

**Risk Assessment for Indian Point Unit 2
A Hypothetical Case
Loss of Safeguards Electrical Bus 6A
Coincident with a Steam Generator Tube Rupture**

Background:

February 15, 2000 - Steam Generator Tube Rupture

The Indian Point Unit 2 facility experienced a steam generator tube rupture (SGTR) on February 14, 2000 when a flaw in the U-bend of tube R2C5 in steam generator 24 failed. This flaw had not been detected during the last nondestructive examination of steam generator tubes because of programmatic problems. During the recovery process following the SGTR, there were no failures in equipment or operator actions that were needed to mitigate the consequences of the event.

The conditional core damage probability (CCDP) associated with this event was calculated by ConEd using their risk model as $7.7E-05$. This is comparable to the CCDP of $3.3E-04$ calculated using the NRC's Rev. 2-QA Standardized Plant Analysis Risk Model (SPAR) for Indian Point Unit 2. Additional analysis was performed by NRR to quantify the increase in core damage frequency (CDF) and large early release frequency (LERF) that resulted from operation with the flawed steam generator tubes¹. An incremental increase in CDF was calculated as $1.0E-04$ per reactor year for the second year of operation. In accordance with the guidance from MC0609, Appendix H, the LERF frequency equals the CDF for a SGTR, therefore the LERF frequency for this condition is also $1.0E-04$ ². Risk was dominated by the probability of human error in identifying and isolating the faulted steam generator and depressurizing the reactor coolant system to below the steam generator safety valve pressure.

August 31, 1999 - Reactor Trip and Loss of Safeguards Electrical Power

The Indian Point Unit 2 facility also experienced a reactor trip prior to the SGTR on August 31, 1999. This trip was complicated by the loss of the 6A 480 volt ac safeguards electrical bus and the subsequent loss of the 24 battery. The loss of the 6A bus resulted in the loss of some emergency core cooling equipment including: one of the two motor driven auxiliary feedwater (AFW) trains, one of three high pressure injection trains, one of two high pressure recirculation trains, one of two residual heat removal trains and loss of power to one of the two normally closed PORV block valves.

The CCDP associated with this event was calculated as $2.0E-04$ by the NRR Operations support team (OST). Risk was dominated by the failure probabilities of the one remaining motor driven AFW pump, the turbine driven AFW pump and the probability for non-recovery of main feedwater. Had auxiliary feedwater failed, core damage could normally be prevented through use of primary bleed and feed. The success for reactor coolant system bleed and feed requires

¹Subsequent examination determined that other tubes had not been detected during the examination performed prior to the SGTR event.

²Reference: memorandum Barrett to Blough, dated May 4, 2000

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flow through both power operated relief valves (PORVs). However, flow through one of the PORVs was prevented because its normally closed block valve receives power from electrical bus 6A.

The CDF calculated using the NRC's Rev. 2-QA Standardized Plant Analysis Risk Model (SPAR) for Indian Point Unit 2 was somewhat less than that calculated by the OST. The Rev 2-QA SPAR³ model calculated a CDFP for this event of 4.9E-05. The difference being that the SPAR model uses industry average basic event equipment failure data where the OST used data from the IP-2 individual plant evaluation (IPE) without including credit for equipment recovery.

Risk Analysis of Concurrent Events:

This analysis constructed a hypothetical event, a SGTR, for which the recovery was complicated by failures in the electrical distribution system similar to those experienced during the August 31 event. Risk would increase because of the loss of safety related equipment and also because of the additional challenges to the operators. The August 31 event proved difficult for the ConEd organization to analyze and react to in a timely manner.

The August 31st event was initiated following a normal reactor trip that was complicated by actuation of safeguards bus undervoltage protective devices. A switchyard transformer tap changer was in its manual mode for an extended period. The event would have been a routine reactor trip had the tap changer been in automatic mode. Following the loss of self generation, safeguards 480 volt ac bus voltage sagged because of plant distribution system impedance. Protective instrumentation started all three emergency diesel generators (EDGs). When the diesel generators were ready to load, their output breakers were closed onto the three safeguards electrical buses. However, the generator output breaker to bus 6A tripped open on overload. Subsequent investigation found issues with the overcurrent trip device calibration process, including the type of equipment used for this activity. Although the process deficiencies may have resulted in a common cause failure of all three EDG output breakers, only one of the breakers' overcurrent trip point was set low enough to cause an overcurrent trip. The above referenced risk analysis for this event did not include recovery of the EDG, recovery of offsite power or activation of the station blackout cross-connection from Unit 1. Recovery was not considered because it is a complex process and the licensee's organization performed poorly during follow-up to the event as evidenced by their allowing a station battery to discharge to the point of cell reversal.

³ The IP-2 Rev 2-QA SPAR model was corrected to reflect the normally CLOSED position of the PORV block valves and was revised to credit operator recovery of the RHR suction path MOVs for shutdown cooling. The SPAR model human error recovery process was used to calculate the HRA for this recovery action as 2.0E-03 after consultation with RI operator licensing personnel.

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In reviewing the circumstances of these two events, it is clear that the causes for the August 31st event may not have revealed themselves until the SGTR event had there not been the earlier reactor trip. If that were the case, the SGTR recovery would have become complicated by the loss of power to important emergency safeguards equipment. A SGTR is a significant challenge to operators who would then have to cope with additional degraded plant equipment.

A risk assessment was performed of this hypothetical event, this assessment imposed the bus 6A electrical failures on to the SGTR event analysis. The CCDP was calculated using the NRC's Rev. 2-QA SPAR as $3.8E-04$. The probability for core damage was dominated by the failure to identify and isolate the faulted steam generator and the failure to depressurize the RCS. This assessment did not calculate new human error probabilities for actions needed to recover from a SGTR. The loss of the 6A 480 volt electrical bus is expected to increase these failure probabilities because it complicates the recovery and causes additional stress to the operators. A copy of this analysis is Attachment 1.

Effect of Concurrent Events on Human Reliability Analysis

Additional stress may have affected the Indian Point Unit 2 plant operators performance if bus 6A had failed during the SGTR. This increase stress level was accounted for in an additional risk analysis that used recalculated human error probabilities for four of the five operator tasks associated with the SGTR top events:

RCS-SG	Depressurize RCS to below SG RV setpoint
DEP-REC	Operator depressurizes the RCS after SG RV lift
SGISOL	Ruptured SG isolated
THROTTLE	Throttle HPI to reduce pressure
RCS-DEP	Depressurize RCS to RHR entry

The human error values for these five tasks were originally derived for the Rev. 2-QA SPAR models from sources such as the Surry facility NUREG 1150 study⁴, plant IPE's and the NRC Daily Events Manual. These values were recalculated using the Rev. 3i SPAR Model Human Error Worksheets. For each case, the "Stress" shaping factor associated with task diagnosis or action was set to "Extreme". The following summarizes these changes:

Event Name	Task Description	Original Value	Re-Calculated Value
HPI-XHE-XM-THRTL	Operator fails to throttle HPI flow to reduce RCS pressure	1.0E-02 Surry 1150	5.0E-03

⁴Analysis of Core Damage frequency: Surry Unit 1, Internal Events, NUREG/CR-4550

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MSS-XHE-XM-ERROR	Operator fails to isolate faulted steam generator	1.0E-03 San Onfre IPE	5.0E-03
PCS-XHE-XM-RCOOL	Operator fails to initiate RCS cooldown below SDC	1.0E-03 Daily Events Manual	no change
RCS-XHE-DIAG	Operator fails to diagnose SGTR and start procedures	6.8E-03 Surry 1150	2.1E-02
RCS-XHE-RECOVER	Operator fails to depressurize RCS below SG SRV given SG RV opens	3.5E-03 Surry 1150	5.0E-03
RCS-XHE-XM-SG	Operator fails to initiate RCS depressurization	2.1E-02 Surry 1150	5.0E-03

The CCDP for a SGTR with a loss of the 6A 480 volt electrical bus and re-calculated human error failure probabilities is 4.6E-04. A copy of this risk assessment is Attachment 2. Again, the probability for core damage was dominated by the failure to identify and isolate the faulted steam generator and the failure to depressurize the RCS. The table below lists the human error tasks and the contribution to the CDF from cut sets that the tasks are included.

Event Name	Task Description	Contribution to CDF	
RCS-XHE-RECOVER	Operator fails to depressurize RCS below SG SRV given SG RV opens	1.6E-04	33.6%
RCS-XHE-DIAG	Operator fails to diagnose SGTR and start procedures	1.1E-04	23.8%
MSS-XHE-XM-ERROR	Operator fails to isolate faulted steam generator	7.8E-05	16.9%
RCS-XHE-XM-SG	Operator fails to initiate RCS depressurization	2.6E-05	5.7%
HPI-XHE-XM-THRTL	Operator fails to throttle HPI flow to reduce RCS pressure	2.6E-05	5.7%
PCS-XHE-XM-RCOOL	Operator fails to initiate RCS cooldown below SDC	1.5E-05	3.4%

**Completed by:
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Jim Trapp**

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I N I T I A T I N G E V E N T A S S E S S M E N T

Fam : IPT2_2QA	Code Ver : 6:68
User :	Model Ver : 1998/04/14
Ev ID: SGTR W/BUS 6A OOS	Init Event: IE-SGTR
Desc : Initiating Event Assessment	Total CCDP: 3.8E-004

BASIC EVENT CHANGES

Event Name Type	Description	Base Prob	Curr Prob
-----	-----	-----	-----
ACP-BAC-LP-6A TRUE	DIVISION 6A AC POWER 480V BU	9.0E-005	1.0E+000
IE-LOOP	LOSS OF OFFSITE POWER INITIA	3.1E-005	+0.0E+000
IE-SGTR	STEAM GENERATOR TUBE RUPTURE	1.6E-006	1.0E+000
IE-SLOCA	SMALL LOCA INITIATING EVENT	2.3E-006	+0.0E+000
IE-TRANS	TRANSIENT INITIATING EVENT	2.7E-004	+0.0E+000

SEQUENCE PROBABILITIES

Truncation : Cumulative : 100.0% Individual : 1.0%

Event Tree Name %Cont	Sequence Name	CCDP
-----	-----	-----
SGTR	11	1.3E-004
34.2		
SGTR	03	1.2E-004
31.6		
SGTR	43	5.7E-005
15.0		
SGTR	04	4.4E-005
11.6		
SGTR	05	1.0E-005
2.6		
SGTR	44	5.5E-006
1.5		
SGTR	08	4.6E-006
1.2		

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SEQUENCE LOGIC			
Event Tree	Sequence Name		Logic
SGTR	11	/RT /HPI DEP-REC	/AFW-SGTR RCS-SG
SGTR	03	/RT /HPI /SG-DEP /RCS-DEP	/AFW-SGTR /RCS-SG SGISOL RHR
SGTR	43	/RT MFW-NT	AFW-SGTR F&B
SGTR	04	/RT /HPI /SG-DEP	/AFW-SGTR /RCS-SG SGISOL

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		RCS-DEP	
SGTR	05	/RT /HPI SG-DEP	/AFW-SGTR /RCS-SG
SGTR	44	RT	
SGTR	08	/RT /HPI /DEP-REC SGISOL1 RHR	/AFW-SGTR RCS-SG /SG-DEP /RCS-DEP

Fault Tree Name	Description
AFW-SGTR DEP-REC OR SR F&B HPI MFW-NT NON-TRANS RCS-DEP RCS-SG RV SETP RHR RT SG-DEP SETPO SGISOL DEPLETION SGISOL1	NO OR INSUFFICIENT AFW FLOW DURING SGTR OPERATOR FAILS TO DEPRESSURIZE RCS GIVEN SG ADV FAILURE TO PROVIDE FEED AND BLEED COOLING NO OR INSUFFICIENT FLOW FROM THE HPI SYSTEM FAILURE OF THE MAIN FEEDWATER SYSTEM DURING FAILURE TO COOLDOWN RCS TO < RHR PRESSURE OPERATOR FAILS TO LOWER RCS PRESSURE TO < SG NO OR INSUFFICIENT FLOW FROM THE RHR SYSTEM REACTOR FAILS TO TRIP DURING TRANSIENT HARDWARE FAILS TO LOWER RCS PRESSURE TO < SG RV FAILURE TO ISOLATE RUPTURED SG BEFORE RWST FAILURE TO DEPRESSURIZE RCS TO ISOLATE SG

SEQUENCE CUT SETS

Truncation: Cumulative: 100.0% Individual: 1.0%

Event Tree: SGTR
Sequence: 11

CCDP: 1.3E-004

CCDP % Cut Set

Cut Set Events

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7.4E-005	55.6	RCS-XHE-RECOVER SGTR-11-NREC	RCS-XHE-XM-SG
3.5E-005	26.5	RCS-XHE-RECOVER SGTR-11-NREC	HPI-XHE-XM-THRTL
2.4E-005	18.0	RCS-XHE-RECOVER SGTR-11-NREC	RCS-XHE-DIAG

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Sequence: 03

CCDP: 1.2E-004

CCDP	% Cut Set	Cut Set Events	
-----	-----	-----	-----
3.8E-005	31.7	RHR-MDP-FC-2B SGTR-03-NREC	MSS-VCF-HW-ISOL
3.0E-005	25.0	RHR-MOV-OO-RWST SGTR-03-NREC	MSS-VCF-HW-ISOL
2.0E-005	16.7	MSS-VCF-HW-ISOL SGTR-03-NREC	RHR-XHE-SUCTION
1.0E-005	8.3	RHR-XHE-XM SGTR-03-NREC	MSS-VCF-HW-ISOL
5.6E-006	4.7	RHR-MDP-CF-ALL SGTR-03-NREC	MSS-VCF-HW-ISOL
3.8E-006	3.2	RHR-MDP-FC-2B SGTR-03-NREC	MSS-XHE-XM-ERROR
3.0E-006	2.5	RHR-MOV-OO-RWST SGTR-03-NREC	MSS-XHE-XM-ERROR
2.6E-006	2.2	RHR-MOV-CF-DIS SGTR-03-NREC	MSS-VCF-HW-ISOL
2.0E-006	1.7	MSS-XHE-XM-ERROR SGTR-03-NREC	RHR-XHE-SUCTION
1.4E-006	1.2	RHR-MOV-OC-VLV SGTR-03-NREC	MSS-VCF-HW-ISOL

Event Tree: SGTR
Sequence: 43

CCDP: 5.7E-005

CCDP	% Cut Set	Cut Set Events	
-----	-----	-----	-----
2.8E-005	49.0	AFW-MDP-FC-21 SGTR-43-NREC	AFW-TDP-FC-22
1.2E-005	21.3	AFW-PMP-CF-ALL	SGTR-43-NREC
7.9E-006	13.8	AFW-TDP-FC-22 SGTR-43-NREC	AFW-AOV-CC-MSG21
4.0E-006	7.0	AFW-AOV-CF-SGS	SGTR-43-NREC
1.5E-006	2.6	AFW-MDP-CF-AB SGTR-43-NREC	AFW-TDP-FC-22
7.2E-007	1.3	AFW-TDP-FC-22 SGTR-43-NREC	AFW-CKV-CC-SG21
6.5E-007	1.1	AFW-TDP-FC-22 SGTR-43-NREC	ACP-BAC-LP-2-3A
5.9E-007	1.0	AFW-CKV-CF-SUCT	SGTR-43-NREC

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5.9E-007	1.0	AFW-CKV-CF-SGS-S	SGTR-43-NREC
5.9E-007	1.0	AFW-CKV-CF-PMPS	SGTR-43-NREC

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Sequence: 04

CCDP: 4.4E-005

CCDP	% Cut Set	Cut Set Events	
3.0E-005	68.2	PCS-VCF-HW SGTR-04-NREC	MSS-VCF-HW-ISOL
1.0E-005	22.7	PCS-XHE-XM-RCOOL SGTR-04-NREC	MSS-VCF-HW-ISOL
3.0E-006	6.8	PCS-VCF-HW SGTR-04-NREC	MSS-XHE-XM-ERROR
1.0E-006	2.3	PCS-XHE-XM-RCOOL SGTR-04-NREC	MSS-XHE-XM-ERROR

Event Tree: SGTR
Sequence: 05

CCDP: 1.0E-005

CCDP	% Cut Set	Cut Set Events	
1.0E-005	100.0	PCS-PSF-HW	SGTR-05-NREC

Event Tree: SGTR
Sequence: 44

CCDP: 5.5E-006

CCDP	% Cut Set	Cut Set Events	
4.3E-006	77.8	RPS-XHE-XM-SCRAM SGTR-44-NREC	RPS-VCF-FO-ELEC
1.1E-006	20.6	RPS-BKR-FC-FTO SGTR-44-NREC	RPS-XHE-ERROR
8.9E-008	1.6	RPS-VCF-FO-MECH	SGTR-44-NREC

Event Tree: SGTR
Sequence: 08

CCDP: 4.6E-006

CCDP	% Cut Set	Cut Set Events	
8.0E-007	17.4	RHR-MDP-FC-2B MSS-VCF-HW-ISOL	RCS-XHE-XM-SG SGTR-08-NREC
6.3E-007	13.7	RHR-MOV-OO-RWST MSS-VCF-HW-ISOL	RCS-XHE-XM-SG SGTR-08-NREC
4.2E-007	9.2	RCS-XHE-XM-SG	MSS-VCF-HW-ISOL

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3.8E-007	8.3	RHR-XHE-SUCTION	SGTR-08-NREC
		RHR-MDP-FC-2B	HPI-XHE-XM-THRTL
		MSS-VPF-HW-ISOL	SGTR-08-NREC
3.0E-007	6.5	RHR-MOV-OO-RWST	HPI-XHE-XM-THRTL
		MSS-VPF-HW-ISOL	SGTR-08-NREC
2.6E-007	5.6	RHR-MDP-FC-2B	RCS-XHE-DIAG
		MSS-VPF-HW-ISOL	SGTR-08-NREC
2.1E-007	4.6	RCS-XHE-XM-SG	RHR-XHE-XM
		MSS-VPF-HW-ISOL	SGTR-08-NREC

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2.0E-007	4.5	RHR-MOV-OO-RWST MSS-VCF-HW-ISOL	RCS-XHE-DIAG SGTR-08-NREC
2.0E-007	4.4	HPI-XHE-XM-THRTL RHR-XHE-SUCTION	MSS-VCF-HW-ISOL SGTR-08-NREC
1.4E-007	3.0	RCS-XHE-DIAG RHR-XHE-SUCTION	MSS-VCF-HW-ISOL SGTR-08-NREC
1.2E-007	2.6	RHR-MDP-CF-ALL MSS-VCF-HW-ISOL	RCS-XHE-XM-SG SGTR-08-NREC
1.0E-007	2.2	HPI-XHE-XM-THRTL MSS-VCF-HW-ISOL	RHR-XHE-XM SGTR-08-NREC
8.0E-008	1.7	RHR-MDP-FC-2B MSS-XHE-XM-ERROR	RCS-XHE-XM-SG SGTR-08-NREC
6.8E-008	1.5	RCS-XHE-DIAG MSS-VCF-HW-ISOL	RHR-XHE-XM SGTR-08-NREC
6.3E-008	1.4	RHR-MOV-OO-RWST MSS-XHE-XM-ERROR	RCS-XHE-XM-SG SGTR-08-NREC
5.6E-008	1.2	RHR-MDP-CF-ALL MSS-VCF-HW-ISOL	HPI-XHE-XM-THRTL SGTR-08-NREC
5.5E-008	1.2	RCS-XHE-XM-SG MSS-VCF-HW-ISOL	RHR-MOV-CF-DIS SGTR-08-NREC

BASIC EVENTS (Cut Sets Only)

Event Name Curr Prob	Description
----- ACP-BAC-LP-2-3A 9.0E-005	DIVISION 2A/3A AC POWER 480V BUS FAILS
AFW-AOV-CC-MSG21 1.1E-003	SG-21 FLOW CONTROL VALVE 406A FAILS
AFW-AOV-CF-SGS 1.9E-005	CCF OF STEAM GENERATOR INLET AOV'S (FCVS)
AFW-CKV-CC-SG21 1.0E-004	STEAM GENERATOR 21 INLET CHECK VALVE FAILS
AFW-CKV-CF-PMPS 2.7E-006	CCF OF AFW PUMP DISCHARGE CHECK VALVES
AFW-CKV-CF-SGS-S 2.7E-006	CCF OF SG INLET CHECK VALVES - SGTR
AFW-CKV-CF-SUCT 2.7E-006	CCF OF AFW PUMP SUCTION CHECK VALVES
AFW-MDP-CF-AB 2.1E-004	COMMON CAUSE FAILURE OF MOTOR DRIVEN PUMPS
AFW-MDP-FC-21 3.9E-003	AFW MOTOR DRIVEN PUMP 21 FAILS

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AFW-PMP-CF-ALL	COMMON CAUSE FAILURE OF AFW PUMPS
5.6E-005	
AFW-TDP-FC-22	AFW TURBINE DRIVEN PUMP 22 FAILS
3.3E-002	
HPI-XHE-XM-THRTL	OPERATOR FAILS TO THROTTLE HPI TO REDUCE PRES
1.0E-002	
MSS-VCF-HW-ISOL	RUPTURED STEAM GENERATOR ISOLATION FAILURES
1.0E-002	
MSS-XHE-XM-ERROR	OPERATOR FAILS TO ISOLATE FAULTED STEAM GENER
1.0E-003	
PCS-PSF-HW	HARDWARE FAILURES CAUSING FAILURE TO DEPRESSU
1.0E-005	
PCS-VCF-HW	TBVS/COND/CIR FAILURES
3.0E-003	
PCS-XHE-XM-RCOOL	OPERATOR FAILS TO INITIATE RCS COOLDOWN BELOW
1.0E-003	
RCS-XHE-DIAG	OPERATOR FAILS TO DIAGNOSE SGTR TO START PROC
6.8E-003	
RCS-XHE-RECOVER	OPERATOR FAILS TO DEPRESSURIZE RCS BELOW SG S
3.5E-003	
RCS-XHE-XM-SG	OPERATOR FAILS TO INITIATE RCS DEPRESSURIZATI
2.1E-002	
RHR-MDP-CF-ALL	RHR PUMP COMMON CAUSE FAILURES
5.6E-004	
RHR-MDP-FC-2B	RHR TRAIN B FAILS
3.8E-003	
RHR-MOV-CF-DIS	COMMON CAUSE FAILURE OF RHR DISCHARGE MOV S
2.6E-004	
RHR-MOV-OC-VLV	RHR DISCHARGE VALVE FAILS
1.4E-004	
RHR-MOV-OO-RWST	RHR/RWST ISOLATION MOV FAILS
3.0E-003	
RHR-XHE-SUCTION	OPERATOR FAILS TO RECOVER RHR SUCTION PATH
2.0E-003	

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Event Name Curr Prob	Description
RHR-XHE-XM 1.0E-003	OPERATOR FAILS TO INITIATE RHR SYSTEM
RPS-BKR-FC-FTO 5.7E-006	RPS BREAKERS FAIL TO OPEN
RPS-VCF-FO-ELEC 4.3E-004	CONTROL ROD DRIVES REMAIN ENERGIZED
RPS-VCF-FO-MECH 8.9E-008	CONTROL ROD ASSEMBLIES FAIL TO INSERT
RPS-XHE-ERROR 2.0E-001	OPERATOR FAILS TO DE-ENERGIZE MG SETS
RPS-XHE-XM-SCRAM 1.0E-002	OPERATOR FAILS TO MANUALLY TRIP THE REACTOR
SGTR-03-NREC 1.0E+000	SGTR SEQUENCE 03 NONRECOVERY PROBABILITY
SGTR-04-NREC 1.0E+000	SGTR SEQUENCE 04 NONRECOVERY PROBABILITY
SGTR-05-NREC 1.0E+000	SGTR SEQUENCE 05 NONRECOVERY PROBABILITY
SGTR-08-NREC 1.0E+000	SGTR SEQUENCE 08 NONRECOVERY PROBABILITY
SGTR-11-NREC 1.0E+000	SGTR SEQUENCE 11 NONRECOVERY PROBABILITY
SGTR-43-NREC 2.2E-001	SGTR SEQUENCE 43 NONRECOVERY PROBABILITY
SGTR-44-NREC 1.0E+000	SGTR SEQUENCE 44 NONRECOVERY PROBABILITY

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I N I T I A T I N G E V E N T A S S E S S M E N T

Fam : IPT2_2QA
User :
Ev ID: SGTR W/BUS 6A OOS
Desc : Initiating Event Assessment

Code Ver : 6:68
Model Ver : 1998/04/14
Init Event: IE-SGTR
Total CCDP: 4.6E-004

BASIC EVENT CHANGES				
Event Name Type	Description	Base Prob	Curr Prob	Prob
ACP-BAC-LP-6A TRUE	DIVISION 6A AC POWER 480V BU	9.0E-005	1.0E+000	
HPI-XHE-XM-THRTL IE-LOOP	OPERATOR FAILS TO THROTTLE H LOSS OF OFFSITE POWER INITIA	1.0E-002	5.0E-003	
IE-SGTR	STEAM GENERATOR TUBE RUPTURE	1.6E-006	1.0E+000	
IE-SLOCA	SMALL LOCA INITIATING EVENT	2.3E-006	+0.0E+000	
IE-TRANS	TRANSIENT INITIATING EVENT	2.7E-004	+0.0E+000	
MSS-XHE-XM-ERROR	OPERATOR FAILS TO ISOLATE FA	1.0E-003	5.0E-003	
RCS-XHE-DIAG	OPERATOR FAILS TO DIAGNOSE S	6.8E-003	2.1E-002	
RCS-XHE-RECOVER	OPERATOR FAILS TO DEPRESSURI	3.5E-003	5.0E-003	
RCS-XHE-XM-SG	OPERATOR FAILS TO INITIATE R	2.1E-002	5.0E-003	

SEQUENCE PROBABILITIES

Truncation : Cumulative : 100.0% Individual : 0.0%

Event Tree Name %Cont	Sequence Name	CCDP
SGTR 34.8	03	1.6E-004
SGTR 34.8	11	1.6E-004
SGTR 13.0	04	6.0E-005
SGTR 12.4	43	5.7E-005
SGTR 2.2	05	1.0E-005

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SGTR	44	5.5E-006
1.2		
SGTR	08	5.1E-006
1.1		
SGTR	13	3.4E-006
0.7		
SGTR	09	1.9E-006
0.4		
SGTR	10	3.1E-007
0.1		
SGTR	16	8.8E-008
0.0		
SGTR	18	2.9E-008
0.0		
SGTR	14	2.2E-009
0.0		
SGTR	17	5.8E-011
0.0		

SEQUENCE LOGIC

Event Tree	Sequence Name	Logic
SGTR	03	/RT /HPI /SG-DEP /AFW-SGTR /RCS-SG SGISOL

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		/RCS-DEP	RHR
SGTR	11	/RT /HPI DEP-REC	/AFW-SGTR RCS-SG
SGTR	04	/RT /HPI /SG-DEP RCS-DEP	/AFW-SGTR /RCS-SG SGISOL
SGTR	43	/RT MFW-NT	AFW-SGTR F&B
SGTR	05	/RT /HPI SG-DEP	/AFW-SGTR /RCS-SG
SGTR	44	RT	
SGTR	08	/RT /HPI /DEP-REC SGISOL1 RHR	/AFW-SGTR RCS-SG /SG-DEP /RCS-DEP
SGTR	13	/RT HPI /SG-DEP	/AFW-SGTR /RCS-SG1 SGISOL
SGTR	09	/RT /HPI /DEP-REC SGISOL1	/AFW-SGTR RCS-SG /SG-DEP RCS-DEP
SGTR	10	/RT /HPI /DEP-REC	/AFW-SGTR RCS-SG SG-DEP
SGTR	16	/RT HPI /DEP-REC SGISOL1	/AFW-SGTR RCS-SG1 /SG-DEP
SGTR	18	/RT HPI DEP-REC	/AFW-SGTR RCS-SG1

Loss of Safeguards Electrical Bus 6A
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SGTR

14

/RT
HPI
SG-DEP

/AFW-SGTR
/RCS-SG1

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SGTR	17	/RT	/AFW-SGTR
		HPI	RCS-SG1
		/DEP-REC	SG-DEP

Fault Tree Name	Description
AFW-SGTR	NO OR INSUFFICIENT AFW FLOW DURING SGTR
DEP-REC	OPERATOR FAILS TO DEPRESSURIZE RCS GIVEN SG ADV
OR SR	
F&B	FAILURE TO PROVIDE FEED AND BLEED COOLING
HPI	NO OR INSUFFICIENT FLOW FROM THE HPI SYSTEM
MFW-NT	FAILURE OF THE MAIN FEEDWATER SYSTEM DURING
NON-TRANS	
RCS-DEP	FAILURE TO COOLDOWN RCS TO < RHR PRESSURE
RCS-SG	OPERATOR FAILS TO LOWER RCS PRESSURE TO < SG
RV SETP	
RCS-SG1	OPERATOR FAILS TO LOWER RCS PRESSURE TO < SG RV
SETPO	
RHR	NO OR INSUFFICIENT FLOW FROM THE RHR SYSTEM
RT	REACTOR FAILS TO TRIP DURING TRANSIENT
SG-DEP	HARDWARE FAILS TO LOWER RCS PRESSURE TO < SG RV
SETPO	
SGISOL	FAILURE TO ISOLATE RUPTURED SG BEFORE RWST
DEPLETION	
SGISOL1	FAILURE TO DEPRESSURIZE RCS TO ISOLATE SG

SEQUENCE CUT SETS

Truncation: Cumulative: 100.0% Individual: 1.0%

CCDP: 1.6E-004

Event Tree: SGTR
Sequence: 03

CCDP	% Cut Set	Cut Set Events
3.8E-005	23.3	RHR-MDP-FC-2B SGTR-03-NREC MSS-VCF-HW-ISOL
3.0E-005	18.4	RHR-MOV-OO-RWST SGTR-03-NREC MSS-VCF-HW-ISOL
2.0E-005	12.2	MSS-VCF-HW-ISOL SGTR-03-NREC RHR-XHE-SUCTION

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1.9E-005	11.6	RHR-MDP-FC-2B SGTR-03-NREC	MSS-XHE-XM-ERROR
1.5E-005	9.2	RHR-MOV-OO-RWST SGTR-03-NREC	MSS-XHE-XM-ERROR
1.0E-005	6.1	MSS-XHE-XM-ERROR SGTR-03-NREC	RHR-XHE-SUCTION
1.0E-005	6.1	RHR-XHE-XM SGTR-03-NREC	MSS-VCF-HW-ISOL
5.6E-006	3.4	RHR-MDP-CF-ALL SGTR-03-NREC	MSS-VCF-HW-ISOL
5.0E-006	3.1	RHR-XHE-XM SGTR-03-NREC	MSS-XHE-XM-ERROR
2.8E-006	1.7	RHR-MDP-CF-ALL SGTR-03-NREC	MSS-XHE-XM-ERROR

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6.5E-007	1.1	AFW-TDP-FC-22	ACP-BAC-LP-2-3A
		SGTR-43-NREC	
5.9E-007	1.0	AFW-CKV-CF-SUCT	SGTR-43-NREC
5.9E-007	1.0	AFW-CKV-CF-SGS-S	SGTR-43-NREC
5.9E-007	1.0	AFW-CKV-CF-PMPS	SGTR-43-NREC

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Sequence: 05

CCDP: 1.0E-005

CCDP	% Cut Set	Cut Set Events	
1.0E-005	100.0	PCS-PSF-HW	SGTR-05-NREC

Event Tree: SGTR
Sequence: 44

CCDP: 5.5E-006

CCDP	% Cut Set	Cut Set Events	
4.3E-006	77.8	RPS-XHE-XM-SCRAM	RPS-VCF-FO-ELEC
1.1E-006	20.6	SGTR-44-NREC	RPS-XHE-ERROR
8.9E-008	1.6	RPS-BKR-FC-FTO	SGTR-44-NREC
		SGTR-44-NREC	
		RPS-VCF-FO-MECH	

Event Tree: SGTR
Sequence: 08

CCDP: 5.1E-006

CCDP	% Cut Set	Cut Set Events	
8.0E-007	15.6	RHR-MDP-FC-2B	RCS-XHE-DIAG
6.3E-007	12.3	MSS-VCF-HW-ISOL	SGTR-08-NREC
4.2E-007	8.2	RHR-MOV-OO-RWST	RCS-XHE-DIAG
4.0E-007	7.8	MSS-VCF-HW-ISOL	SGTR-08-NREC
3.2E-007	6.2	RCS-XHE-DIAG	MSS-VCF-HW-ISOL
2.1E-007	4.1	RHR-XHE-SUCTION	SGTR-08-NREC
2.1E-007	4.1	RHR-MDP-FC-2B	RCS-XHE-DIAG
1.9E-007	3.7	MSS-XHE-XM-ERROR	SGTR-08-NREC
1.9E-007	3.7	RHR-MOV-OO-RWST	RCS-XHE-DIAG
1.5E-007	2.9	MSS-XHE-XM-ERROR	SGTR-08-NREC
		RCS-XHE-DIAG	RHR-XHE-XM
		MSS-VCF-HW-ISOL	SGTR-08-NREC
		RCS-XHE-DIAG	MSS-XHE-XM-ERROR
		RHR-XHE-SUCTION	SGTR-08-NREC
		RHR-MDP-FC-2B	HPI-XHE-XM-THRTL
		MSS-VCF-HW-ISOL	SGTR-08-NREC
		RHR-MDP-FC-2B	RCS-XHE-XM-SG
		MSS-VCF-HW-ISOL	SGTR-08-NREC
		RHR-MOV-OO-RWST	HPI-XHE-XM-THRTL
		MSS-VCF-HW-ISOL	SGTR-08-NREC

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1.5E-007	2.9	RHR-MOV-OO-RWST	RCS-XHE-XM-SG
		MSS-VCF-HW-ISOL	SGTR-08-NREC
1.2E-007	2.3	RHR-MDP-CF-ALL	RCS-XHE-DIAG
		MSS-VCF-HW-ISOL	SGTR-08-NREC
1.1E-007	2.1	RCS-XHE-DIAG	RHR-XHE-XM
		MSS-XHE-XM-ERROR	SGTR-08-NREC
1.0E-007	2.0	HPI-XHE-XM-THRTL	MSS-VCF-HW-ISOL
		RHR-XHE-SUCTION	SGTR-08-NREC

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1.0E-007	2.0	RCS-XHE-XM-SG RHR-XHE-SUCTION	MSS-VCF-HW-ISOL SGTR-08-NREC
9.5E-008	1.9	RHR-MDP-FC-2B MSS-XHE-XM-ERROR	HPI-XHE-XM-THRTL SGTR-08-NREC
9.5E-008	1.9	RHR-MDP-FC-2B MSS-XHE-XM-ERROR	RCS-XHE-XM-SG SGTR-08-NREC
7.5E-008	1.5	RHR-MOV-OO-RWST MSS-XHE-XM-ERROR	HPI-XHE-XM-THRTL SGTR-08-NREC
7.5E-008	1.5	RHR-MOV-OO-RWST MSS-XHE-XM-ERROR	RCS-XHE-XM-SG SGTR-08-NREC
5.9E-008	1.2	RHR-MDP-CF-ALL MSS-XHE-XM-ERROR	RCS-XHE-DIAG SGTR-08-NREC
5.5E-008	1.1	RCS-XHE-DIAG MSS-VCF-HW-ISOL	RHR-MOV-CF-DIS SGTR-08-NREC

Event Tree: SGTR
Sequence: 13

CCDP: 3.4E-006

CCDP	% Cut Set	Cut Set Events	
-----	-----	-----	-----
1.2E-006	35.1	HPI-MOV-OC-SUCT SGTR-13-NREC	MSS-VCF-HW-ISOL
7.6E-007	22.8	HPI-MDP-CF-ALL SGTR-13-NREC	MSS-VCF-HW-ISOL
5.9E-007	17.5	HPI-MOV-OC-SUCT SGTR-13-NREC	MSS-XHE-XM-ERROR
3.8E-007	11.4	HPI-MDP-CF-ALL SGTR-13-NREC	MSS-XHE-XM-ERROR
1.2E-007	3.7	HPI-MDP-FC-2A MSS-VCF-HW-ISOL	HPI-MDP-FC-2B SGTR-13-NREC
9.2E-008	2.8	MSS-VCF-HW-ISOL SGTR-13-NREC	HPI-CKV-CF-CLINJ
6.2E-008	1.9	HPI-MDP-FC-2A MSS-XHE-XM-ERROR	HPI-MDP-FC-2B SGTR-13-NREC
4.6E-008	1.4	MSS-XHE-XM-ERROR SGTR-13-NREC	HPI-CKV-CF-CLINJ

Event Tree: SGTR
Sequence: 09

CCDP: 1.9E-006

CCDP	% Cut Set	Cut Set Events	
-----	-----	-----	-----
6.3E-007	33.6	PCS-VCF-HW MSS-VCF-HW-ISOL	RCS-XHE-DIAG SGTR-09-NREC
3.2E-007	16.8	PCS-VCF-HW	RCS-XHE-DIAG

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2.1E-007	11.2	MSS-XHE-XM-ERROR	SGTR-09-NREC
		PCS-XHE-XM-RCOOL	RCS-XHE-DIAG
		MSS-VCF-HW-ISOL	SGTR-09-NREC
1.5E-007	8.0	PCS-VCF-HW	RCS-XHE-XM-SG
		MSS-VCF-HW-ISOL	SGTR-09-NREC
1.5E-007	8.0	PCS-VCF-HW	HPI-XHE-XM-THRTL
		MSS-VCF-HW-ISOL	SGTR-09-NREC

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1.1E-007	5.6	PCS-XHE-XM-RCOOL MSS-XHE-XM-ERROR	RCS-XHE-DIAG SGTR-09-NREC
7.5E-008	4.0	PCS-VCF-HW MSS-XHE-XM-ERROR	HPI-XHE-XM-THRTL SGTR-09-NREC
7.5E-008	4.0	PCS-VCF-HW MSS-XHE-XM-ERROR	RCS-XHE-XM-SG SGTR-09-NREC
5.0E-008	2.7	PCS-XHE-XM-RCOOL MSS-VCF-HW-ISOL	RCS-XHE-XM-SG SGTR-09-NREC
5.0E-008	2.7	PCS-XHE-XM-RCOOL MSS-VCF-HW-ISOL	HPI-XHE-XM-THRTL SGTR-09-NREC
2.5E-008	1.3	PCS-XHE-XM-RCOOL MSS-XHE-XM-ERROR	HPI-XHE-XM-THRTL SGTR-09-NREC
2.5E-008	1.3	PCS-XHE-XM-RCOOL MSS-XHE-XM-ERROR	RCS-XHE-XM-SG SGTR-09-NREC

Event Tree: SGTR
Sequence: 10

CCDP: 3.1E-007

CCDP	% Cut Set	Cut Set Events	
2.1E-007	67.7	RCS-XHE-DIAG SGTR-10-NREC	PCS-PSF-HW
5.0E-008	16.1	RCS-XHE-XM-SG SGTR-10-NREC	PCS-PSF-HW
5.0E-008	16.1	HPI-XHE-XM-THRTL SGTR-10-NREC	PCS-PSF-HW

Event Tree: SGTR
Sequence: 16

CCDP: 8.8E-008

CCDP	% Cut Set	Cut Set Events	
2.5E-008	28.1	HPI-MOV-OC-SUCT MSS-VCF-HW-ISOL	RCS-XHE-DIAG SGTR-16-NREC
1.6E-008	18.3	HPI-MDP-CF-ALL MSS-VCF-HW-ISOL	RCS-XHE-DIAG SGTR-16-NREC
1.2E-008	14.1	HPI-MOV-OC-SUCT MSS-XHE-XM-ERROR	RCS-XHE-DIAG SGTR-16-NREC
8.0E-009	9.1	HPI-MDP-CF-ALL MSS-XHE-XM-ERROR	RCS-XHE-DIAG SGTR-16-NREC
5.9E-009	6.7	HPI-MOV-OC-SUCT MSS-VCF-HW-ISOL	RCS-XHE-XM-SG SGTR-16-NREC
3.8E-009	4.4	HPI-MDP-CF-ALL MSS-VCF-HW-ISOL	RCS-XHE-XM-SG SGTR-16-NREC
2.9E-009	3.3	HPI-MOV-OC-SUCT	RCS-XHE-XM-SG

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2.6E-009	3.0	MSS-XHE-XM-ERROR HPI-MDP-FC-2A RCS-XHE-DIAG SGTR-16-NREC	SGTR-16-NREC HPI-MDP-FC-2B MSS-VCF-HW-ISOL
1.9E-009	2.2	RCS-XHE-DIAG HPI-CKV-CF-CLINJ	MSS-VCF-HW-ISOL SGTR-16-NREC
1.9E-009	2.2	HPI-MDP-CF-ALL	RCS-XHE-XM-SG

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1.3E-009	1.5	MSS-XHE-XM-ERROR HPI-MDP-FC-2A RCS-XHE-DIAG SGTR-16-NREC	SGTR-16-NREC HPI-MDP-FC-2B MSS-XHE-XM-ERROR
9.7E-010	1.1	RCS-XHE-DIAG HPI-CKV-CF-CLINJ	MSS-XHE-XM-ERROR SGTR-16-NREC

Event Tree: SGTR
Sequence: 18

CCDP: 2.9E-008

CCDP	% Cut Set	Cut Set Events	
-----	-----	-----	-----
1.2E-008	42.5	RCS-XHE-RECOVER RCS-XHE-DIAG	HPI-MOV-OC-SUCT SGTR-18-NREC
8.0E-009	27.6	RCS-XHE-RECOVER RCS-XHE-DIAG	HPI-MDP-CF-ALL SGTR-18-NREC
2.9E-009	10.1	RCS-XHE-RECOVER RCS-XHE-XM-SG	HPI-MOV-OC-SUCT SGTR-18-NREC
1.9E-009	6.6	RCS-XHE-RECOVER RCS-XHE-XM-SG	HPI-MDP-CF-ALL SGTR-18-NREC
1.3E-009	4.5	RCS-XHE-RECOVER HPI-MDP-FC-2B SGTR-18-NREC	HPI-MDP-FC-2A RCS-XHE-DIAG
9.7E-010	3.3	RCS-XHE-RECOVER HPI-CKV-CF-CLINJ	RCS-XHE-DIAG SGTR-18-NREC
3.1E-010	1.1	RCS-XHE-RECOVER HPI-MDP-FC-2B SGTR-18-NREC	HPI-MDP-FC-2A RCS-XHE-XM-SG

Event Tree: SGTR
Sequence: 14

CCDP: 2.2E-009

CCDP	% Cut Set	Cut Set Events	
-----	-----	-----	-----
1.2E-009	52.6	HPI-MOV-OC-SUCT SGTR-14-NREC	PCS-PSF-HW
7.6E-010	34.2	HPI-MDP-CF-ALL SGTR-14-NREC	PCS-PSF-HW
1.2E-010	5.6	HPI-MDP-FC-2A PCS-PSF-HW	HPI-MDP-FC-2B SGTR-14-NREC
9.2E-011	4.1	PCS-PSF-HW SGTR-14-NREC	HPI-CKV-CF-CLINJ
2.3E-011	1.0	HPI-TNK-VF-RWST SGTR-14-NREC	PCS-PSF-HW
2.3E-011	1.0	PCS-PSF-HW	HPI-CKV-CF-PMPS

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Coincident with a Steam Generator Tube Rupture

SGTR-14-NREC

Event Tree: SGTR
Sequence: 17

CCDP: 5.8E-011

CCDP	% Cut Set	Cut Set Events
-----	-----	-----

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2.5E-011	42.5	HPI-MOV-OC-SUCT PCS-PSF-HW	RCS-XHE-DIAG SGTR-17-NREC
1.6E-011	27.6	HPI-MDP-CF-ALL PCS-PSF-HW	RCS-XHE-DIAG SGTR-17-NREC
5.9E-012	10.1	HPI-MOV-OC-SUCT PCS-PSF-HW	RCS-XHE-XM-SG SGTR-17-NREC
3.8E-012	6.6	HPI-MDP-CF-ALL PCS-PSF-HW	RCS-XHE-XM-SG SGTR-17-NREC
2.6E-012	4.5	HPI-MDP-FC-2A RCS-XHE-DIAG SGTR-17-NREC	HPI-MDP-FC-2B PCS-PSF-HW
1.9E-012	3.3	RCS-XHE-DIAG HPI-CKV-CF-CLINJ	PCS-PSF-HW SGTR-17-NREC
6.2E-013	1.1	HPI-MDP-FC-2A RCS-XHE-XM-SG SGTR-17-NREC	HPI-MDP-FC-2B PCS-PSF-HW

BASIC EVENTS (Cut Sets Only)

Event Name Curr Prob	Description
----- -----	
ACP-BAC-LP-2-3A 9.0E-005	DIVISION 2A/3A AC POWER 480V BUS FAILS
AFW-AOV-CC-MSG21 1.1E-003	SG-21 FLOW CONTROL VALVE 406A FAILS
AFW-AOV-CF-SGS 1.9E-005	CCF OF STEAM GENERATOR INLET AOVs (FCVS)
AFW-CKV-CC-SG21 1.0E-004	STEAM GENERATOR 21 INLET CHECK VALVE FAILS
AFW-CKV-CF-PMPS 2.7E-006	CCF OF AFW PUMP DISCHARGE CHECK VALVES
AFW-CKV-CF-SGS-S 2.7E-006	CCF OF SG INLET CHECK VALVES - SGTR
AFW-CKV-CF-SUCT 2.7E-006	CCF OF AFW PUMP SUCTION CHECK VALVES
AFW-MDP-CF-AB 2.1E-004	COMMON CAUSE FAILURE OF MOTOR DRIVEN PUMPS
AFW-MDP-FC-21 3.9E-003	AFW MOTOR DRIVEN PUMP 21 FAILS
AFW-PMP-CF-ALL 5.6E-005	COMMON CAUSE FAILURE OF AFW PUMPS
AFW-TDP-FC-22 3.3E-002	AFW TURBINE DRIVEN PUMP 22 FAILS

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HPI-CKV-CF-CLINJ 1.1E-005	CCF OF COLD LEG INLET CHECK VALVES
HPI-CKV-CF-PMPS 2.7E-006	CCF OF HPI PUMP DISCHARGE CHECK VALVES
HPI-MDP-CF-ALL 9.1E-005	HPI PUMP COMMON CAUSE FAILURES
HPI-MDP-FC-2A 3.9E-003	HPI TRAIN A FAILS
HPI-MDP-FC-2B 3.8E-003	HPI TRAIN B FAILS
HPI-MOV-OC-SUCT 1.4E-004	HPI SUCTION VALVES FAIL
HPI-TNK-VF-RWST 2.7E-006	RWST NOT AVAILABLE
HPI-XHE-XM-THRTL 5.0E-003	OPERATOR FAILS TO THROTTLE HPI TO REDUCE PRES
MSS-VCF-HW-ISOL 1.0E-002	RUPTURED STEAM GENERATOR ISOLATION FAILURES
MSS-XHE-XM-ERROR 5.0E-003	OPERATOR FAILS TO ISOLATE FAULTED STEAM GENER
PCS-PSF-HW 1.0E-005	HARDWARE FAILURES CAUSING FAILURE TO DEPRESSU
PCS-VCF-HW 3.0E-003	TBVS/COND/CIR FAILURES
PCS-XHE-XM-RCOOL 1.0E-003	OPERATOR FAILS TO INITIATE RCS COOLDOWN BELOW
RCS-XHE-DIAG 2.1E-002	OPERATOR FAILS TO DIAGNOSE SGTR TO START PROC
RCS-XHE-RECOVER 5.0E-003	OPERATOR FAILS TO DEPRESSURIZE RCS BELOW SG S
RCS-XHE-XM-SG 5.0E-003	OPERATOR FAILS TO INITIATE RCS DEPRESSURIZATI
RHR-MDP-CF-ALL 5.6E-004	RHR PUMP COMMON CAUSE FAILURES
RHR-MDP-FC-2B 3.8E-003	RHR TRAIN B FAILS
RHR-MOV-CF-DIS 2.6E-004	COMMON CAUSE FAILURE OF RHR DISCHARGE MOVES

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Event Name Curr Prob	Description
RHR-MOV-OO-RWST 3.0E-003	RHR/RWST ISOLATION MOV FAILS
RHR-XHE-SUCTION 2.0E-003	OPERATOR FAILS TO RECOVER RHR SUCTION PATH
RHR-XHE-XM 1.0E-003	OPERATOR FAILS TO INITIATE RHR SYSTEM
RPS-BKR-FC-FTO 5.7E-006	RPS BREAKERS FAIL TO OPEN
RPS-VCF-FO-ELEC 4.3E-004	CONTROL ROD DRIVES REMAIN ENERGIZED
RPS-VCF-FO-MECH 8.9E-008	CONTROL ROD ASSEMBLIES FAIL TO INSERT
RPS-XHE-ERROR 2.0E-001	OPERATOR FAILS TO DE-ENERGIZE MG SETS
RPS-XHE-XM-SCRAM 1.0E-002	OPERATOR FAILS TO MANUALLY TRIP THE REACTOR
SGTR-03-NREC 1.0E+000	SGTR SEQUENCE 03 NONRECOVERY PROBABILITY
SGTR-04-NREC 1.0E+000	SGTR SEQUENCE 04 NONRECOVERY PROBABILITY
SGTR-05-NREC 1.0E+000	SGTR SEQUENCE 05 NONRECOVERY PROBABILITY
SGTR-08-NREC 1.0E+000	SGTR SEQUENCE 08 NONRECOVERY PROBABILITY
SGTR-09-NREC 1.0E+000	SGTR SEQUENCE 09 NONRECOVERY PROBABILITY
SGTR-10-NREC 1.0E+000	SGTR SEQUENCE 10 NONRECOVERY PROBABILITY
SGTR-11-NREC 1.0E+000	SGTR SEQUENCE 11 NONRECOVERY PROBABILITY
SGTR-13-NREC 8.4E-001	SGTR SEQUENCE 13 NONRECOVERY PROBABILITY
SGTR-14-NREC 8.4E-001	SGTR SEQUENCE 14 NONRECOVERY PROBABILITY
SGTR-16-NREC 8.4E-001	SGTR SEQUENCE 16 NONRECOVERY PROBABILITY
SGTR-17-NREC 8.4E-001	SGTR SEQUENCE 17 NONRECOVERY PROBABILITY
SGTR-18-NREC 8.4E-001	SGTR SEQUENCE 18 NONRECOVERY PROBABILITY
SGTR-43-NREC 2.2E-001	SGTR SEQUENCE 43 NONRECOVERY PROBABILITY
SGTR-44-NREC	SGTR SEQUENCE 44 NONRECOVERY PROBABILITY

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Loss of Safeguards Electrical Bus 6A
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1.0E+000