-10	1.00E+00	1.00E+00	4.23E-11
CE3-RYL-FF-LCD2	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LCD4	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LCD3	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBC4	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LCD1	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBD4	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBD3	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBD2	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBD1	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBC3	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBC2	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12
CE3-RYL-FF-LBC1	2.60E-04	1.93E-10	1.00E+00	1.00E+00	5.62E-12

Table F-21. RPS CE Group 3 top 50 cutsets (manual scram).

Cut Set	Cut Set %	Cut Set Prob.	Basic Event *	Description	Prob.
1	52.6	1.00E-06	CE3-BME-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKERS	1.00E-06
2	44.3	8.40E-07	CE3-ROD-CF-RODS	CCF 20% OR MORE CRD/RODS FAIL TO INSERT	8.40E-07
3	2.5	4.80E-08	CE3-RYT-CF-2OF4	CCF 2 OF 4 (1-OUT-OF-2 TWICE) TRIP CONTACTORS	4.80E-06
			CE3-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
4	0.4	7.50E-09	CE3-CBI-CF-6OF8	CCF SPECIFIC 6 OF 8 BISTABLE TRIP UNITS	7.70E-07
			/CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE3-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
5	0	5.80E-10	CE3-BSN-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-05
			CE3-BUV-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER UNDERVOLTAGE DEVICE	5.40E-05
6	0	4.20E-10	/CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE3-RYL-CF-LM12OF24	CCF SPECIFIC 12 OF 24 LOGIC MATRIX OUTPUT RELAYS	4.30E-08
			CE3-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
7	0	3.20E-10	CE3-BME-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES	1.80E-05
			CE3-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES	1.80E-05
8	0	3.20E-10	CE3-BME-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES	1.80E-05
			CE3-BME-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES	1.80E-05
9	0	3.20E-10	CE3-BME-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 HARDWARE FAILURES	1.80E-05
			CE3-BME-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 HARDWARE FAILURES	1.80E-05
10	0	3.20E-10	CE3-BME-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 HARDWARE FAILURES	1.80E-05
			CE3-BME-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 HARDWARE FAILURES	1.80E-05
11	0	2.80E-10	CE3-CBI-CF-4OF6TM	CCF SPECIFIC 4 OF 6 BISTABLE TRIP UNITS (CH A T&M)	1.70E-06
			CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE3-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
12	0	1.40E-10	CE3-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
			CE3-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
			CE3-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
13	0	1.40E-10	CE3-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
			CE3-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
			CE3-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
14	0	1.40E-10	CE3-BUV-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER UNDERVOLTAGE DEVICE	5.40E-05
			CE3-PWR-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP POWER	2.50E-06
15	0	2.50E-11	CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE3-RYL-CF-LM6OF12TM	CCF SPECIFIC 6 OF 12 LOGIC MATRIX OUTPUT RELAYS (CH A T&M)	1.60E-07
			CE3-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
16	0	2.40E-11	CE3-MSW-CF-2OF4	CCF 2 OF 4 (1-OUT-OF-2 TWICE) MANUAL SWITCHES	4.90E-06
			CE3-RYT-CF-2OF4	CCF 2 OF 4 (1-OUT-OF-2 TWICE) TRIP CONTACTORS	4.80E-06
17	0	2.20E-11	CE3-BME-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES	1.80E-05
			CE3-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
			CE3-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
18	0	2.20E-11	CE3-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES	1.80E-05
			CE3-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
			CE3-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
19	0	2.20E-11	CE3-BME-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES	1.80E-05
			CE3-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
			CE3-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
20	0	2.20E-11	CE3-BME-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES	1.80E-05
			CE3-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
			CE3-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
21	0	2.20E-11	CE3-BME-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 HARDWARE FAILURES	1.80E-05
			CE3-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
			CE3-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
22	0	2.20E-11	CE3-BME-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 HARDWARE FAILURES	1.80E-05
			CE3-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
			CE3-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
23	0	2.20E-11	CE3-BME-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 HARDWARE FAILURES	1.80E-05
			CE3-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
			CE3-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
24	0	2.20E-11	CE3-BME-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 HARDWARE FAILURES	1.80E-05

Appendix F

Table F-21. (Continued)

Cut Set	Cut Set %	Cut Set Prob.	Basic Event *	Description	Prob.
25	0	1.30E-11	CE3-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
			CE3-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
			CE3-BSN-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-05
26	0	1.30E-11	CE3-BUV-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-BUV-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-BSN-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-05
27	0	1.30E-11	CE3-BUV-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-BUV-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-BSN-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-05
28	0	1.30E-11	CE3-BUV-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-BUV-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-BSN-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER SHUNT TRIP DEVICE	1.10E-05
29	0	4.10E-12	CE3-BUV-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-BUV-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
30	0	3.70E-12	CE3-CPD-CF-T3OF4	CCF 3 OF 4 CORE PROTECTION CALCULATORS	5.70E-05
			/CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE3-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
31	0	3.00E-12	CE3-CBI-CF-6OF8	CCF SPECIFIC 6 OF 8 BISTABLE TRIP UNITS	7.70E-07
			CE3-MSW-CF-2OF4	CCF 2 OF 4 (1-OUT-OF-2 TWICE) MANUAL SWITCHES	4.90E-06
			/CE3-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
32	0	3.00E-12	CE3-BUV-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-BUV-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-PWR-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP POWER	2.50E-06
33	0	3.00E-12	CE3-BUV-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-BUV-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-PWR-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP POWER	2.50E-06
34	0	3.00E-12	CE3-BUV-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-BUV-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-PWR-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP POWER	2.50E-06
35	0	3.00E-12	CE3-BUV-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-BUV-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-PWR-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP POWER	2.50E-06
36	0	3.00E-12	CE3-BME-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES	1.80E-05
			CE3-BSN-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS	1.10E-03
37	0	3.00E-12	CE3-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES	1.80E-05
			CE3-BSN-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BUV-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS	1.10E-03
38	0	3.00E-12	CE3-BME-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES	1.80E-05
			CE3-BSN-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BUV-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS	1.10E-03
39	0	3.00E-12	CE3-BME-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES	1.80E-05
			CE3-BSN-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BUV-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS	1.10E-03
40	0	3.00E-12	CE3-BME-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 HARDWARE FAILURES	1.80E-05
			CE3-BSN-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BUV-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 UNDERVOLTAGE DEVICE FAILS	1.10E-03
41	0	3.00E-12	CE3-BME-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 HARDWARE FAILURES	1.80E-05
			CE3-BSN-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BUV-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 UNDERVOLTAGE DEVICE FAILS	1.10E-03
42	0	3.00E-12	CE3-BME-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 HARDWARE FAILURES	1.80E-05
			CE3-BSN-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BUV-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 UNDERVOLTAGE DEVICE FAILS	1.10E-03
43	0	1.20E-12	CE3-BME-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 HARDWARE FAILURES	1.80E-05
			CE3-BSN-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BUV-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 UNDERVOLTAGE DEVICE FAILS	1.10E-03
44	0	1.20E-12	CE3-BSN-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BSN-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 SHUNT TRIP DEVICE FAILS	1.50E-04

Table F-21. (Continued)

Cut Set	Cut Set %	Cut Set Prob.	Basic Event ^a	Description	Prob.
			CE3-BUV-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER UNDERVOLTAGE DEVICE	5.40E-05
44	0	1.20E-12	CE3-BSN-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BSN-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BUV-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER UNDERVOLTAGE DEVICE	5.40E-05
45	0	1.20E-12	CE3-BSN-FO-TB5	TRIP CIRCUIT BREAKER TCB-5 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BSN-FO-TB6	TRIP CIRCUIT BREAKER TCB-6 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BUV-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER UNDERVOLTAGE DEVICE	5.40E-05
46	0	1.20E-12	CE3-BSN-FO-TB7	TRIP CIRCUIT BREAKER TCB-7 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BSN-FO-TB8	TRIP CIRCUIT BREAKER TCB-8 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE3-BUV-CF-TB2OF8	CCF SPECIFIC 2 OF 8 TRIP CIRCUIT BREAKER UNDERVOLTAGE DEVICE	5.40E-05
47	0	1.20E-12	CE3-BME-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES	1.80E-05
			CE3-BUV-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-PWR-FF-TB26	TCB-2-TCB-6 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05
48	0	1.20E-12	CE3-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES	1.80E-05
			CE3-BUV-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-PWR-FF-TB15	TCB-1-TCB-5 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05
49	0	1.20E-12	CE3-BME-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES	1.80E-05
			CE3-BUV-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-PWR-FF-TB48	TCB-4-TCB-8 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05
50	0	1.20E-12	CE3-BME-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES	1.80E-05
			CE3-BUV-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE3-PWR-FF-TB37	TCB-3-TCB-7 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05

- a. A / as the first character in a basic event name indicates a complemented event (Success = 1 - Failure). For example, the basic event for channel A in test and maintenance (T&M) is CEx-RPS-TM-CHA (Failure = 1.60E-02). Thus, the basic event name for channel A not in T&M is /CEx-RPS-TM-CHA (Success = 9.84E-01). The event description for complemented events remains the same as the description used for the failure event.

Appendix F

Table F-22. Importance measures sorted on Fussell-Vesely for case (CE Group 3, manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE3-BME-CF-TB2OF8	9.97E-07	5.26E-01	2.11E+00	5.28E+05	1.00E+00
CE3-ROD-CF-RODS	8.40E-07	4.43E-01	1.80E+00	5.28E+05	1.00E+00
CE3-XHE-XE-SCRAM	1.00E-02	2.98E-02	1.03E+00	3.95E+00	5.65E-06
CE3-RYT-CF-2OF4	4.78E-06	2.52E-02	1.03E+00	5.28E+03	1.00E-02
CE3-CBI-CF-6OF8	7.66E-07	3.98E-03	1.00E+00	5.19E+03	9.85E-03
CE3-BUV-CF-TB2OF8	5.43E-05	3.81E-04	1.00E+00	8.02E+00	1.33E-05
CE3-BSN-CF-TB2OF8	1.06E-05	3.32E-04	1.00E+00	3.23E+01	5.93E-05
CE3-RYL-CF-LM12OF24	4.29E-08	2.23E-04	1.00E+00	5.19E+03	9.85E-03
CE3-BME-FO-TB7	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB8	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB5	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB6	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB4	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB3	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB2	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB1	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-CBI-CF-4OF6TM	1.72E-06	1.45E-04	1.00E+00	8.54E+01	1.60E-04
CE3-RYT-FF-ICK4	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE3-RYT-FF-ICK1	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE3-RYT-FF-ICK2	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE3-RYT-FF-ICK3	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE3-RPS-TM-CHA	1.60E-02	9.04E-05	1.00E+00	1.01E+00	1.07E-08
CE3-PWR-CF-TB2OF4	2.51E-06	7.85E-05	1.00E+00	3.23E+01	5.93E-05
CE3-MSW-CF-2OF4	4.95E-06	1.48E-05	1.00E+00	3.98E+00	5.65E-06
CE3-RYL-CF-LM6OF12TM	1.58E-07	1.33E-05	1.00E+00	8.54E+01	1.60E-04
CE3-BUV-FO-TB7	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB3	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB8	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB6	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB5	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB4	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB1	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB2	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-CBI-CF-P3OF4	7.21E-06	3.18E-06	1.00E+00	1.44E+00	8.37E-07
CE3-BSN-FO-TB3	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB8	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB7	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB2	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB6	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB4	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB1	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB5	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-CPD-CF-T3OF4	5.73E-05	2.60E-06	1.00E+00	1.05E+00	8.58E-08
CE3-PWR-FF-TB26	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE3-PWR-FF-TB37	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE3-PWR-FF-TB48	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE3-PWR-FF-TB15	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE3-CPR-CF-P3OF4	1.51E-06	6.66E-07	1.00E+00	1.44E+00	8.36E-07
CE3-CTP-CF-CT3OF4	1.02E-05	4.62E-07	1.00E+00	1.05E+00	8.58E-08
CE3-CTP-CF-HT3OF4	1.02E-05	4.62E-07	1.00E+00	1.05E+00	8.58E-08
CE3-MSW-FF-MT4	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE3-MSW-FF-MT2	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE3-MSW-FF-MT1	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE3-MSW-FF-MT3	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE3-CBI-CF-T3OF4	7.21E-06	3.26E-07	1.00E+00	1.05E+00	8.58E-08
CE3-RYL-CF-1LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06

Table F-22. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE3-RYL-CF-2LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE3-RYL-CF-3LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE3-RYL-CF-4LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE3-CPR-CF-P2OF3TM	5.03E-06	1.13E-07	1.00E+00	1.02E+00	4.27E-08
CE3-CPD-CF-T2OF3TM	1.35E-04	7.27E-08	1.00E+00	1.00E+00	1.02E-09
CE3-CTP-CF-HT2OF3TM	3.73E-05	1.89E-08	1.00E+00	1.00E+00	9.66E-10
CE3-CTP-CF-CT2OF3TM	3.73E-05	1.89E-08	1.00E+00	1.00E+00	9.66E-10
CE3-CPD-FF-TC	2.70E-03	1.34E-08	1.00E+00	1.00E+00	9.41E-12
CE3-CPD-FF-TD	2.70E-03	1.34E-08	1.00E+00	1.00E+00	9.41E-12
CE3-CPD-FF-TB	2.70E-03	1.34E-08	1.00E+00	1.00E+00	9.41E-12
CE3-CBI-FF-PD	5.00E-04	1.01E-08	1.00E+00	1.00E+00	3.83E-11
CE3-CBI-FF-PC	5.00E-04	1.01E-08	1.00E+00	1.00E+00	3.83E-11
CE3-CBI-FF-PB	5.00E-04	1.01E-08	1.00E+00	1.00E+00	3.83E-11
CE3-RYL-CF-1LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE3-RYL-CF-4LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE3-RYL-CF-3LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE3-RYL-CF-2LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE3-CBI-CF-P2OF3TM	2.55E-07	4.57E-09	1.00E+00	1.02E+00	3.35E-08
CE3-CPD-FF-TA	2.70E-03	2.28E-09	1.00E+00	1.00E+00	1.55E-12
CE3-CTP-FF-CTC	8.40E-04	1.87E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CTP-FF-CTB	8.40E-04	1.87E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CTP-FF-CTD	8.40E-04	1.87E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CTP-FF-HTC	8.40E-04	1.87E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CTP-FF-HTD	8.40E-04	1.87E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CTP-FF-HTB	8.40E-04	1.87E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CPR-FF-PD	1.10E-04	1.29E-09	1.00E+00	1.00E+00	2.16E-11
CE3-CPR-FF-PC	1.10E-04	1.29E-09	1.00E+00	1.00E+00	2.16E-11
CE3-CPR-FF-PB	1.10E-04	1.29E-09	1.00E+00	1.00E+00	2.16E-11
CE3-CBI-FF-TD	5.00E-04	1.17E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CBI-FF-TC	5.00E-04	1.17E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CBI-FF-TB	5.00E-04	1.17E-09	1.00E+00	1.00E+00	4.35E-12

Appendix F

Table F-23. Importance measures sorted on Risk Increase for case (CE Group 3, manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE3-BME-CF-TB2OF8	9.97E-07	5.26E-01	2.11E+00	5.28E+05	1.00E+00
CE3-ROD-CF-RODS	8.40E-07	4.43E-01	1.80E+00	5.28E+05	1.00E+00
CE3-RYT-CF-2OF4	4.78E-06	2.52E-02	1.03E+00	5.28E+03	1.00E-02
CE3-CBI-CF-6OF8	7.66E-07	3.98E-03	1.00E+00	5.19E+03	9.85E-03
CE3-RYL-CF-LM12OF24	4.29E-08	2.23E-04	1.00E+00	5.19E+03	9.85E-03
CE3-CBI-CF-4OF6TM	1.72E-06	1.45E-04	1.00E+00	8.54E+01	1.60E-04
CE3-RYL-CF-LM6OF12TM	1.58E-07	1.33E-05	1.00E+00	8.54E+01	1.60E-04
CE3-BSN-CF-TB2OF8	1.06E-05	3.32E-04	1.00E+00	3.23E+01	5.93E-05
CE3-PWR-CF-TB2OF4	2.51E-06	7.85E-05	1.00E+00	3.23E+01	5.93E-05
CE3-BME-FO-TB7	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB8	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB5	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB6	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB4	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB3	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB2	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB1	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BUV-CF-TB2OF8	5.43E-05	3.81E-04	1.00E+00	8.02E+00	1.33E-05
CE3-MSW-CF-2OF4	4.95E-06	1.48E-05	1.00E+00	3.98E+00	5.65E-06
CE3-XHE-XE-SCRAM	1.00E-02	2.98E-02	1.03E+00	3.95E+00	5.65E-06
CE3-RYT-FF-ICK4	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE3-RYT-FF-ICK1	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE3-RYT-FF-ICK2	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE3-RYT-FF-ICK3	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE3-RYL-CF-1LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE3-RYL-CF-2LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE3-RYL-CF-3LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE3-RYL-CF-4LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE3-CBI-CF-P3OF4	7.21E-06	3.18E-06	1.00E+00	1.44E+00	8.37E-07
CE3-CPR-CF-P3OF4	1.51E-06	6.66E-07	1.00E+00	1.44E+00	8.36E-07
CE3-CPD-CF-T3OF4	5.73E-05	2.60E-06	1.00E+00	1.05E+00	8.58E-08
CE3-CTP-CF-CT3OF4	1.02E-05	4.62E-07	1.00E+00	1.05E+00	8.58E-08
CE3-CTP-CF-HT3OF4	1.02E-05	4.62E-07	1.00E+00	1.05E+00	8.58E-08
CE3-CBI-CF-T3OF4	7.21E-06	3.26E-07	1.00E+00	1.05E+00	8.58E-08
CE3-PWR-FF-TB26	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE3-PWR-FF-TB37	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE3-PWR-FF-TB48	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE3-PWR-FF-TB15	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE3-BSN-FO-TB3	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB8	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB7	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB2	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB6	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB4	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB1	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB5	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-CPR-CF-P2OF3TM	5.03E-06	1.13E-07	1.00E+00	1.02E+00	4.27E-08
CE3-CBI-CF-P2OF3TM	2.55E-07	4.57E-09	1.00E+00	1.02E+00	3.35E-08
CE3-RPS-TM-CHA	1.60E-02	9.04E-05	1.00E+00	1.01E+00	1.07E-08
CE3-BUV-FO-TB7	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB3	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB8	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB6	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB5	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB4	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB1	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08

Table F-23. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE3-BUV-FO-TB2	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-RYL-CF-1LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE3-RYL-CF-4LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE3-RYL-CF-3LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE3-RYL-CF-2LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE3-MSW-FF-MT4	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE3-MSW-FF-MT2	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE3-MSW-FF-MT1	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE3-MSW-FF-MT3	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE3-CPD-CF-T2OF3TM	1.35E-04	7.27E-08	1.00E+00	1.00E+00	1.02E-09
CE3-CTP-CF-HT2OF3TM	3.73E-05	1.89E-08	1.00E+00	1.00E+00	9.66E-10
CE3-CTP-CF-CT2OF3TM	3.73E-05	1.89E-08	1.00E+00	1.00E+00	9.66E-10
CE3-CPD-FF-TC	2.70E-03	1.34E-08	1.00E+00	1.00E+00	9.41E-12
CE3-CPD-FF-TD	2.70E-03	1.34E-08	1.00E+00	1.00E+00	9.41E-12
CE3-CPD-FF-TB	2.70E-03	1.34E-08	1.00E+00	1.00E+00	9.41E-12
CE3-CBI-FF-PD	5.00E-04	1.01E-08	1.00E+00	1.00E+00	3.83E-11
CE3-CBI-FF-PC	5.00E-04	1.01E-08	1.00E+00	1.00E+00	3.83E-11
CE3-CBI-FF-PB	5.00E-04	1.01E-08	1.00E+00	1.00E+00	3.83E-11
CE3-CPD-FF-TA	2.70E-03	2.28E-09	1.00E+00	1.00E+00	1.55E-12
CE3-CTP-FF-CTC	8.40E-04	1.87E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CTP-FF-CTB	8.40E-04	1.87E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CTP-FF-CTD	8.40E-04	1.87E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CTP-FF-HTC	8.40E-04	1.87E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CTP-FF-HTD	8.40E-04	1.87E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CTP-FF-HTB	8.40E-04	1.87E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CPR-FF-PD	1.10E-04	1.29E-09	1.00E+00	1.00E+00	2.16E-11
CE3-CPR-FF-PC	1.10E-04	1.29E-09	1.00E+00	1.00E+00	2.16E-11
CE3-CPR-FF-PB	1.10E-04	1.29E-09	1.00E+00	1.00E+00	2.16E-11
CE3-CBI-FF-TD	5.00E-04	1.17E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CBI-FF-TC	5.00E-04	1.17E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CBI-FF-TB	5.00E-04	1.17E-09	1.00E+00	1.00E+00	4.35E-12

Appendix F

Table F-24. Importance measures sorted on Birnbaum for case (CE Group 3, manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE3-BME-CF-TB2OF8	9.97E-07	5.26E-01	2.11E+00	5.28E+05	1.00E+00
CE3-ROD-CF-RODS	8.40E-07	4.43E-01	1.80E+00	5.28E+05	1.00E+00
CE3-RYT-CF-2OF4	4.78E-06	2.52E-02	1.03E+00	5.28E+03	1.00E-02
CE3-CBI-CF-6OF8	7.66E-07	3.98E-03	1.00E+00	5.19E+03	9.85E-03
CE3-RYL-CF-LM12OF24	4.29E-08	2.23E-04	1.00E+00	5.19E+03	9.85E-03
CE3-CBI-CF-4OF6TM	1.72E-06	1.45E-04	1.00E+00	8.54E+01	1.60E-04
CE3-RYL-CF-LM6OF12TM	1.58E-07	1.33E-05	1.00E+00	8.54E+01	1.60E-04
CE3-BSN-CF-TB2OF8	1.06E-05	3.32E-04	1.00E+00	3.23E+01	5.93E-05
CE3-PWR-CF-TB2OF4	2.51E-06	7.85E-05	1.00E+00	3.23E+01	5.93E-05
CE3-BME-FO-TB7	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB8	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB5	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB6	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB4	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB3	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB2	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BME-FO-TB1	1.80E-05	1.85E-04	1.00E+00	1.13E+01	1.95E-05
CE3-BUV-CF-TB2OF8	5.43E-05	3.81E-04	1.00E+00	8.02E+00	1.33E-05
CE3-XHE-XE-SCRAM	1.00E-02	2.98E-02	1.03E+00	3.95E+00	5.65E-06
CE3-MSW-CF-2OF4	4.95E-06	1.48E-05	1.00E+00	3.98E+00	5.65E-06
CE3-RYT-FF-ICK4	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE3-RYT-FF-ICK1	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE3-RYT-FF-ICK2	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE3-RYT-FF-ICK3	1.20E-04	9.96E-05	1.00E+00	1.83E+00	1.57E-06
CE3-RYL-CF-1LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE3-RYL-CF-2LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE3-RYL-CF-3LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE3-RYL-CF-4LM6OF6	2.02E-07	1.64E-07	1.00E+00	1.81E+00	1.54E-06
CE3-CBI-CF-P3OF4	7.21E-06	3.18E-06	1.00E+00	1.44E+00	8.37E-07
CE3-CPR-CF-P3OF4	1.51E-06	6.66E-07	1.00E+00	1.44E+00	8.36E-07
CE3-CPD-CF-T3OF4	5.73E-05	2.60E-06	1.00E+00	1.05E+00	8.58E-08
CE3-CTP-CF-CT3OF4	1.02E-05	4.62E-07	1.00E+00	1.05E+00	8.58E-08
CE3-CTP-CF-HT3OF4	1.02E-05	4.62E-07	1.00E+00	1.05E+00	8.58E-08
CE3-CBI-CF-T3OF4	7.21E-06	3.26E-07	1.00E+00	1.05E+00	8.58E-08
CE3-PWR-FF-TB26	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE3-PWR-FF-TB37	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE3-PWR-FF-TB48	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE3-PWR-FF-TB15	6.00E-05	2.04E-06	1.00E+00	1.03E+00	6.44E-08
CE3-CPR-CF-P2OF3TM	5.03E-06	1.13E-07	1.00E+00	1.02E+00	4.27E-08
CE3-BSN-FO-TB3	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB8	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB7	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB2	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB6	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB4	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB1	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-BSN-FO-TB5	1.50E-04	2.68E-06	1.00E+00	1.02E+00	3.38E-08
CE3-CBI-CF-P2OF3TM	2.55E-07	4.57E-09	1.00E+00	1.02E+00	3.35E-08
CE3-RYL-CF-1LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE3-RYL-CF-4LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE3-RYL-CF-3LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE3-RYL-CF-2LM3OF3TM	4.66E-07	6.15E-09	1.00E+00	1.01E+00	2.50E-08
CE3-BUV-FO-TB7	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB3	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB8	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB6	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08

Table F-24. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE3-BUV-FO-TB5	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB4	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB1	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-BUV-FO-TB2	1.10E-03	1.09E-05	1.00E+00	1.01E+00	1.88E-08
CE3-RPS-TM-CHA	1.60E-02	9.04E-05	1.00E+00	1.01E+00	1.07E-08
CE3-MSW-FF-MT4	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE3-MSW-FF-MT2	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE3-MSW-FF-MT1	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE3-MSW-FF-MT3	1.30E-04	3.61E-07	1.00E+00	1.00E+00	5.27E-09
CE3-CPD-CF-T2OF3TM	1.35E-04	7.27E-08	1.00E+00	1.00E+00	1.02E-09
CE3-CTP-CF-HT2OF3TM	3.73E-05	1.89E-08	1.00E+00	1.00E+00	9.66E-10
CE3-CTP-CF-CT2OF3TM	3.73E-05	1.89E-08	1.00E+00	1.00E+00	9.66E-10
CE3-CBI-FF-PD	5.00E-04	1.01E-08	1.00E+00	1.00E+00	3.83E-11
CE3-CBI-FF-PC	5.00E-04	1.01E-08	1.00E+00	1.00E+00	3.83E-11
CE3-CBI-FF-PB	5.00E-04	1.01E-08	1.00E+00	1.00E+00	3.83E-11
CE3-CPR-FF-PD	1.10E-04	1.29E-09	1.00E+00	1.00E+00	2.16E-11
CE3-CPR-FF-PC	1.10E-04	1.29E-09	1.00E+00	1.00E+00	2.16E-11
CE3-CPR-FF-PB	1.10E-04	1.29E-09	1.00E+00	1.00E+00	2.16E-11
CE3-CPD-FF-TC	2.70E-03	1.34E-08	1.00E+00	1.00E+00	9.41E-12
CE3-CPD-FF-TD	2.70E-03	1.34E-08	1.00E+00	1.00E+00	9.41E-12
CE3-CPD-FF-TB	2.70E-03	1.34E-08	1.00E+00	1.00E+00	9.41E-12
CE3-CTP-FF-CTC	8.40E-04	1.87E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CTP-FF-CTB	8.40E-04	1.87E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CTP-FF-CTD	8.40E-04	1.87E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CTP-FF-HTC	8.40E-04	1.87E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CTP-FF-HTD	8.40E-04	1.87E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CTP-FF-HTB	8.40E-04	1.87E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CBI-FF-TD	5.00E-04	1.17E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CBI-FF-TC	5.00E-04	1.17E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CBI-FF-TB	5.00E-04	1.17E-09	1.00E+00	1.00E+00	4.35E-12
CE3-CPD-FF-TA	2.70E-03	2.28E-09	1.00E+00	1.00E+00	1.55E-12

Appendix F

Table F-25. RPS CE Group 4 top 50 cutsets (no manual scram).

Cut Set	Cut Set %	Cut Set Prob.	Basic Event *	Description	Prob.
1	66.5	4.80E-06	CE4-RYT-CF-2OF4	CCF 2 OF 4 (1-OUT-OF-2 TWICE) TRIP CONTACTORS	4.80E-06
2	11.7	8.40E-07	CE4-ROD-CF-RODS	CCF OF 20% OR MORE CRD/RODS FAIL TO INSERT	8.40E-07
3	10.5	7.50E-07	CE4-CBI-CF-6OF8	CCF SPECIFIC 6 OF 8 BISTABLE TRIP UNITS	7.70E-07
			/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
4	9.8	7.10E-07	CE4-BME-CF-TB2OF4	CCF 2 OF 4 (1-OUT-OF-2 TWICE) TRIP CIRCUIT BREAKERS	7.10E-07
5	0.6	4.20E-08	/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE4-RYL-CF-LM12OF24	CCF SPECIFIC 12 OF 24 LOGIC MATRIX OUTPUT RELAYS	4.30E-08
6	0.4	2.80E-08	CE4-CBI-CF-4OF6TM	CCF SPECIFIC 4 OF 6 BISTABLE TRIP UNITS (CH A T&M)	1.70E-06
			CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
7	0.2	1.40E-08	CE4-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
			CE4-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
8	0.2	1.40E-08	CE4-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
			CE4-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
9	0	2.50E-09	CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE4-RYL-CF-LM6OF12TM	CCF SPECIFIC 6 OF 12 LOGIC MATRIX OUTPUT RELAYS (CH A T&M)	1.60E-07
10	0	2.20E-09	CE4-BME-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES	1.80E-05
			CE4-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
11	0	2.20E-09	CE4-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES	1.80E-05
			CE4-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
12	0	2.20E-09	CE4-BME-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES	1.80E-05
			CE4-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
13	0	2.20E-09	CE4-BME-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES	1.80E-05
			CE4-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
14	0	4.10E-10	CE4-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE4-CPD-CF-T3OF4	CCF 3 OF 4 CORE PROTECTION CALCULATORS	5.70E-05
			/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
15	0	3.20E-10	CE4-BME-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES	1.80E-05
			CE4-BME-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES	1.80E-05
16	0	3.20E-10	CE4-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES	1.80E-05
			CE4-BME-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES	1.80E-05
17	0	3.20E-10	CE4-BSN-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP DEVIC	8.70E-06
			CE4-BUV-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR UNDERVOLTAGE DEV	3.70E-05
18	0	9.20E-11	CE4-BUV-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR UNDERVOLTAGE DEV	3.70E-05
			CE4-PWR-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP POWER	2.50E-06
19	0	8.50E-11	CE4-CPD-CF-T3OF4	CCF 3 OF 4 CORE PROTECTION CALCULATORS	5.70E-05
			CE4-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
			/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
20	0	7.20E-11	CE4-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE4-CTP-CF-CT3OF4	CCF 3 OF 4 COLD LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
21	0	7.20E-11	CE4-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE4-CTP-CF-HT3OF4	CCF 3 OF 4 HOT LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
22	0	5.10E-11	CE4-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE4-CBI-CF-T3OF4	CCF 3 OF 4 TEMPERATURE BISTABLES	7.20E-06
			/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
23	0	2.40E-11	/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE4-RYL-CF-1LM6OF6	CCF 6 OF 6 K1 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			CE4-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
24	0	2.40E-11	/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE4-RYL-CF-2LM6OF6	CCF 6 OF 6 K2 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			CE4-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
25	0	2.40E-11	/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE4-RYL-CF-3LM6OF6	CCF 6 OF 6 K3 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			CE4-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
26	0	2.40E-11	/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE4-RYL-CF-4LM6OF6	CCF 6 OF 6 K4 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			CE4-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04

Table F-25. (Continued)

Cut Set	Cut Set %	Cut Set Prob.	Basic Event ^a	Description	Prob.
27	0	2.00E-11	CE4-BSN-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE4-BUV-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE4-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
28	0	2.00E-11	CE4-BSN-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE4-BUV-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE4-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
29	0	2.00E-11	CE4-BSN-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE4-BUV-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE4-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
30	0	2.00E-11	CE4-BSN-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE4-BUV-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE4-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
31	0	1.50E-11	CE4-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
			CE4-CTP-CF-CT3OF4	CCF 3 OF 4 COLD LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
32	0	1.50E-11	CE4-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
			CE4-CTP-CF-HT3OF4	CCF 3 OF 4 HOT LEG TEMPERATURE SENSORS/TRANSMITTERS	1.00E-05
			/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
33	0	1.10E-11	CE4-CPD-CF-T2OF3TM	CCF 2 OF 3 CORE PROTECTION CALCULATORS (CH A T&M)	1.30E-04
			CE4-CPR-CF-P2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
34	0	1.10E-11	CE4-CBI-CF-T3OF4	CCF 3 OF 4 TEMPERATURE BISTABLES	7.20E-06
			CE4-CPR-CF-P3OF4	CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS	1.50E-06
			/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
35	0	1.10E-11	CE4-BSN-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP DEVIC	8.70E-06
			CE4-BUV-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE4-BUV-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS	1.10E-03
36	0	1.10E-11	CE4-BSN-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP DEVIC	8.70E-06
			CE4-BUV-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE4-BUV-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS	1.10E-03
37	0	7.90E-12	CE4-BUV-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE4-PWR-FF-TB1	TRIP CIRCUIT BREAKER TCB-1 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05
			CE4-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
38	0	7.90E-12	CE4-BUV-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE4-PWR-FF-TB2	TRIP CIRCUIT BREAKER TCB-2 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05
			CE4-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
39	0	7.90E-12	CE4-BUV-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE4-PWR-FF-TB3	TRIP CIRCUIT BREAKER TCB-3 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05
			CE4-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
40	0	7.90E-12	CE4-BUV-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE4-PWR-FF-TB4	TRIP CIRCUIT BREAKER TCB-4 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05
			CE4-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
41	0	3.60E-12	CE4-BME-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES	1.80E-05
			/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE4-RYL-CF-3LM6OF6	CCF 6 OF 6 K3 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
42	0	3.60E-12	CE4-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES	1.80E-05
			/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE4-RYL-CF-4LM6OF6	CCF 6 OF 6 K4 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
43	0	3.60E-12	CE4-BME-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES	1.80E-05
			/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE4-RYL-CF-1LM6OF6	CCF 6 OF 6 K1 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
44	0	3.60E-12	CE4-BME-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES	1.80E-05
			/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE4-RYL-CF-2LM6OF6	CCF 6 OF 6 K2 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
45	0	3.00E-12	CE4-BUV-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE4-BUV-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE4-PWR-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP POWER	2.50E-06
46	0	3.00E-12	CE4-BUV-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE4-BUV-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE4-PWR-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP	2.50E-06

Appendix F

Table F-25. (Continued)

Cut Set	Cut Set %	Cut Set Prob.	Basic Event ^a	Description	Prob.
47	0	3.00E-12	CE4-CPR-CF-P2OF3TM	POWER	
			CE4-CTP-CF-CT2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE4-RPS-TM-CHA	CCF 2 OF 3 COLD LEG TEMPERATURE SENSORS/TRANSMITTERS	3.70E-05
48	0	3.00E-12	CE4-CPR-CF-P2OF3TM	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE4-CTP-CF-HT2OF3TM	CCF 2 OF 3 PRESSURE SENSORS/TRANSMITTERS (CH A T&M)	5.00E-06
			CE4-RPS-TM-CHA	CCF 2 OF 3 HOT LEG TEMPERATURE SENSORS/TRANSMITTERS	3.70E-05
49	0	3.00E-12	CE4-BME-FO-TB1	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE4-BSN-FO-TB3	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES	1.80E-05
			CE4-BUV-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 SHUNT TRIP DEVICE FAILS	1.50E-04
50	0	3.00E-12	CE4-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE4-BSN-FO-TB4	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES	1.80E-05
			CE4-BUV-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 SHUNT TRIP DEVICE FAILS	1.50E-04
				TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS	1.10E-03

- a. A / as the first character in a basic event name indicates a complemented event (Success = 1 - Failure). For example, the basic event for channel A in test and maintenance (T&M) is CEx-RPS-TM-CHA (Failure = 1.60E-02). Thus, the basic event name for channel A not in T&M is /CEx-RPS-TM-CHA (Success = 9.84E-01). The event description for complemented events remains the same as the description used for the failure event.

Table F-26. Importance measures sorted on Fussell-Vesely for case (CE Group 4, no manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE4-RYT-CF-2OF4	4.78E-06	6.65E-01	2.98E+00	1.39E+05	1.00E+00
CE4-ROD-CF-RODS	8.40E-07	1.17E-01	1.13E+00	1.39E+05	1.00E+00
CE4-CBI-CF-6OF8	7.66E-07	1.05E-01	1.12E+00	1.37E+05	9.84E-01
CE4-BME-CF-TB2OF4	7.07E-07	9.83E-02	1.11E+00	1.39E+05	1.00E+00
CE4-RYL-CF-LM12OF24	4.29E-08	5.87E-03	1.01E+00	1.37E+05	9.84E-01
CE4-CBI-CF-4OF6TM	1.72E-06	3.83E-03	1.00E+00	2.23E+03	1.60E-02
CE4-RPS-TM-CHA	1.60E-02	2.38E-03	1.00E+00	1.15E+00	1.07E-06
CE4-RYT-FF-ICK1	1.20E-04	2.31E-03	1.00E+00	2.03E+01	1.39E-04
CE4-RYT-FF-ICK2	1.20E-04	2.31E-03	1.00E+00	2.03E+01	1.39E-04
CE4-RYT-FF-ICK3	1.20E-04	2.31E-03	1.00E+00	2.03E+01	1.39E-04
CE4-RYT-FF-ICK4	1.20E-04	2.31E-03	1.00E+00	2.03E+01	1.39E-04
CE4-RYL-CF-LM6OF12TM	1.58E-07	3.52E-04	1.00E+00	2.23E+03	1.60E-02
CE4-BME-FO-TB2	1.80E-05	3.47E-04	1.00E+00	2.03E+01	1.39E-04
CE4-BME-FO-TB3	1.80E-05	3.47E-04	1.00E+00	2.03E+01	1.39E-04
CE4-BME-FO-TB1	1.80E-05	3.47E-04	1.00E+00	2.03E+01	1.39E-04
CE4-BME-FO-TB4	1.80E-05	3.47E-04	1.00E+00	2.03E+01	1.39E-04
CE4-CBI-CF-P3OF4	7.21E-06	8.42E-05	1.00E+00	1.27E+01	8.40E-05
CE4-CPD-CF-T3OF4	5.73E-05	6.84E-05	1.00E+00	2.19E+00	8.58E-06
CE4-BUV-CF-TB2OF4	3.65E-05	5.81E-05	1.00E+00	2.59E+00	1.14E-05
CE4-BSN-CF-TB2OF4	8.73E-06	4.80E-05	1.00E+00	6.50E+00	3.95E-05
CE4-CPR-CF-P3OF4	1.51E-06	1.76E-05	1.00E+00	1.27E+01	8.40E-05
CE4-PWR-CF-TB2OF4	2.51E-06	1.38E-05	1.00E+00	6.50E+00	3.95E-05
CE4-CTP-CF-CT3OF4	1.02E-05	1.22E-05	1.00E+00	2.19E+00	8.58E-06
CE4-CTP-CF-HT3OF4	1.02E-05	1.22E-05	1.00E+00	2.19E+00	8.58E-06
CE4-CBI-CF-T3OF4	7.21E-06	8.60E-06	1.00E+00	2.19E+00	8.58E-06
CE4-BUV-FO-TB3	1.10E-03	6.57E-06	1.00E+00	1.01E+00	4.30E-08
CE4-BUV-FO-TB4	1.10E-03	6.57E-06	1.00E+00	1.01E+00	4.30E-08
CE4-BUV-FO-TB2	1.10E-03	6.57E-06	1.00E+00	1.01E+00	4.30E-08
CE4-BUV-FO-TB1	1.10E-03	6.57E-06	1.00E+00	1.01E+00	4.30E-08
CE4-RYL-CF-3LM6OF6	2.02E-07	3.83E-06	1.00E+00	1.99E+01	1.36E-04
CE4-RYL-CF-2LM6OF6	2.02E-07	3.83E-06	1.00E+00	1.99E+01	1.36E-04
CE4-RYL-CF-4LM6OF6	2.02E-07	3.83E-06	1.00E+00	1.99E+01	1.36E-04
CE4-RYL-CF-1LM6OF6	2.02E-07	3.83E-06	1.00E+00	1.99E+01	1.36E-04
CE4-BSN-FO-TB4	1.50E-04	3.44E-06	1.00E+00	1.02E+00	1.65E-07
CE4-BSN-FO-TB3	1.50E-04	3.44E-06	1.00E+00	1.02E+00	1.65E-07
CE4-BSN-FO-TB2	1.50E-04	3.44E-06	1.00E+00	1.02E+00	1.65E-07
CE4-BSN-FO-TB1	1.50E-04	3.44E-06	1.00E+00	1.02E+00	1.65E-07
CE4-CPR-CF-P2OF3TM	5.03E-06	3.15E-06	1.00E+00	1.63E+00	4.50E-06
CE4-CPD-CF-T2OF3TM	1.35E-04	1.92E-06	1.00E+00	1.01E+00	1.02E-07
CE4-PWR-FF-TB1	6.00E-05	1.38E-06	1.00E+00	1.02E+00	1.65E-07
CE4-PWR-FF-TB2	6.00E-05	1.38E-06	1.00E+00	1.02E+00	1.65E-07
CE4-PWR-FF-TB4	6.00E-05	1.38E-06	1.00E+00	1.02E+00	1.65E-07
CE4-PWR-FF-TB3	6.00E-05	1.38E-06	1.00E+00	1.02E+00	1.65E-07
CE4-CPD-FF-TB	2.70E-03	5.62E-07	1.00E+00	1.00E+00	1.50E-09
CE4-CPD-FF-TC	2.70E-03	5.62E-07	1.00E+00	1.00E+00	1.50E-09
CE4-CPD-FF-TD	2.70E-03	5.62E-07	1.00E+00	1.00E+00	1.50E-09
CE4-CTP-CF-CT2OF3TM	3.73E-05	5.31E-07	1.00E+00	1.01E+00	1.02E-07
CE4-CTP-CF-HT2OF3TM	3.73E-05	5.31E-07	1.00E+00	1.01E+00	1.02E-07
CE4-CBI-FF-PB	5.00E-04	3.21E-07	1.00E+00	1.00E+00	4.62E-09
CE4-CBI-FF-PC	5.00E-04	3.21E-07	1.00E+00	1.00E+00	4.62E-09
CE4-CBI-FF-PD	5.00E-04	3.21E-07	1.00E+00	1.00E+00	4.62E-09
CE4-CPD-FF-TA	2.70E-03	2.30E-07	1.00E+00	1.00E+00	6.13E-10
CE4-CTP-FF-HTD	8.40E-04	1.71E-07	1.00E+00	1.00E+00	1.47E-09
CE4-CTP-FF-HTC	8.40E-04	1.71E-07	1.00E+00	1.00E+00	1.47E-09
CE4-CTP-FF-HTB	8.40E-04	1.71E-07	1.00E+00	1.00E+00	1.47E-09
CE4-CTP-FF-CTD	8.40E-04	1.71E-07	1.00E+00	1.00E+00	1.47E-09

Appendix F

Table F-26. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE4-CTP-FF-CTC	8.40E-04	1.71E-07	1.00E+00	1.00E+00	1.47E-09
CE4-CTP-FF-CTB	8.40E-04	1.71E-07	1.00E+00	1.00E+00	1.47E-09
CE4-CBI-CF-P2OF3TM	2.55E-07	1.60E-07	1.00E+00	1.63E+00	4.50E-06
CE4-RYL-CF-1LM3OF3TM	4.66E-07	1.44E-07	1.00E+00	1.31E+00	2.22E-06
CE4-RYL-CF-2LM3OF3TM	4.66E-07	1.44E-07	1.00E+00	1.31E+00	2.22E-06
CE4-RYL-CF-3LM3OF3TM	4.66E-07	1.44E-07	1.00E+00	1.31E+00	2.22E-06
CE4-RYL-CF-4LM3OF3TM	4.66E-07	1.44E-07	1.00E+00	1.31E+00	2.22E-06
CE4-CBI-FF-TD	5.00E-04	1.01E-07	1.00E+00	1.00E+00	1.46E-09
CE4-CBI-FF-TB	5.00E-04	1.01E-07	1.00E+00	1.00E+00	1.46E-09
CE4-CBI-FF-TC	5.00E-04	1.01E-07	1.00E+00	1.00E+00	1.46E-09
CE4-CTP-FF-CTA	8.40E-04	6.91E-08	1.00E+00	1.00E+00	5.92E-10
CE4-CTP-FF-HTA	8.40E-04	6.91E-08	1.00E+00	1.00E+00	5.92E-10
CE4-CPR-FF-PD	1.10E-04	6.83E-08	1.00E+00	1.00E+00	4.46E-09
CE4-CPR-FF-PC	1.10E-04	6.83E-08	1.00E+00	1.00E+00	4.46E-09
CE4-CPR-FF-PB	1.10E-04	6.83E-08	1.00E+00	1.00E+00	4.46E-09
CE4-CBI-FF-TA	5.00E-04	4.07E-08	1.00E+00	1.00E+00	5.87E-10
CE4-CBI-FF-PA	5.00E-04	5.23E-09	1.00E+00	1.00E+00	7.60E-11
CE4-CBI-CF-T2OF3TM	2.55E-07	3.41E-09	1.00E+00	1.01E+00	9.66E-08
CE4-CPR-FF-PA	1.10E-04	6.48E-10	1.00E+00	1.00E+00	4.23E-11
CE4-RYL-FF-LCD3	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LCD1	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LCD4	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBC1	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LCD2	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBC3	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBD4	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBD3	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBD2	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBD1	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBC4	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBC2	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12

Table F-27. Importance measures sorted on Risk Increase for case (CE Group 4, no manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE4-RYT-CF-2OF4	4.78E-06	6.65E-01	2.98E+00	1.39E+05	1.00E+00
CE4-ROD-CF-RODS	8.40E-07	1.17E-01	1.13E+00	1.39E+05	1.00E+00
CE4-BME-CF-TB2OF4	7.07E-07	9.83E-02	1.11E+00	1.39E+05	1.00E+00
CE4-CBI-CF-6OF8	7.66E-07	1.05E-01	1.12E+00	1.37E+05	9.84E-01
CE4-RYL-CF-LM12OF24	4.29E-08	5.87E-03	1.01E+00	1.37E+05	9.84E-01
CE4-CBI-CF-4OF6TM	1.72E-06	3.83E-03	1.00E+00	2.23E+03	1.60E-02
CE4-RYL-CF-LM6OF12TM	1.58E-07	3.52E-04	1.00E+00	2.23E+03	1.60E-02
CE4-RYT-FF-ICK1	1.20E-04	2.31E-03	1.00E+00	2.03E+01	1.39E-04
CE4-RYT-FF-ICK2	1.20E-04	2.31E-03	1.00E+00	2.03E+01	1.39E-04
CE4-RYT-FF-ICK3	1.20E-04	2.31E-03	1.00E+00	2.03E+01	1.39E-04
CE4-RYT-FF-ICK4	1.20E-04	2.31E-03	1.00E+00	2.03E+01	1.39E-04
CE4-BME-FO-TB2	1.80E-05	3.47E-04	1.00E+00	2.03E+01	1.39E-04
CE4-BME-FO-TB3	1.80E-05	3.47E-04	1.00E+00	2.03E+01	1.39E-04
CE4-BME-FO-TB1	1.80E-05	3.47E-04	1.00E+00	2.03E+01	1.39E-04
CE4-BME-FO-TB4	1.80E-05	3.47E-04	1.00E+00	2.03E+01	1.39E-04
CE4-RYL-CF-3LM6OF6	2.02E-07	3.83E-06	1.00E+00	1.99E+01	1.36E-04
CE4-RYL-CF-2LM6OF6	2.02E-07	3.83E-06	1.00E+00	1.99E+01	1.36E-04
CE4-RYL-CF-4LM6OF6	2.02E-07	3.83E-06	1.00E+00	1.99E+01	1.36E-04
CE4-RYL-CF-1LM6OF6	2.02E-07	3.83E-06	1.00E+00	1.99E+01	1.36E-04
CE4-CBI-CF-P3OF4	7.21E-06	8.42E-05	1.00E+00	1.27E+01	8.40E-05
CE4-CPR-CF-P3OF4	1.51E-06	1.76E-05	1.00E+00	1.27E+01	8.40E-05
CE4-BSN-CF-TB2OF4	8.73E-06	4.80E-05	1.00E+00	6.50E+00	3.95E-05
CE4-PWR-CF-TB2OF4	2.51E-06	1.38E-05	1.00E+00	6.50E+00	3.95E-05
CE4-BUV-CF-TB2OF4	3.65E-05	5.81E-05	1.00E+00	2.59E+00	1.14E-05
CE4-CPD-CF-T3OF4	5.73E-05	6.84E-05	1.00E+00	2.19E+00	8.58E-06
CE4-CTP-CF-CT3OF4	1.02E-05	1.22E-05	1.00E+00	2.19E+00	8.58E-06
CE4-CTP-CF-HT3OF4	1.02E-05	1.22E-05	1.00E+00	2.19E+00	8.58E-06
CE4-CBI-CF-T3OF4	7.21E-06	8.60E-06	1.00E+00	2.19E+00	8.58E-06
CE4-CPR-CF-P2OF3TM	5.03E-06	3.15E-06	1.00E+00	1.63E+00	4.50E-06
CE4-CBI-CF-P2OF3TM	2.55E-07	1.60E-07	1.00E+00	1.63E+00	4.50E-06
CE4-RYL-CF-1LM3OF3TM	4.66E-07	1.44E-07	1.00E+00	1.31E+00	2.22E-06
CE4-RYL-CF-2LM3OF3TM	4.66E-07	1.44E-07	1.00E+00	1.31E+00	2.22E-06
CE4-RYL-CF-3LM3OF3TM	4.66E-07	1.44E-07	1.00E+00	1.31E+00	2.22E-06
CE4-RYL-CF-4LM3OF3TM	4.66E-07	1.44E-07	1.00E+00	1.31E+00	2.22E-06
CE4-RPS-TM-CHA	1.60E-02	2.38E-03	1.00E+00	1.15E+00	1.07E-06
CE4-BSN-FO-TB4	1.50E-04	3.44E-06	1.00E+00	1.02E+00	1.65E-07
CE4-BSN-FO-TB3	1.50E-04	3.44E-06	1.00E+00	1.02E+00	1.65E-07
CE4-BSN-FO-TB2	1.50E-04	3.44E-06	1.00E+00	1.02E+00	1.65E-07
CE4-BSN-FO-TB1	1.50E-04	3.44E-06	1.00E+00	1.02E+00	1.65E-07
CE4-PWR-FF-TB1	6.00E-05	1.38E-06	1.00E+00	1.02E+00	1.65E-07
CE4-PWR-FF-TB2	6.00E-05	1.38E-06	1.00E+00	1.02E+00	1.65E-07
CE4-PWR-FF-TB4	6.00E-05	1.38E-06	1.00E+00	1.02E+00	1.65E-07
CE4-PWR-FF-TB3	6.00E-05	1.38E-06	1.00E+00	1.02E+00	1.65E-07
CE4-BUV-FO-TB3	1.10E-03	6.57E-06	1.00E+00	1.01E+00	4.30E-08
CE4-BUV-FO-TB4	1.10E-03	6.57E-06	1.00E+00	1.01E+00	4.30E-08
CE4-BUV-FO-TB2	1.10E-03	6.57E-06	1.00E+00	1.01E+00	4.30E-08
CE4-BUV-FO-TB1	1.10E-03	6.57E-06	1.00E+00	1.01E+00	4.30E-08
CE4-CPD-CF-T2OF3TM	1.35E-04	1.92E-06	1.00E+00	1.01E+00	1.02E-07
CE4-CTP-CF-CT2OF3TM	3.73E-05	5.31E-07	1.00E+00	1.01E+00	1.02E-07
CE4-CTP-CF-HT2OF3TM	3.73E-05	5.31E-07	1.00E+00	1.01E+00	1.02E-07
CE4-CBI-CF-T2OF3TM	2.55E-07	3.41E-09	1.00E+00	1.01E+00	9.66E-08
CE4-CPD-FF-TB	2.70E-03	5.62E-07	1.00E+00	1.00E+00	1.50E-09
CE4-CPD-FF-TC	2.70E-03	5.62E-07	1.00E+00	1.00E+00	1.50E-09
CE4-CPD-FF-TD	2.70E-03	5.62E-07	1.00E+00	1.00E+00	1.50E-09
CE4-CBI-FF-PB	5.00E-04	3.21E-07	1.00E+00	1.00E+00	4.62E-09
CE4-CBI-FF-PC	5.00E-04	3.21E-07	1.00E+00	1.00E+00	4.62E-09

Appendix F

Table F-27. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE4-CBI-FF-PD	5.00E-04	3.21E-07	1.00E+00	1.00E+00	4.62E-09
CE4-CPD-FF-TA	2.70E-03	2.30E-07	1.00E+00	1.00E+00	6.13E-10
CE4-CTP-FF-HTD	8.40E-04	1.71E-07	1.00E+00	1.00E+00	1.47E-09
CE4-CTP-FF-HTC	8.40E-04	1.71E-07	1.00E+00	1.00E+00	1.47E-09
CE4-CTP-FF-HTB	8.40E-04	1.71E-07	1.00E+00	1.00E+00	1.47E-09
CE4-CTP-FF-CTD	8.40E-04	1.71E-07	1.00E+00	1.00E+00	1.47E-09
CE4-CTP-FF-CTC	8.40E-04	1.71E-07	1.00E+00	1.00E+00	1.47E-09
CE4-CTP-FF-CTB	8.40E-04	1.71E-07	1.00E+00	1.00E+00	1.47E-09
CE4-CBI-FF-TD	5.00E-04	1.01E-07	1.00E+00	1.00E+00	1.46E-09
CE4-CBI-FF-TB	5.00E-04	1.01E-07	1.00E+00	1.00E+00	1.46E-09
CE4-CBI-FF-TC	5.00E-04	1.01E-07	1.00E+00	1.00E+00	1.46E-09
CE4-CTP-FF-CTA	8.40E-04	6.91E-08	1.00E+00	1.00E+00	5.92E-10
CE4-CTP-FF-HTA	8.40E-04	6.91E-08	1.00E+00	1.00E+00	5.92E-10
CE4-CPR-FF-PD	1.10E-04	6.83E-08	1.00E+00	1.00E+00	4.46E-09
CE4-CPR-FF-PC	1.10E-04	6.83E-08	1.00E+00	1.00E+00	4.46E-09
CE4-CPR-FF-PB	1.10E-04	6.83E-08	1.00E+00	1.00E+00	4.46E-09
CE4-CBI-FF-TA	5.00E-04	4.07E-08	1.00E+00	1.00E+00	5.87E-10
CE4-CBI-FF-PA	5.00E-04	5.23E-09	1.00E+00	1.00E+00	7.60E-11
CE4-CPR-FF-PA	1.10E-04	6.48E-10	1.00E+00	1.00E+00	4.23E-11
CE4-RYL-FF-LCD3	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LCD1	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LCD4	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBC1	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LCD2	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBC3	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBD4	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBD3	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBD2	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBD1	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBC4	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBC2	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12

Table F-28. Importance measures sorted on Birnbaum for case (CE Group 4, no manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE4-RYT-CF-2OF4	4.78E-06	6.65E-01	2.98E+00	1.39E+05	1.00E+00
CE4-ROD-CF-RODS	8.40E-07	1.17E-01	1.13E+00	1.39E+05	1.00E+00
CE4-BME-CF-TB2OF4	7.07E-07	9.83E-02	1.11E+00	1.39E+05	1.00E+00
CE4-CBI-CF-6OF8	7.66E-07	1.05E-01	1.12E+00	1.37E+05	9.84E-01
CE4-RYL-CF-1LM12OF24	4.29E-08	5.87E-03	1.01E+00	1.37E+05	9.84E-01
CE4-CBI-CF-4OF6TM	1.72E-06	3.83E-03	1.00E+00	2.23E+03	1.60E-02
CE4-RYL-CF-1LM6OF12TM	1.58E-07	3.52E-04	1.00E+00	2.23E+03	1.60E-02
CE4-RYT-FF-ICK1	1.20E-04	2.31E-03	1.00E+00	2.03E+01	1.39E-04
CE4-RYT-FF-ICK2	1.20E-04	2.31E-03	1.00E+00	2.03E+01	1.39E-04
CE4-RYT-FF-ICK3	1.20E-04	2.31E-03	1.00E+00	2.03E+01	1.39E-04
CE4-RYT-FF-ICK4	1.20E-04	2.31E-03	1.00E+00	2.03E+01	1.39E-04
CE4-BME-FO-TB2	1.80E-05	3.47E-04	1.00E+00	2.03E+01	1.39E-04
CE4-BME-FO-TB3	1.80E-05	3.47E-04	1.00E+00	2.03E+01	1.39E-04
CE4-BME-FO-TB1	1.80E-05	3.47E-04	1.00E+00	2.03E+01	1.39E-04
CE4-BME-FO-TB4	1.80E-05	3.47E-04	1.00E+00	2.03E+01	1.39E-04
CE4-RYL-CF-3LM6OF6	2.02E-07	3.83E-06	1.00E+00	1.99E+01	1.36E-04
CE4-RYL-CF-2LM6OF6	2.02E-07	3.83E-06	1.00E+00	1.99E+01	1.36E-04
CE4-RYL-CF-4LM6OF6	2.02E-07	3.83E-06	1.00E+00	1.99E+01	1.36E-04
CE4-RYL-CF-1LM6OF6	2.02E-07	3.83E-06	1.00E+00	1.99E+01	1.36E-04
CE4-CBI-CF-P3OF4	7.21E-06	8.42E-05	1.00E+00	1.27E+01	8.40E-05
CE4-CPR-CF-P3OF4	1.51E-06	1.76E-05	1.00E+00	1.27E+01	8.40E-05
CE4-BSN-CF-TB2OF4	8.73E-06	4.80E-05	1.00E+00	6.50E+00	3.95E-05
CE4-PWR-CF-TB2OF4	2.51E-06	1.38E-05	1.00E+00	6.50E+00	3.95E-05
CE4-BUV-CF-TB2OF4	3.65E-05	5.81E-05	1.00E+00	2.59E+00	1.14E-05
CE4-CPD-CF-T3OF4	5.73E-05	6.84E-05	1.00E+00	2.19E+00	8.58E-06
CE4-CTP-CF-CT3OF4	1.02E-05	1.22E-05	1.00E+00	2.19E+00	8.58E-06
CE4-CTP-CF-HT3OF4	1.02E-05	1.22E-05	1.00E+00	2.19E+00	8.58E-06
CE4-CBI-CF-T3OF4	7.21E-06	8.60E-06	1.00E+00	2.19E+00	8.58E-06
CE4-CPR-CF-P2OF3TM	5.03E-06	3.15E-06	1.00E+00	1.63E+00	4.50E-06
CE4-CBI-CF-P2OF3TM	2.55E-07	1.60E-07	1.00E+00	1.63E+00	4.50E-06
CE4-RYL-CF-1LM3OF3TM	4.66E-07	1.44E-07	1.00E+00	1.31E+00	2.22E-06
CE4-RYL-CF-2LM3OF3TM	4.66E-07	1.44E-07	1.00E+00	1.31E+00	2.22E-06
CE4-RYL-CF-3LM3OF3TM	4.66E-07	1.44E-07	1.00E+00	1.31E+00	2.22E-06
CE4-RYL-CF-4LM3OF3TM	4.66E-07	1.44E-07	1.00E+00	1.31E+00	2.22E-06
CE4-RPS-TM-CHA	1.60E-02	2.38E-03	1.00E+00	1.15E+00	1.07E-06
CE4-BSN-FO-TB4	1.50E-04	3.44E-06	1.00E+00	1.02E+00	1.65E-07
CE4-BSN-FO-TB3	1.50E-04	3.44E-06	1.00E+00	1.02E+00	1.65E-07
CE4-BSN-FO-TB2	1.50E-04	3.44E-06	1.00E+00	1.02E+00	1.65E-07
CE4-BSN-FO-TB1	1.50E-04	3.44E-06	1.00E+00	1.02E+00	1.65E-07
CE4-PWR-FF-TB1	6.00E-05	1.38E-06	1.00E+00	1.02E+00	1.65E-07
CE4-PWR-FF-TB2	6.00E-05	1.38E-06	1.00E+00	1.02E+00	1.65E-07
CE4-PWR-FF-TB4	6.00E-05	1.38E-06	1.00E+00	1.02E+00	1.65E-07
CE4-PWR-FF-TB3	6.00E-05	1.38E-06	1.00E+00	1.02E+00	1.65E-07
CE4-CPD-CF-T2OF3TM	1.35E-04	1.92E-06	1.00E+00	1.01E+00	1.02E-07
CE4-CTP-CF-CT2OF3TM	3.73E-05	5.31E-07	1.00E+00	1.01E+00	1.02E-07
CE4-CTP-CF-HT2OF3TM	3.73E-05	5.31E-07	1.00E+00	1.01E+00	1.02E-07
CE4-CBI-CF-T2OF3TM	2.55E-07	3.41E-09	1.00E+00	1.01E+00	9.66E-08
CE4-BUV-FO-TB3	1.10E-03	6.57E-06	1.00E+00	1.01E+00	4.30E-08
CE4-BUV-FO-TB4	1.10E-03	6.57E-06	1.00E+00	1.01E+00	4.30E-08
CE4-BUV-FO-TB2	1.10E-03	6.57E-06	1.00E+00	1.01E+00	4.30E-08
CE4-BUV-FO-TB1	1.10E-03	6.57E-06	1.00E+00	1.01E+00	4.30E-08
CE4-CBI-FF-PB	5.00E-04	3.21E-07	1.00E+00	1.00E+00	4.62E-09
CE4-CBI-FF-PC	5.00E-04	3.21E-07	1.00E+00	1.00E+00	4.62E-09
CE4-CBI-FF-PD	5.00E-04	3.21E-07	1.00E+00	1.00E+00	4.62E-09
CE4-CPR-FF-PD	1.10E-04	6.83E-08	1.00E+00	1.00E+00	4.46E-09
CE4-CPR-FF-PC	1.10E-04	6.83E-08	1.00E+00	1.00E+00	4.46E-09

Appendix F

Table F-28. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE4-CPR-FF-PB	1.10E-04	6.83E-08	1.00E+00	1.00E+00	4.46E-09
CE4-CPD-FF-TB	2.70E-03	5.62E-07	1.00E+00	1.00E+00	1.50E-09
CE4-CPD-FF-TC	2.70E-03	5.62E-07	1.00E+00	1.00E+00	1.50E-09
CE4-CPD-FF-TD	2.70E-03	5.62E-07	1.00E+00	1.00E+00	1.50E-09
CE4-CTP-FF-HTD	8.40E-04	1.71E-07	1.00E+00	1.00E+00	1.47E-09
CE4-CTP-FF-HTC	8.40E-04	1.71E-07	1.00E+00	1.00E+00	1.47E-09
CE4-CTP-FF-HTB	8.40E-04	1.71E-07	1.00E+00	1.00E+00	1.47E-09
CE4-CTP-FF-CTD	8.40E-04	1.71E-07	1.00E+00	1.00E+00	1.47E-09
CE4-CTP-FF-CTC	8.40E-04	1.71E-07	1.00E+00	1.00E+00	1.47E-09
CE4-CTP-FF-CTB	8.40E-04	1.71E-07	1.00E+00	1.00E+00	1.47E-09
CE4-CBI-FF-TD	5.00E-04	1.01E-07	1.00E+00	1.00E+00	1.46E-09
CE4-CBI-FF-TB	5.00E-04	1.01E-07	1.00E+00	1.00E+00	1.46E-09
CE4-CBI-FF-TC	5.00E-04	1.01E-07	1.00E+00	1.00E+00	1.46E-09
CE4-CPD-FF-TA	2.70E-03	2.30E-07	1.00E+00	1.00E+00	6.13E-10
CE4-CTP-FF-CTA	8.40E-04	6.91E-08	1.00E+00	1.00E+00	5.92E-10
CE4-CTP-FF-HTA	8.40E-04	6.91E-08	1.00E+00	1.00E+00	5.92E-10
CE4-CBI-FF-TA	5.00E-04	4.07E-08	1.00E+00	1.00E+00	5.87E-10
CE4-CBI-FF-PA	5.00E-04	5.23E-09	1.00E+00	1.00E+00	7.60E-11
CE4-CPR-FF-PA	1.10E-04	6.48E-10	1.00E+00	1.00E+00	4.23E-11
CE4-RYL-FF-LCD3	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LCD1	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LCD4	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBC1	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LCD2	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBC3	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBD4	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBD3	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBD2	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBD1	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBC4	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12
CE4-RYL-FF-LBC2	2.60E-04	2.01E-10	1.00E+00	1.00E+00	5.62E-12

Table F-29. RPS CE Group 4 top 50 cutsets (manual scram).

Cut Set	Cut Set %	Cut Set Prob.	Basic Event *	Description	Prob.
1	52.3	8.40E-07	CE4-ROD-CF-RODS	CCF OF 20% OR MORE CRD/RODS FAIL TO INSERT	8.40E-07
2	44.1	7.10E-07	CE4-BME-CF-TB2OF4	CCF 2 OF 4 (1-OUT-OF-2 TWICE) TRIP CIRCUIT BREAKERS	7.10E-07
3	3	4.80E-08	CE4-RYT-CF-2OF4	CCF 2 OF 4 (1-OUT-OF-2 TWICE) TRIP CONTACTORS	4.80E-06
			CE4-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
4	0.5	7.50E-09	CE4-CBI-CF-6OF8	CCF SPECIFIC 6 OF 8 BISTABLE TRIP UNITS	7.70E-07
			/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE4-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
5	0	4.20E-10	/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE4-RYL-CF-LM12OF24	CCF SPECIFIC 12 OF 24 LOGIC MATRIX OUTPUT RELAYS	4.30E-08
			CE4-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
6	0	3.20E-10	CE4-BME-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES	1.80E-05
			CE4-BME-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES	1.80E-05
7	0	3.20E-10	CE4-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES	1.80E-05
			CE4-BME-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES	1.80E-05
8	0	3.20E-10	CE4-BSN-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP DEVIC	8.70E-06
			CE4-BUV-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR UNDERVOLTAGE DEV	3.70E-05
9	0	2.80E-10	CE4-CBI-CF-4OF6TM	CCF SPECIFIC 4 OF 6 BISTABLE TRIP UNITS (CH A T&M)	1.70E-06
			CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE4-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
10	0	1.40E-10	CE4-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
			CE4-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
			CE4-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
11	0	1.40E-10	CE4-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
			CE4-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
			CE4-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
12	0	9.20E-11	CE4-BUV-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR UNDERVOLTAGE DEV	3.70E-05
			CE4-PWR-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP POWER	2.50E-06
13	0	2.50E-11	CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	1.60E-02
			CE4-RYL-CF-LM6OF12TM	CCF SPECIFIC 6 OF 12 LOGIC MATRIX OUTPUT RELAYS (CH A T&M)	1.60E-07
			CE4-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
14	0	2.40E-11	CE4-MSW-CF-2OF4	CCF 2 OF 4 (1-OUT-OF-2 TWICE) MANUAL SWITCHES	4.90E-06
			CE4-RYT-CF-2OF4	CCF 2 OF 4 (1-OUT-OF-2 TWICE) TRIP CONTACTORS	4.80E-06
15	0	2.20E-11	CE4-BME-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES	1.80E-05
			CE4-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
			CE4-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
16	0	2.20E-11	CE4-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES	1.80E-05
			CE4-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
			CE4-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
17	0	2.20E-11	CE4-BME-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES	1.80E-05
			CE4-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
			CE4-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
18	0	2.20E-11	CE4-BME-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES	1.80E-05
			CE4-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
			CE4-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
19	0	1.10E-11	CE4-BSN-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP DEVIC	8.70E-06
			CE4-BUV-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE4-BUV-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS	1.10E-03
20	0	1.10E-11	CE4-BSN-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP DEVIC	8.70E-06
			CE4-BUV-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS	1.10E-03
			CE4-BUV-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS	1.10E-03
21	0	4.10E-12	CE4-CBI-CF-P3OF4	CCF 3 OF 4 PRESSURE BISTABLES	7.20E-06
			CE4-CPD-CF-T3OF4	CCF 3 OF 4 CORE PROTECTION CALCULATORS	5.70E-05
			/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE4-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
22	0	3.70E-12	CE4-CBI-CF-6OF8	CCF SPECIFIC 6 OF 8 BISTABLE TRIP UNITS	7.70E-07
			CE4-MSW-CF-2OF4	CCF 2 OF 4 (1-OUT-OF-2 TWICE) MANUAL SWITCHES	4.90E-06

Appendix F

Table F-29. (Continued)

Cut Set	Cut Set %	Cut Set Prob.	Basic Event *	Description	Prob.
23	0	3.00E-12	/CE4-RPS-TM-CHA CE4-BUV-FO-TB1 CE4-BUV-FO-TB3 CE4-PWR-CF-TB2OF4	RPS CHANNEL A IN TEST AND MAINTENANCE TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP POWER	9.80E-01 1.10E-03 1.10E-03 2.50E-06
24	0	3.00E-12	CE4-BUV-FO-TB2 CE4-BUV-FO-TB4 CE4-PWR-CF-TB2OF4	TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR SHUNT TRIP POWER	1.10E-03 1.10E-03 2.50E-06
25	0	3.00E-12	CE4-BME-FO-TB1 CE4-BSN-FO-TB3 CE4-BUV-FO-TB3	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES TRIP CIRCUIT BREAKER TCB-3 SHUNT TRIP DEVICE FAILS TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS	1.80E-05 1.50E-04 1.10E-03
26	0	3.00E-12	CE4-BME-FO-TB2 CE4-BSN-FO-TB4 CE4-BUV-FO-TB4	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES TRIP CIRCUIT BREAKER TCB-4 SHUNT TRIP DEVICE FAILS TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS	1.80E-05 1.50E-04 1.10E-03
27	0	3.00E-12	CE4-BME-FO-TB3 CE4-BSN-FO-TB1 CE4-BUV-FO-TB1	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES TRIP CIRCUIT BREAKER TCB-1 SHUNT TRIP DEVICE FAILS TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS	1.80E-05 1.50E-04 1.10E-03
28	0	3.00E-12	CE4-BME-FO-TB4 CE4-BSN-FO-TB2 CE4-BUV-FO-TB2	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES TRIP CIRCUIT BREAKER TCB-2 SHUNT TRIP DEVICE FAILS TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS	1.80E-05 1.50E-04 1.10E-03
29	0	1.20E-12	CE4-BME-FO-TB1 CE4-BUV-FO-TB3 CE4-PWR-FF-TB3	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES TRIP CIRCUIT BREAKER TCB-3 UNDERVOLTAGE DEVICE FAILS TRIP CIRCUIT BREAKER TCB-3 SHUNT TRIP DEVICE DC POWER FAILS	1.80E-05 1.10E-03 6.00E-05
30	0	1.20E-12	CE4-BME-FO-TB2 CE4-BUV-FO-TB4 CE4-PWR-FF-TB4	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES TRIP CIRCUIT BREAKER TCB-4 UNDERVOLTAGE DEVICE FAILS TRIP CIRCUIT BREAKER TCB-4 SHUNT TRIP DEVICE DC POWER FAILS	1.80E-05 1.10E-03 6.00E-05
31	0	1.20E-12	CE4-BME-FO-TB3 CE4-BUV-FO-TB1 CE4-PWR-FF-TB1	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES TRIP CIRCUIT BREAKER TCB-1 UNDERVOLTAGE DEVICE FAILS TRIP CIRCUIT BREAKER TCB-1 SHUNT TRIP DEVICE DC POWER FAILS	1.80E-05 1.10E-03 6.00E-05
32	0	1.20E-12	CE4-BME-FO-TB4 CE4-BUV-FO-TB2 CE4-PWR-FF-TB2	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES TRIP CIRCUIT BREAKER TCB-2 UNDERVOLTAGE DEVICE FAILS TRIP CIRCUIT BREAKER TCB-2 SHUNT TRIP DEVICE DC POWER FAILS	1.80E-05 1.10E-03 6.00E-05
33	0	8.50E-13	CE4-CPD-CF-T3OF4 CE4-CPR-CF-P3OF4 /CE4-RPS-TM-CHA CE4-XHE-XE-SCRAM	CCF 3 OF 4 CORE PROTECTION CALCULATORS CCF 3 OF 4 PRESSURE SENSORS/TRANSMITTERS RPS CHANNEL A IN TEST AND MAINTENANCE OPERATOR FAILS TO INITIATE MANUAL SCRAM	5.70E-05 1.50E-06 9.80E-01 1.00E-02
34	0	8.20E-13	CE4-BSN-FO-TB1 CE4-BSN-FO-TB3 CE4-BUV-CF-TB2OF4	TRIP CIRCUIT BREAKER TCB-1 SHUNT TRIP DEVICE FAILS TRIP CIRCUIT BREAKER TCB-3 SHUNT TRIP DEVICE FAILS CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR UNDERVOLTAGE DEV	1.50E-04 1.50E-04 3.70E-05
35	0	8.20E-13	CE4-BSN-FO-TB2 CE4-BSN-FO-TB4 CE4-BUV-CF-TB2OF4	TRIP CIRCUIT BREAKER TCB-2 SHUNT TRIP DEVICE FAILS TRIP CIRCUIT BREAKER TCB-4 SHUNT TRIP DEVICE FAILS CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR UNDERVOLTAGE DEV	1.50E-04 1.50E-04 3.70E-05
36	0	7.20E-13	CE4-CBI-CF-P3OF4 CE4-CTP-CF-CT3OF4 /CE4-RPS-TM-CHA CE4-XHE-XE-SCRAM	CCF 3 OF 4 PRESSURE BISTABLES CCF 3 OF 4 COLD LEG TEMPERATURE SENSORS/TRANSMITTERS RPS CHANNEL A IN TEST AND MAINTENANCE OPERATOR FAILS TO INITIATE MANUAL SCRAM	7.20E-06 1.00E-05 9.80E-01 1.00E-02
37	0	7.20E-13	CE4-CBI-CF-P3OF4 CE4-CTP-CF-HT3OF4 /CE4-RPS-TM-CHA CE4-XHE-XE-SCRAM	CCF 3 OF 4 PRESSURE BISTABLES CCF 3 OF 4 HOT LEG TEMPERATURE SENSORS/TRANSMITTERS RPS CHANNEL A IN TEST AND MAINTENANCE OPERATOR FAILS TO INITIATE MANUAL SCRAM	7.20E-06 1.00E-05 9.80E-01 1.00E-02
38	0	5.10E-13	CE4-CBI-CF-P3OF4 CE4-CBI-CF-T3OF4 /CE4-RPS-TM-CHA CE4-XHE-XE-SCRAM	CCF 3 OF 4 PRESSURE BISTABLES CCF 3 OF 4 TEMPERATURE BISTABLES RPS CHANNEL A IN TEST AND MAINTENANCE OPERATOR FAILS TO INITIATE MANUAL SCRAM	7.20E-06 7.20E-06 9.80E-01 1.00E-02
39	0	3.30E-13	CE4-BSN-FO-TB1 CE4-BUV-CF-TB2OF4 CE4-PWR-FF-TB3	TRIP CIRCUIT BREAKER TCB-1 SHUNT TRIP DEVICE FAILS CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR UNDERVOLTAGE DEV TRIP CIRCUIT BREAKER TCB-3 SHUNT TRIP DEVICE DC POWER FAILS	1.50E-04 3.70E-05 6.00E-05
40	0	3.30E-13	CE4-BSN-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 SHUNT TRIP DEVICE FAILS	1.50E-04

Table F-29. (Continued)

Cut Set	Cut Set %	Cut Set Prob.	Basic Event ^a	Description	Prob.
			CE4-BUV-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR UNDERVOLTAGE DEV	3.70E-05
			CE4-PWR-FF-TB4	TRIP CIRCUIT BREAKER TCB-4 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05
41	0	3.30E-13	CE4-BSN-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE4-BUV-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR UNDERVOLTAGE DEV	3.70E-05
			CE4-PWR-FF-TB1	TRIP CIRCUIT BREAKER TCB-1 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05
42	0	3.30E-13	CE4-BSN-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 SHUNT TRIP DEVICE FAILS	1.50E-04
			CE4-BUV-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR UNDERVOLTAGE DEV	3.70E-05
			CE4-PWR-FF-TB2	TRIP CIRCUIT BREAKER TCB-2 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05
43	0	2.80E-13	CE4-BME-FO-TB1	TRIP CIRCUIT BREAKER TCB-1 HARDWARE FAILURES	1.80E-05
			CE4-MSW-FF-MT3	MANUAL SWITCH 3 FAILS	1.30E-04
			CE4-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
44	0	2.80E-13	CE4-BME-FO-TB2	TRIP CIRCUIT BREAKER TCB-2 HARDWARE FAILURES	1.80E-05
			CE4-MSW-FF-MT4	MANUAL SWITCH 4 FAILS	1.30E-04
			CE4-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
45	0	2.80E-13	CE4-BME-FO-TB3	TRIP CIRCUIT BREAKER TCB-3 HARDWARE FAILURES	1.80E-05
			CE4-MSW-FF-MT1	MANUAL SWITCH 1 FAILS	1.30E-04
			CE4-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
46	0	2.80E-13	CE4-BME-FO-TB4	TRIP CIRCUIT BREAKER TCB-4 HARDWARE FAILURES	1.80E-05
			CE4-MSW-FF-MT2	MANUAL SWITCH 2 FAILS	1.30E-04
			CE4-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
47	0	2.40E-13	/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE4-RYL-CF-1LM6OF6	CCF 6 OF 6 K1 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			CE4-RYT-FF-ICK3	TRIP CONTACTOR K3 RELAY FAILS	1.20E-04
			CE4-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
48	0	2.40E-13	/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE4-RYL-CF-2LM6OF6	CCF 6 OF 6 K2 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			CE4-RYT-FF-ICK4	TRIP CONTACTOR K4 RELAY FAILS	1.20E-04
			CE4-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
49	0	2.40E-13	/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE4-RYL-CF-3LM6OF6	CCF 6 OF 6 K3 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			CE4-RYT-FF-ICK1	TRIP CONTACTOR K1 RELAY FAILS	1.20E-04
			CE4-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
50	0	2.40E-13	/CE4-RPS-TM-CHA	RPS CHANNEL A IN TEST AND MAINTENANCE	9.80E-01
			CE4-RYL-CF-4LM6OF6	CCF 6 OF 6 K4 LOGIC MATRIC RELAY OUTPUTS	2.00E-07
			CE4-RYT-FF-ICK2	TRIP CONTACTOR K2 RELAY FAILS	1.20E-04
			CE4-XHE-XE-SCRAM	OPERATOR FAILS TO INITIATE MANUAL SCRAM	1.00E-02
			CE4-BUV-CF-TB2OF4	CCF 2 OF 4 (1-OF-2 TWICE) TRIP CIRCUIT BRKR UNDERVOLTAGE DEV	3.70E-05
			CE4-PWR-FF-TB3	TRIP CIRCUIT BREAKER TCB-3 SHUNT TRIP DEVICE DC POWER FAILS	6.00E-05

- a. A / as the first character in a basic event name indicates a complemented event (Success = 1 - Failure). For example, the basic event for channel A in test and maintenance (T&M) is CEx-RPS-TM-CHA (Failure = 1.60E-02). Thus, the basic event name for channel A not in T&M is /CEx-RPS-TM-CHA (Success = 9.84E-01). The event description for complemented events remains the same as the description used for the failure event.

Appendix F

Table F-30. Importance measures sorted on Fussell-Vesely for case (CE Group 4, manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE4-ROD-CF-RODS	8.40E-07	5.24E-01	2.10E+00	6.23E+05	1.00E+00
CE4-BME-CF-TB2OF4	7.07E-07	4.41E-01	1.79E+00	6.23E+05	1.00E+00
CE4-XHE-XE-SCRAM	1.00E-02	3.52E-02	1.04E+00	4.48E+00	5.64E-06
CE4-RYT-CF-2OF4	4.78E-06	2.98E-02	1.03E+00	6.24E+03	1.00E-02
CE4-CBI-CF-6OF8	7.66E-07	4.70E-03	1.01E+00	6.14E+03	9.85E-03
CE4-RYL-CF-LM12OF24	4.29E-08	2.63E-04	1.00E+00	6.14E+03	9.85E-03
CE4-BUV-CF-TB2OF4	3.65E-05	2.58E-04	1.00E+00	8.07E+00	1.13E-05
CE4-BME-FO-TB1	1.80E-05	2.18E-04	1.00E+00	1.31E+01	1.95E-05
CE4-BME-FO-TB2	1.80E-05	2.18E-04	1.00E+00	1.31E+01	1.95E-05
CE4-BME-FO-TB3	1.80E-05	2.18E-04	1.00E+00	1.31E+01	1.95E-05
CE4-BME-FO-TB4	1.80E-05	2.18E-04	1.00E+00	1.31E+01	1.95E-05
CE4-BSN-CF-TB2OF4	8.73E-06	2.12E-04	1.00E+00	2.53E+01	3.90E-05
CE4-CBI-CF-4OF6TM	1.72E-06	1.72E-04	1.00E+00	1.01E+02	1.60E-04
CE4-RPS-TM-CHA	1.60E-02	1.07E-04	1.00E+00	1.01E+00	1.07E-08
CE4-RYT-FF-ICK4	1.20E-04	1.04E-04	1.00E+00	1.87E+00	1.39E-06
CE4-RYT-FF-ICK3	1.20E-04	1.04E-04	1.00E+00	1.87E+00	1.39E-06
CE4-RYT-FF-ICK2	1.20E-04	1.04E-04	1.00E+00	1.87E+00	1.39E-06
CE4-RYT-FF-ICK1	1.20E-04	1.04E-04	1.00E+00	1.87E+00	1.39E-06
CE4-PWR-CF-TB2OF4	2.51E-06	6.10E-05	1.00E+00	2.53E+01	3.90E-05
CE4-MSW-CF-2OF4	4.95E-06	1.74E-05	1.00E+00	4.52E+00	5.64E-06
CE4-RYL-CF-LM6OF12TM	1.58E-07	1.58E-05	1.00E+00	1.01E+02	1.60E-04
CE4-BUV-FO-TB1	1.10E-03	1.14E-05	1.00E+00	1.01E+00	1.67E-08
CE4-BUV-FO-TB2	1.10E-03	1.14E-05	1.00E+00	1.01E+00	1.67E-08
CE4-BUV-FO-TB3	1.10E-03	1.14E-05	1.00E+00	1.01E+00	1.67E-08
CE4-BUV-FO-TB4	1.10E-03	1.14E-05	1.00E+00	1.01E+00	1.67E-08
CE4-CBI-CF-P3OF4	7.21E-06	3.76E-06	1.00E+00	1.52E+00	8.37E-07
CE4-CPD-CF-T3OF4	5.73E-05	3.07E-06	1.00E+00	1.05E+00	8.58E-08
CE4-BSN-FO-TB2	1.50E-04	2.78E-06	1.00E+00	1.02E+00	2.98E-08
CE4-BSN-FO-TB3	1.50E-04	2.78E-06	1.00E+00	1.02E+00	2.98E-08
CE4-BSN-FO-TB1	1.50E-04	2.78E-06	1.00E+00	1.02E+00	2.98E-08
CE4-BSN-FO-TB4	1.50E-04	2.78E-06	1.00E+00	1.02E+00	2.98E-08
CE4-PWR-FF-TB2	6.00E-05	1.11E-06	1.00E+00	1.02E+00	2.98E-08
CE4-PWR-FF-TB1	6.00E-05	1.11E-06	1.00E+00	1.02E+00	2.98E-08
CE4-PWR-FF-TB3	6.00E-05	1.11E-06	1.00E+00	1.02E+00	2.98E-08
CE4-PWR-FF-TB4	6.00E-05	1.11E-06	1.00E+00	1.02E+00	2.98E-08
CE4-CPR-CF-P3OF4	1.51E-06	7.86E-07	1.00E+00	1.52E+00	8.36E-07
CE4-CTP-CF-CT3OF4	1.02E-05	5.45E-07	1.00E+00	1.05E+00	8.58E-08
CE4-CTP-CF-HT3OF4	1.02E-05	5.45E-07	1.00E+00	1.05E+00	8.58E-08
CE4-CBI-CF-T3OF4	7.21E-06	3.86E-07	1.00E+00	1.05E+00	8.58E-08
CE4-MSW-FF-MT2	1.30E-04	2.43E-07	1.00E+00	1.00E+00	2.99E-09
CE4-MSW-FF-MT3	1.30E-04	2.43E-07	1.00E+00	1.00E+00	2.99E-09
CE4-MSW-FF-MT1	1.30E-04	2.43E-07	1.00E+00	1.00E+00	2.99E-09
CE4-MSW-FF-MT4	1.30E-04	2.43E-07	1.00E+00	1.00E+00	2.99E-09
CE4-RYL-CF-4LM6OF6	2.02E-07	1.71E-07	1.00E+00	1.85E+00	1.36E-06
CE4-RYL-CF-3LM6OF6	2.02E-07	1.71E-07	1.00E+00	1.85E+00	1.36E-06
CE4-RYL-CF-2LM6OF6	2.02E-07	1.71E-07	1.00E+00	1.85E+00	1.36E-06
CE4-RYL-CF-1LM6OF6	2.02E-07	1.71E-07	1.00E+00	1.85E+00	1.36E-06
CE4-CPR-CF-P2OF3TM	5.03E-06	1.34E-07	1.00E+00	1.03E+00	4.27E-08
CE4-CPD-CF-T2OF3TM	1.35E-04	8.59E-08	1.00E+00	1.00E+00	1.02E-09
CE4-CTP-CF-CT2OF3TM	3.73E-05	2.24E-08	1.00E+00	1.00E+00	9.66E-10
CE4-CTP-CF-HT2OF3TM	3.73E-05	2.24E-08	1.00E+00	1.00E+00	9.66E-10
CE4-CPD-FF-TD	2.70E-03	1.59E-08	1.00E+00	1.00E+00	9.41E-12
CE4-CPD-FF-TC	2.70E-03	1.59E-08	1.00E+00	1.00E+00	9.41E-12
CE4-CPD-FF-TB	2.70E-03	1.59E-08	1.00E+00	1.00E+00	9.41E-12
CE4-CBI-FF-PD	5.00E-04	1.19E-08	1.00E+00	1.00E+00	3.83E-11
CE4-CBI-FF-PC	5.00E-04	1.19E-08	1.00E+00	1.00E+00	3.83E-11

Table F-30. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE4-CBI-FF-PB	5.00E-04	1.19E-08	1.00E+00	1.00E+00	3.83E-11
CE4-RYL-CF-3LM3OF3TM	4.66E-07	6.44E-09	1.00E+00	1.01E+00	2.21E-08
CE4-RYL-CF-2LM3OF3TM	4.66E-07	6.44E-09	1.00E+00	1.01E+00	2.21E-08
CE4-RYL-CF-1LM3OF3TM	4.66E-07	6.44E-09	1.00E+00	1.01E+00	2.21E-08
CE4-RYL-CF-4LM3OF3TM	4.66E-07	6.44E-09	1.00E+00	1.01E+00	2.21E-08
CE4-CBI-CF-P2OF3TM	2.55E-07	5.40E-09	1.00E+00	1.02E+00	3.35E-08
CE4-CPD-FF-TA	2.70E-03	2.70E-09	1.00E+00	1.00E+00	1.55E-12
CE4-CTP-FF-CTD	8.40E-04	2.21E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CTP-FF-HTC	8.40E-04	2.21E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CTP-FF-HTD	8.40E-04	2.21E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CTP-FF-CTC	8.40E-04	2.21E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CTP-FF-CTB	8.40E-04	2.21E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CTP-FF-HTB	8.40E-04	2.21E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CPR-FF-PC	1.10E-04	1.52E-09	1.00E+00	1.00E+00	2.16E-11
CE4-CPR-FF-PB	1.10E-04	1.52E-09	1.00E+00	1.00E+00	2.16E-11
CE4-CPR-FF-PD	1.10E-04	1.52E-09	1.00E+00	1.00E+00	2.16E-11
CE4-CBI-FF-TD	5.00E-04	1.38E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CBI-FF-TC	5.00E-04	1.38E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CBI-FF-TB	5.00E-04	1.38E-09	1.00E+00	1.00E+00	4.35E-12

Appendix F

Table F-31. Importance measures sorted on Risk Increase for case (CE Group 4, manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE4-ROD-CF-RODS	8.40E-07	5.24E-01	2.10E+00	6.23E+05	1.00E+00
CE4-BME-CF-TB2OF4	7.07E-07	4.41E-01	1.79E+00	6.23E+05	1.00E+00
CE4-XHE-XE-SCRAM	1.00E-02	3.52E-02	1.04E+00	4.48E+00	5.64E-06
CE4-RYT-CF-2OF4	4.78E-06	2.98E-02	1.03E+00	6.24E+03	1.00E-02
CE4-CBI-CF-6OF8	7.66E-07	4.70E-03	1.01E+00	6.14E+03	9.85E-03
CE4-RYL-CF-LM12OF24	4.29E-08	2.63E-04	1.00E+00	6.14E+03	9.85E-03
CE4-BUV-CF-TB2OF4	3.65E-05	2.58E-04	1.00E+00	8.07E+00	1.13E-05
CE4-BME-FO-TB1	1.80E-05	2.18E-04	1.00E+00	1.31E+01	1.95E-05
CE4-BME-FO-TB2	1.80E-05	2.18E-04	1.00E+00	1.31E+01	1.95E-05
CE4-BME-FO-TB3	1.80E-05	2.18E-04	1.00E+00	1.31E+01	1.95E-05
CE4-BME-FO-TB4	1.80E-05	2.18E-04	1.00E+00	1.31E+01	1.95E-05
CE4-BSN-CF-TB2OF4	8.73E-06	2.12E-04	1.00E+00	2.53E+01	3.90E-05
CE4-CBI-CF-4OF6TM	1.72E-06	1.72E-04	1.00E+00	1.01E+02	1.60E-04
CE4-RPS-TM-CHA	1.60E-02	1.07E-04	1.00E+00	1.01E+00	1.07E-08
CE4-RYT-FF-ICK4	1.20E-04	1.04E-04	1.00E+00	1.87E+00	1.39E-06
CE4-RYT-FF-ICK3	1.20E-04	1.04E-04	1.00E+00	1.87E+00	1.39E-06
CE4-RYT-FF-ICK2	1.20E-04	1.04E-04	1.00E+00	1.87E+00	1.39E-06
CE4-RYT-FF-ICK1	1.20E-04	1.04E-04	1.00E+00	1.87E+00	1.39E-06
CE4-PWR-CF-TB2OF4	2.51E-06	6.10E-05	1.00E+00	2.53E+01	3.90E-05
CE4-MSW-CF-2OF4	4.95E-06	1.74E-05	1.00E+00	4.52E+00	5.64E-06
CE4-RYL-CF-LM6OF12TM	1.58E-07	1.58E-05	1.00E+00	1.01E+02	1.60E-04
CE4-BUV-FO-TB1	1.10E-03	1.14E-05	1.00E+00	1.01E+00	1.67E-08
CE4-BUV-FO-TB2	1.10E-03	1.14E-05	1.00E+00	1.01E+00	1.67E-08
CE4-BUV-FO-TB3	1.10E-03	1.14E-05	1.00E+00	1.01E+00	1.67E-08
CE4-BUV-FO-TB4	1.10E-03	1.14E-05	1.00E+00	1.01E+00	1.67E-08
CE4-CBI-CF-P3OF4	7.21E-06	3.76E-06	1.00E+00	1.52E+00	8.37E-07
CE4-CPD-CF-T3OF4	5.73E-05	3.07E-06	1.00E+00	1.05E+00	8.58E-08
CE4-BSN-FO-TB2	1.50E-04	2.78E-06	1.00E+00	1.02E+00	2.98E-08
CE4-BSN-FO-TB3	1.50E-04	2.78E-06	1.00E+00	1.02E+00	2.98E-08
CE4-BSN-FO-TB1	1.50E-04	2.78E-06	1.00E+00	1.02E+00	2.98E-08
CE4-BSN-FO-TB4	1.50E-04	2.78E-06	1.00E+00	1.02E+00	2.98E-08
CE4-PWR-FF-TB2	6.00E-05	1.11E-06	1.00E+00	1.02E+00	2.98E-08
CE4-PWR-FF-TB1	6.00E-05	1.11E-06	1.00E+00	1.02E+00	2.98E-08
CE4-PWR-FF-TB3	6.00E-05	1.11E-06	1.00E+00	1.02E+00	2.98E-08
CE4-PWR-FF-TB4	6.00E-05	1.11E-06	1.00E+00	1.02E+00	2.98E-08
CE4-CPR-CF-P3OF4	1.51E-06	7.86E-07	1.00E+00	1.52E+00	8.36E-07
CE4-CTP-CF-CT3OF4	1.02E-05	5.45E-07	1.00E+00	1.05E+00	8.58E-08
CE4-CTP-CF-HT3OF4	1.02E-05	5.45E-07	1.00E+00	1.05E+00	8.58E-08
CE4-CBI-CF-T3OF4	7.21E-06	3.86E-07	1.00E+00	1.05E+00	8.58E-08
CE4-MSW-FF-MT2	1.30E-04	2.43E-07	1.00E+00	1.00E+00	2.99E-09
CE4-MSW-FF-MT3	1.30E-04	2.43E-07	1.00E+00	1.00E+00	2.99E-09
CE4-MSW-FF-MT1	1.30E-04	2.43E-07	1.00E+00	1.00E+00	2.99E-09
CE4-MSW-FF-MT4	1.30E-04	2.43E-07	1.00E+00	1.00E+00	2.99E-09
CE4-RYL-CF-4LM6OF6	2.02E-07	1.71E-07	1.00E+00	1.85E+00	1.36E-06
CE4-RYL-CF-3LM6OF6	2.02E-07	1.71E-07	1.00E+00	1.85E+00	1.36E-06
CE4-RYL-CF-2LM6OF6	2.02E-07	1.71E-07	1.00E+00	1.85E+00	1.36E-06
CE4-RYL-CF-1LM6OF6	2.02E-07	1.71E-07	1.00E+00	1.85E+00	1.36E-06
CE4-CPR-CF-P2OF3TM	5.03E-06	1.34E-07	1.00E+00	1.03E+00	4.27E-08
CE4-CPD-CF-T2OF3TM	1.35E-04	8.59E-08	1.00E+00	1.00E+00	1.02E-09
CE4-CTP-CF-CT2OF3TM	3.73E-05	2.24E-08	1.00E+00	1.00E+00	9.66E-10
CE4-CTP-CF-HT2OF3TM	3.73E-05	2.24E-08	1.00E+00	1.00E+00	9.66E-10
CE4-CPD-FF-TD	2.70E-03	1.59E-08	1.00E+00	1.00E+00	9.41E-12
CE4-CPD-FF-TC	2.70E-03	1.59E-08	1.00E+00	1.00E+00	9.41E-12
CE4-CPD-FF-TB	2.70E-03	1.59E-08	1.00E+00	1.00E+00	9.41E-12
CE4-CBI-FF-PD	5.00E-04	1.19E-08	1.00E+00	1.00E+00	3.83E-11
CE4-CBI-FF-PC	5.00E-04	1.19E-08	1.00E+00	1.00E+00	3.83E-11

Table F-31. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE4-CBI-FF-PB	5.00E-04	1.19E-08	1.00E+00	1.00E+00	3.83E-11
CE4-RYL-CF-3LM3OF3TM	4.66E-07	6.44E-09	1.00E+00	1.01E+00	2.21E-08
CE4-RYL-CF-2LM3OF3TM	4.66E-07	6.44E-09	1.00E+00	1.01E+00	2.21E-08
CE4-RYL-CF-1LM3OF3TM	4.66E-07	6.44E-09	1.00E+00	1.01E+00	2.21E-08
CE4-RYL-CF-4LM3OF3TM	4.66E-07	6.44E-09	1.00E+00	1.01E+00	2.21E-08
CE4-CBI-CF-P2OF3TM	2.55E-07	5.40E-09	1.00E+00	1.02E+00	3.35E-08
CE4-CPD-FF-TA	2.70E-03	2.70E-09	1.00E+00	1.00E+00	1.55E-12
CE4-CTP-FF-CTD	8.40E-04	2.21E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CTP-FF-HTC	8.40E-04	2.21E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CTP-FF-HTD	8.40E-04	2.21E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CTP-FF-CTC	8.40E-04	2.21E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CTP-FF-CTB	8.40E-04	2.21E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CTP-FF-HTB	8.40E-04	2.21E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CPR-FF-PC	1.10E-04	1.52E-09	1.00E+00	1.00E+00	2.16E-11
CE4-CPR-FF-PB	1.10E-04	1.52E-09	1.00E+00	1.00E+00	2.16E-11
CE4-CPR-FF-PD	1.10E-04	1.52E-09	1.00E+00	1.00E+00	2.16E-11
CE4-CBI-FF-TD	5.00E-04	1.38E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CBI-FF-TC	5.00E-04	1.38E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CBI-FF-TB	5.00E-04	1.38E-09	1.00E+00	1.00E+00	4.35E-12

Appendix F

Table F-32. Importance measures sorted on Birnbaum for case (CE Group 4, manual scram).

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE4-ROD-CF-RODS	8.40E-07	5.24E-01	2.10E+00	6.23E+05	1.00E+00
CE4-BME-CF-TB2OF4	7.07E-07	4.41E-01	1.79E+00	6.23E+05	1.00E+00
CE4-RYT-CF-2OF4	4.78E-06	2.98E-02	1.03E+00	6.24E+03	1.00E-02
CE4-CBI-CF-6OF8	7.66E-07	4.70E-03	1.01E+00	6.14E+03	9.85E-03
CE4-RYL-CF-LM12OF24	4.29E-08	2.63E-04	1.00E+00	6.14E+03	9.85E-03
CE4-CBI-CF-4OF6TM	1.72E-06	1.72E-04	1.00E+00	1.01E+02	1.60E-04
CE4-RYL-CF-LM6OF12TM	1.58E-07	1.58E-05	1.00E+00	1.01E+02	1.60E-04
CE4-BSN-CF-TB2OF4	8.73E-06	2.12E-04	1.00E+00	2.53E+01	3.90E-05
CE4-PWR-CF-TB2OF4	2.51E-06	6.10E-05	1.00E+00	2.53E+01	3.90E-05
CE4-BME-FO-TB1	1.80E-05	2.18E-04	1.00E+00	1.31E+01	1.95E-05
CE4-BME-FO-TB2	1.80E-05	2.18E-04	1.00E+00	1.31E+01	1.95E-05
CE4-BME-FO-TB3	1.80E-05	2.18E-04	1.00E+00	1.31E+01	1.95E-05
CE4-BME-FO-TB4	1.80E-05	2.18E-04	1.00E+00	1.31E+01	1.95E-05
CE4-BUV-CF-TB2OF4	3.65E-05	2.58E-04	1.00E+00	8.07E+00	1.13E-05
CE4-MSW-CF-2OF4	4.95E-06	1.74E-05	1.00E+00	4.52E+00	5.64E-06
CE4-XHE-XE-SCRAM	1.00E-02	3.52E-02	1.04E+00	4.48E+00	5.64E-06
CE4-RYT-FF-ICK4	1.20E-04	1.04E-04	1.00E+00	1.87E+00	1.39E-06
CE4-RYT-FF-ICK3	1.20E-04	1.04E-04	1.00E+00	1.87E+00	1.39E-06
CE4-RYT-FF-ICK2	1.20E-04	1.04E-04	1.00E+00	1.87E+00	1.39E-06
CE4-RYT-FF-ICK1	1.20E-04	1.04E-04	1.00E+00	1.87E+00	1.39E-06
CE4-RYL-CF-4LM6OF6	2.02E-07	1.71E-07	1.00E+00	1.85E+00	1.36E-06
CE4-RYL-CF-3LM6OF6	2.02E-07	1.71E-07	1.00E+00	1.85E+00	1.36E-06
CE4-RYL-CF-2LM6OF6	2.02E-07	1.71E-07	1.00E+00	1.85E+00	1.36E-06
CE4-RYL-CF-1LM6OF6	2.02E-07	1.71E-07	1.00E+00	1.85E+00	1.36E-06
CE4-CBI-CF-P3OF4	7.21E-06	3.76E-06	1.00E+00	1.52E+00	8.37E-07
CE4-CPR-CF-P3OF4	1.51E-06	7.86E-07	1.00E+00	1.52E+00	8.36E-07
CE4-CPD-CF-T3OF4	5.73E-05	3.07E-06	1.00E+00	1.05E+00	8.58E-08
CE4-CTP-CF-CT3OF4	1.02E-05	5.45E-07	1.00E+00	1.05E+00	8.58E-08
CE4-CTP-CF-HT3OF4	1.02E-05	5.45E-07	1.00E+00	1.05E+00	8.58E-08
CE4-CBI-CF-T3OF4	7.21E-06	3.86E-07	1.00E+00	1.05E+00	8.58E-08
CE4-CPR-CF-P2OF3TM	5.03E-06	1.34E-07	1.00E+00	1.03E+00	4.27E-08
CE4-CBI-CF-P2OF3TM	2.55E-07	5.40E-09	1.00E+00	1.02E+00	3.35E-08
CE4-BSN-FO-TB2	1.50E-04	2.78E-06	1.00E+00	1.02E+00	2.98E-08
CE4-BSN-FO-TB3	1.50E-04	2.78E-06	1.00E+00	1.02E+00	2.98E-08
CE4-BSN-FO-TB1	1.50E-04	2.78E-06	1.00E+00	1.02E+00	2.98E-08
CE4-BSN-FO-TB4	1.50E-04	2.78E-06	1.00E+00	1.02E+00	2.98E-08
CE4-PWR-FF-TB2	6.00E-05	1.11E-06	1.00E+00	1.02E+00	2.98E-08
CE4-PWR-FF-TB1	6.00E-05	1.11E-06	1.00E+00	1.02E+00	2.98E-08
CE4-PWR-FF-TB3	6.00E-05	1.11E-06	1.00E+00	1.02E+00	2.98E-08
CE4-PWR-FF-TB4	6.00E-05	1.11E-06	1.00E+00	1.02E+00	2.98E-08
CE4-RYL-CF-3LM3OF3TM	4.66E-07	6.44E-09	1.00E+00	1.01E+00	2.21E-08
CE4-RYL-CF-2LM3OF3TM	4.66E-07	6.44E-09	1.00E+00	1.01E+00	2.21E-08
CE4-RYL-CF-1LM3OF3TM	4.66E-07	6.44E-09	1.00E+00	1.01E+00	2.21E-08
CE4-RYL-CF-4LM3OF3TM	4.66E-07	6.44E-09	1.00E+00	1.01E+00	2.21E-08
CE4-BUV-FO-TB1	1.10E-03	1.14E-05	1.00E+00	1.01E+00	1.67E-08
CE4-BUV-FO-TB2	1.10E-03	1.14E-05	1.00E+00	1.01E+00	1.67E-08
CE4-BUV-FO-TB3	1.10E-03	1.14E-05	1.00E+00	1.01E+00	1.67E-08
CE4-BUV-FO-TB4	1.10E-03	1.14E-05	1.00E+00	1.01E+00	1.67E-08
CE4-RPS-TM-CHA	1.60E-02	1.07E-04	1.00E+00	1.01E+00	1.07E-08
CE4-MSW-FF-MT2	1.30E-04	2.43E-07	1.00E+00	1.00E+00	2.99E-09
CE4-MSW-FF-MT3	1.30E-04	2.43E-07	1.00E+00	1.00E+00	2.99E-09
CE4-MSW-FF-MT1	1.30E-04	2.43E-07	1.00E+00	1.00E+00	2.99E-09
CE4-MSW-FF-MT4	1.30E-04	2.43E-07	1.00E+00	1.00E+00	2.99E-09
CE4-CPD-CF-T2OF3TM	1.35E-04	8.59E-08	1.00E+00	1.00E+00	1.02E-09
CE4-CTP-CF-CT2OF3TM	3.73E-05	2.24E-08	1.00E+00	1.00E+00	9.66E-10
CE4-CTP-CF-HT2OF3TM	3.73E-05	2.24E-08	1.00E+00	1.00E+00	9.66E-10

Table F-32. (Continued)

Basic Event Name	Probability of Failure	Fussell-Vesely Importance	Risk Reduction Ratio	Risk Increase Ratio	Birnbaum Importance
CE4-CBI-FF-PD	5.00E-04	1.19E-08	1.00E+00	1.00E+00	3.83E-11
CE4-CBI-FF-PC	5.00E-04	1.19E-08	1.00E+00	1.00E+00	3.83E-11
CE4-CBI-FF-PB	5.00E-04	1.19E-08	1.00E+00	1.00E+00	3.83E-11
CE4-CPR-FF-PC	1.10E-04	1.52E-09	1.00E+00	1.00E+00	2.16E-11
CE4-CPR-FF-PB	1.10E-04	1.52E-09	1.00E+00	1.00E+00	2.16E-11
CE4-CPR-FF-PD	1.10E-04	1.52E-09	1.00E+00	1.00E+00	2.16E-11
CE4-CPD-FF-TD	2.70E-03	1.59E-08	1.00E+00	1.00E+00	9.41E-12
CE4-CPD-FF-TC	2.70E-03	1.59E-08	1.00E+00	1.00E+00	9.41E-12
CE4-CPD-FF-TB	2.70E-03	1.59E-08	1.00E+00	1.00E+00	9.41E-12
CE4-CTP-FF-CTD	8.40E-04	2.21E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CTP-FF-HTC	8.40E-04	2.21E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CTP-FF-HTD	8.40E-04	2.21E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CTP-FF-CTC	8.40E-04	2.21E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CTP-FF-CTB	8.40E-04	2.21E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CTP-FF-HTB	8.40E-04	2.21E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CBI-FF-TD	5.00E-04	1.38E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CBI-FF-TC	5.00E-04	1.38E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CBI-FF-TB	5.00E-04	1.38E-09	1.00E+00	1.00E+00	4.35E-12
CE4-CPD-FF-TA	2.70E-03	2.70E-09	1.00E+00	1.00E+00	1.55E-12

Appendix G

Sensitivity Analysis

G. SENSITIVITY ANALYSIS

Sensitivity analyses of the Combustion Engineering Reactor Protection System (RPS) fault tree model and quantification were performed in the area of success criteria. Two sensitivities were analyzed: The sensitivity from using two trip parameters versus three trip parameters and the sensitivity to the rod failure criteria.

G.1. Three Trip Parameter Sensitivity

Only two trip signals were included in the RPS fault tree model: hot leg temperature and pressurizer pressure. If three signals were included in the model, then two of the CCF events dominating the RPS channel unavailability would be affected. Table G-1 shows the revised CCF basic events for the three-trip parameters contribution and their point estimates.

Table G-1. Three-trip parameter basic events.

Three Trip Parameter Basic Events	CCF Basic Event Probability
CEX-CBI-CF-CBI9OF12	3.0E-7
CEX-CBI-CF-CBI6OF9TM	5.4E-7

Figure G-1 shows the overall point estimate of an unavailability comparison between two- and three-trip parameters with no operator action. Figure G-2 shows a similar distribution, but for the results including operator action. When operator action is factored in, the channel contribution decreases significantly, leaving no detectable difference between the models.

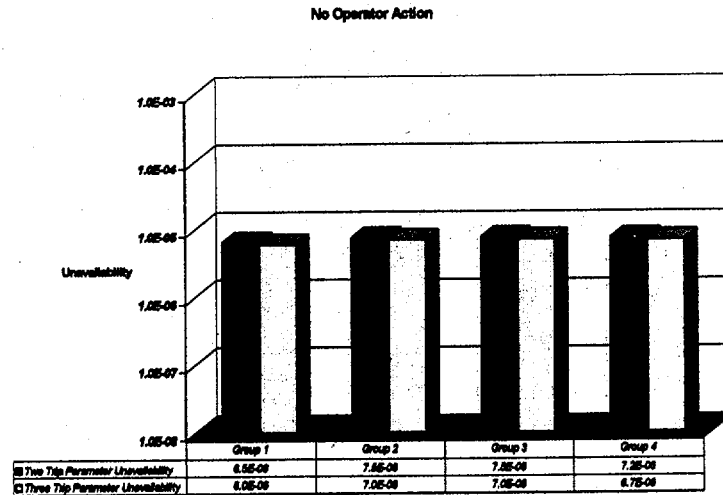


Figure G-1. Sensitivity comparison with no operator action.

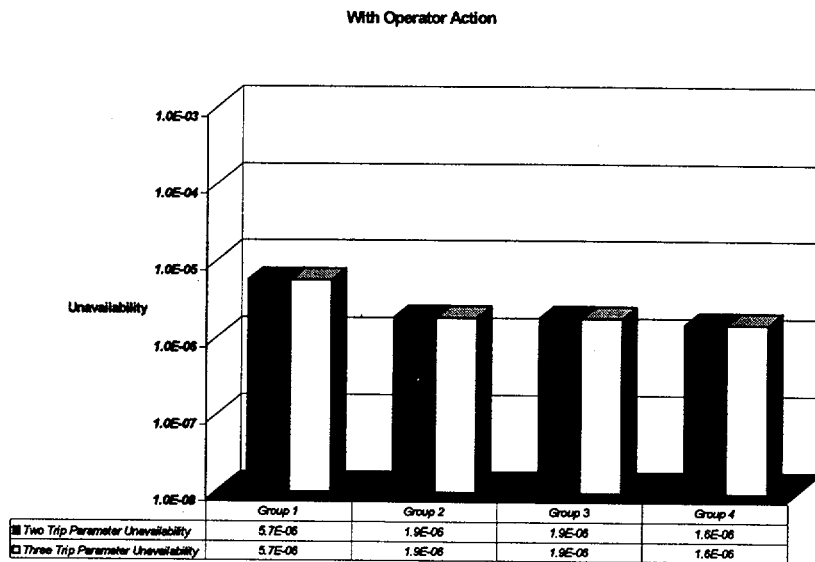


Figure G-2. Sensitivity with operator action.

In all cases, the bistable CCF events change from specific six of eight failures to specific nine of twelve failures. Given these changes, the RPS unavailability in Table G-2 shows the segment percent contributions from the two-trip parameter so that it can be compared to the segment percent contribution from the three-trip parameter model. In all cases, the channel segment decreases its contribution and the trip contactor or trip breaker segments increase the contribution. When operator action to manually trip the reactor is taken into account, the differences between two and three trips become negligible.

Table G-2. Three-trip parameter results and comparison to two-trip parameters.

RPS Segment	Unavailability (Point Estimate) with No Credit for Manual Scram by Operator			Unavailability (Point Estimate) with Credit for Manual Scram by Operator		
	Two Trip	Three Trip	Three Trip	Two Trip	Three Trip	Three Trip
	Parameter	Parameter	Parameter	Parameter	Parameter	Parameter
	Percent	Percent	Unavailability	Percent	Percent	Unavailability
Group 1 RPS Model						
Channel	12.0%	5.0%	3.0E-07	0.1%	0.1%	3.0E-09
Trip Modules	0.7%	0.7%	4.5E-08	0.0%	0.0%	4.2E-10
Trip Contactors	74.4%	80.3%	4.8E-06	85.1%	85.1%	4.8E-06
Rods	12.9%	14.0%	8.4E-07	14.8%	14.8%	8.4E-07
Total Group 1 RPS	100.0%	100.0%	6.0E-06	100.0%	100.0%	5.7E-06
Group 2 RPS Model						
Channel	10.4%	4.3%	3.0E-07	0.4%	0.2%	3.0E-09
Trip Modules	0.6%	0.6%	4.5E-08	0.2%	0.2%	2.9E-09
Trip Breakers	77.8%	83.1%	5.8E-06	55.2%	55.4%	1.0E-06
Rods	11.2%	12.0%	8.4E-07	44.2%	44.3%	8.4E-07
Total Group 2 RPS	100.0%	100.0%	7.0E-06	100.0%	100.0%	1.9E-06
Group 3 RPS Model						
Channel	10.4%	4.3%	3.0E-07	0.4%	0.2%	2.9E-09
Trip Modules	0.6%	0.6%	4.5E-08	0.2%	0.2%	2.9E-09
Trip Breakers	77.9%	83.1%	5.8E-06	55.2%	55.4%	1.0E-06
Rods	11.2%	12.0%	8.4E-07	44.2%	44.3%	8.4E-07
Total Group 3 RPS	100.0%	100.0%	7.0E-06	100.0%	100.0%	1.9E-06
Group 4 RPS Model						
Channel	10.8%	4.5%	3.0E-07	0.5%	0.2%	3.0E-09
Trip Modules	0.6%	0.6%	4.2E-08	0.0%	0.0%	4.2E-10
Trip Breakers	77.0%	82.4%	5.6E-06	47.2%	47.4%	7.6E-07
Rods	11.6%	12.5%	8.4E-07	52.3%	52.4%	8.4E-07
Total Group 4 RPS	100.0%	100.0%	6.7E-06	100.0%	100.0%	1.6E-06

G.2. Rod Failure Criterion Sensitivity

The Combustion Engineering RPS fault tree includes an event that represents the CCF of the shutdown rods to insert, given that the trip breaker(s) have opened. The components included in this failure are the rods and the control rod drive mechanisms (CRDs). One BE has been assigned to the supercomponent, RMA. Combustion Engineering cores contain approximately 36 shutdown rods. This section describes the sensitivity of the BE probability and the RPS unavailability to the assumed failure criterion.

G.2.1. Rod Failure Criteria

The probability of the failure of sufficient rods to insert and shut down the reactor due to ROD or CRD common-cause failure is expected to be very small. This event has never occurred in the operating history of commercial PWR nuclear power plants. The calculated common-cause failure probability depends on the number of rods required to insert. For most transients, the insertion of a few rods is sufficient to shut down the reactor. For others, it requires more rods to insert. In rare cases, insertion of all of the rods will not guarantee successful shut down of the reactor.

From 1984 through 1998, only three possible failures to insert PWR ROD and CRD common-cause events were observed. In the first event, two rods were observed to have clad cracking and guide wear. The other 46 rods were assigned a degradation value of 0.1 due to the design flaw nature of the fault. In another event, two control rod drives out of 48 exhibited faulty firing circuits. In the last event, the drive screw threads were galled. Thus, the operating experience is very sparse.

G.2.2. Rod CCF BE Failure Probability Sensitivity Results

The failure criterion assumed for this study is that 7 or more CEAs (20 percent of the shutdown rods) fail to insert fully into the core upon demand. The Rod CCF Basic Event probabilities were calculated for 20, 30, 40, 50, 60, 70, and 80 percent failure criteria, and are shown in Figure G-3. The Combustion Engineering RPS models were evaluated, using the stated Rod CCF criteria, and the results are shown in Figure G-3. The choice of seven or more CEAs failing to insert results in a rod unavailability contribution of 11.2 to 12.9 percent (no operator action). As can be seen in Figure G-3, the selection of rod CCF criteria does not significantly impact the overall RPS unavailability.

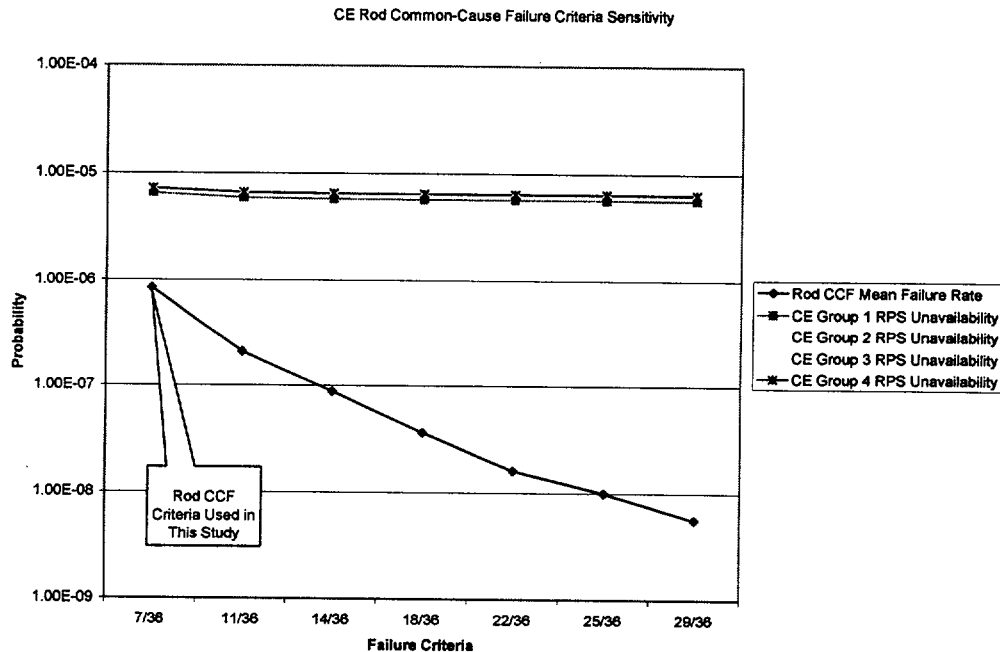


Figure G-3. Sensitivity of the RPS models to shutdown rod failure criterion.

G.3. Trip Breaker Reliability Comparison

The major difference between the CE RPS designs is the trip breaker configurations. The sub-trees representing the trip breaker configurations were analyzed, without the balance of the RPS system, to determine what, if any, differences in unavailability there were based purely on the trip breaker configuration. The results are shown in Table G-3.

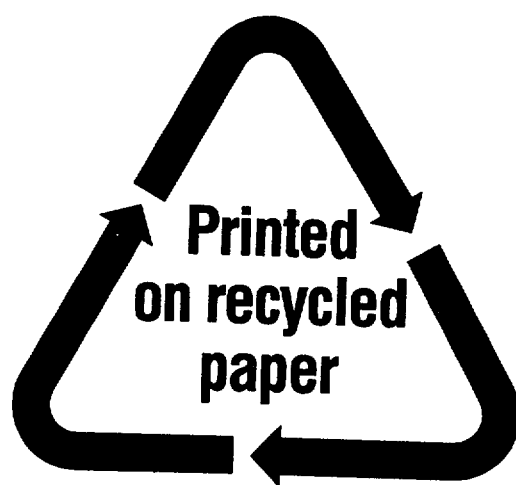
Table G-3. Trip breaker configuration comparison.

	Unavailability	Percent of Lowest
Eight Trip Breakers	9.99E-07	41%
Four Trip Breakers	7.08E-07	0%

The eight-trip breaker configuration is relevant to CE Group 2 and CE Group 3, and the four-trip breaker configuration is relevant to CE Group 4.

The eight-trip breaker configuration is 41 percent less reliable than the four-trip breaker configuration. This is entirely due to the failure criteria used in the model. There are many more combinations of trip breaker failures (combinations of 2, 3, 4, 5, 6, 7, and 8) in the group of eight that will fail to de-energize the CEDM power supplies than in the group of four trip breakers (combinations of 2, 3, and 4). See Appendix E, Table E-1 for the CCF BE equations.

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