UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET SW SUITE 23T85
ATLANTA, GEORGIA 30303-8931

January 14, 2005

EA-05-008

South Carolina Electric & Gas Company
ATTN: Mr. Jeffery B. Archie
Senior Vice President, Nuclear Operations
Virgil C. Summer Nuclear Station
P. O. Box 88
Jenkinsville, SC 29065

SUBJECT: VIRGIL C. SUMMER NUCLEAR STATION - NRC INSPECTION REPORT 05000395/2005006; PRELIMINARY WHITE FINDING

Dear Mr. Archie:

This letter and the enclosed supporting documentation discuss a finding that appears to have low to moderate safety significance [White]. Section 4OA5.2.1.1 of NRC Inspection Report 05000395/2004009, issued on December 22, 2004, identified this finding [Unresolved Item (URI) 05000395/2004009-01] which concerned inadequacies in your corrective actions associated with a deficiency in the design of the emergency feedwater (EFW) system flow control valves. This deficiency could have resulted in a common mode failure of the EFW system as a result of plugging of the valves by tubercles and debris in the service water system. This item was unresolved pending the NRC's determination of the safety significance.

This finding was assessed based on the best available information, including influential assumptions, using the applicable Significance Determination Process (SDP) and was preliminarily determined to be a White finding (i.e., a finding with some increased importance to safety, which may require additional NRC inspection).

As indicated in the enclosed SDP Phase III Analysis, the issue appears to have a low to moderate safety significance due to the importance of continued EFW system availability, when supplied by the service water suction source, during events which deplete or render the condensate storage tank inoperable. However, the risk associated with this deficiency was somewhat mitigated by the fact that the finding only affected the alternate suction source for the EFW system and did not impact normal EFW system operation. Additionally, other core cooling mechanisms, such as use of the main feedwater system or primary system feed and bleed were not affected.

This finding does not present an immediate safety concern because you instituted compensatory measures including operator actions to install temporary hoses to bypass the EFW flow control valves if they become plugged.

Two apparent violations (AV) of 10 CFR 50, Appendix B were identified regarding this finding. The first, an apparent violation of Criterion III, Design Control, is identified as AV 05000395/2005006-01: EFW Flow Control Valves Are Susceptible to Plugging by Tubercles and Other Debris from Service Water. The second, an apparent violation of Criterion XVI, Corrective Actions, is identified as AV 05000395/2005006-02: Inadequate Corrective Actions in Response to Potential EFW Control Valve Plugging. These apparent violations are being considered for escalated enforcement action in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions (Enforcement Policy), NUREG-1600." The current Enforcement Policy is included on the NRC's website at http://www.nrc.gov/what-we-do/regulatory/enforcement/enforce-pol.html. Accordingly, for administrative purposes, URI 05000395/2004009-01, is considered closed.

Before we make a final decision on this matter, we are providing you an opportunity (1) to present to the NRC your perspectives on the facts and assumptions, used by the NRC to arrive at the finding and its significance, at a Regulatory Conference or (2) submit your position on the finding to the NRC in writing. If you request a Regulatory Conference, it should be held within 30 days of the receipt of this letter and we encourage you to submit supporting documentation at least one week prior to the conference in an effort to make the conference more efficient and effective. If a Regulatory Conference is held, it will be open for public observation and the NRC will issue a press release to announce the conference. If you decide to submit only a written response, such submittal should be sent to the NRC within 30 days of the receipt of this letter.

Please contact Mr. Charles R. Ogle at (404) 562-4605 within seven days of the date of this letter to notify the NRC of your intentions regarding the regulatory conference for the preliminary White finding. If we have not heard from you within 10 days, we will continue with our significance determination and associated enforcement processes on this finding, and you will be advised by separate correspondence of the results of our deliberations on this matter.

Since the NRC has not made a final determination in this matter, no Notice of Violation is being issued for the inspection finding at this time. In addition, please be advised that the number and characterization of the apparent violations may change as a result of further NRC review.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

If you have any questions regarding this letter, please contact me at (404) 562-4600.

Sincerely,

/RA By R. Haag For/

Charles A. Casto, Director
Division of Reactor Safety

Docket No.: 50-395
License No.: NPF-12

Enclosure: SDP Phase III Analysis w/Attachments

cc w/encl.:
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*For Previous Concurrence See Attached Copy

OFFICE	RII:DRS	RII:DRS	RII:DRS	RII:DRP	RII:EICS		
SIGNATURE	CRO	JHM2	RPS	KDL	CFE		
NAME	COgle	JMoorman	BSchin	KLandis	CEvans		
DATE	1/13/2005	1/13/2005	1/13/2005	1/13/2005	1/13/2005		
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO
PUBLIC DOCUMENT	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

OFFICIAL RECORD COPY DOCUMENT NAME: E:\Filenet\ML050410097.wpd

SRA Analysis Number: SUM0403
Analysis Type: SDP Phase III
Inspection Report # : 2005006
Plant Name: V. C. Summer
Unit Number: 1
Enforcement Action #: EA-05-008

I. Background - At V.C. Summer the Condensate Storage Tank (CST) is the normal suction supply for the Emergency Feedwater System (standard Westinghouse design - two motor driven and one turbine driven prime movers). Since the CST is not design to withstand tornados, an alternate supply from the Service Water System was provided. The piping interconnecting the two systems contains stagnant service water. Microbiological tubercles are growing and have been growing for many years on the inside diameter of these stagnant pipe segments.

The most flow-restricting passages in the system are in the flow control valves (IFV-3531-EF, IFV-3541-EF, IFV-3551-EF, IFV-3536-EF, IFV-3546-EF, and IFV-3556-EF). The flow control valves contain a cylindrical trim with several hundred orifices through which the EFW flow to each steam generator passes. Based upon observing a spare flow control valve trim, the orifices are widened with a countersink to about 0.125 inches in diameter on the flow entry side and narrow to 0.049 inches in diameter on the flow exit side. The total flow area of the orifices in a single valve trim is about 0.91 square inches. There are no strainers in the EFW system that would prevent particles larger than the these flow-restricting passages from entering the system. The NRC team physically agitated samples of tubercles by rapidly shaking them in a container, to simulate turbulent flow through an EFW pump, and found that most of the tubercle pieces did not pulverize but instead broke into small solid pieces approximately 0.125 to 0.25 inches in diameter. The tubercle pieces were larger than the orifices and therefore could potentially plug the orifices. The team calculated that, with an operating differential pressure across a flow control valve of about 100 pounds per square inch, the differential pressure across each orifice would be about 0.2 pounds. The team found that the sample tubercle pieces were resistant to compressive forces, so that if they became wedged into the orifices, they would likely be able to withstand much more than 0.2 pounds of compressive forces without breaking up.

The original purchase specification for the EFW flow control valves (SP-620-044461-000, dated October 16, 1974) had identified the process fluid as "cold condensate." Therefore, these EFW valves had been specified for use with clean condensate water and not for use with comparatively unclean SW which could contain silt and other debris from the SW pond plus clam shells, tubercles, and other debris from the SW piping. This mis-application of the purchased EFW flow control valves, which were designed for clean condensate, to handle unclean SW in the plant represented inadequate design control.

The licensee became aware of this potential blockage issue in 1986 and has had other opportunities to identify the significance of this design vulnerability since that time. Licensee corrective actions have been inadequate to resolve this design vulnerability.

Performance Deficiency - The licensee's corrective actions in response to a deficiency in the design of the EFW flow control valves was inadequate.

Specifically, the licensee's design control failed to specify that the EFW flow control valves were required to be able to handle relatively unclean SW without plugging. Instead, the EFW flow control valves were specified to handle a process fluid of clean 'cold condensate'. Tubercles as well as other debris in the service water system could plug the valves thereby resulting in a common mode failure of the EFW system. Despite multiple opportunities, the licensee's corrective action program failed to correct the condition in a timely manner.

Exposure Time - 1 year

Date of Occurrence - Condition has existed for numerous years

II. Safety Impact: WHITE

III. Risk Analysis/Considerations

Assumptions

1. Upon transfer of the Emergency Feedwater System (EFW) suction to the Service Water System (SWS) the tubercles will plug the FCVs stopping sufficient flow to any Steam Generator.

2. Failure of the CST as the suction source for the Emergency Feedwater System will cause a reactor trip during the ensuing plant shutdown. The failure of the CST is estimated at 1E-7 failure/hour * 8760 hours/yr = 8.76E-4/yr. {INEEL telecon of database search for equipment failure}

3. For every reactor trip recovery of Main Feedwater is assumed to occur 90% of the time. This is the estimate from the Phase 2 Screening Sheets due to plant modifications that allow this. These modifications are not reflected in the licensee's full scope model.

4. In the absence of the tubercles the failure of the Service Water System as a suction for the Emergency Feedwater System is estimated at 1E-3 (a multi-train system). Therefore, the non-conforming condition will be assumed to be the delta CDF since the conforming case CDF is <<. (Unless specifically quantified by computer models)

5. Recovery of the Emergency Feedwater System, once transferred to the SWS suction source will not be considered. The FCV cages are assumed to be plugged to the point of insufficient flow to the Steam Generators. Operators would be able to recognize that insufficient flow was going to the Steam Generators.

6. However, there would be no procedure direction, training or experience that allow the operators to unplug the FCVs or provide a bypass around the plugged valves. Also, there would be no equipment available to accomplish such a task.

7. The CST function will be assumed to be lost at the medium wind speed/intensity of a F2 tornado (135 mph). The frequency of all tornadoes of this intensity or higher striking the site is estimated to be 6E-5/yr as extrapolated from Figure 3-2 “Tornado Hazard Curve - Exceedance” (page 3-6) contained in the June 1995 IPEEE High Winds Evaluation in response to Generic Letter 88-20, Supplement 4. All tornadoes assumed to cause loss of the CST function will also cause Loss of Offsite Power without recovery.

8. The critical piping segment from CST to EFW is estimated at 30 yards in length with 10 welds. Failure consideration will be by Design and Construction Defects (D&C) and Corrosion Attack (COR) mechanisms. From Table A-33, Pipe failure Rates for Westinghouse Feedwater and Condensate Systems, of EPRI TR-111880, “Piping System Failure Rates and Rupture Frequencies for Use In Risk Informed In-service Inspection Applications,” the per foot or per weld failure probability is:

   COR = 8.47E-8 failure/yr/ft * 90 ft = 7.6E-6 failure/yr

   D&C = 6.89E-7 failure/yr/weld * 10 welds = 6.89E-6 failure/yr

   Total = 6.89E-6 + 7.6E-6 = 1.45E-5 failure/yr

9. Based upon a review of the licensee’s safe shutdown strategy procedures following a fire, it is assumed that when operators remain in the Main Control Room (MCR), the train used for safe shutdown is assumed to be fully protected either by 3 hour barrier, 1 hour barrier with suppression or a separation of 20 feet between trains. Those procedures presently indicate that the CST would be the suction source for the protected EFW train unless the CST was expended. Consequently, fire effects causing actuation of the alternate EFW suction source (SWS) could only happen to the unprotected train. For the unprotected train to affect the protected EFW train it would require a significant number of spurious actuations, including pump start and two suction valves to open before the protected train would be impacted. This is screened as not credible.

Premature transfer of the protected train suction to SWS will be considered credible due to random events and a fully developed fire in the 7.2KV Switchgear Room (Train A) will be used as the surrogate for this situation.

Possible spurious actuation of the SWS valves to the EFW suction source caused by the fire will be considered for those cases where alternate shutdown (shutdown from outside the MCR) is used. The fire in the Main Control Room will be used as the surrogate to screen this situation. Also, in all fire accident sequences it is assumed the licensee will execute a plant shutdown to cold shutdown before the CST volume is expended.

PRA Model used for basis of the risk analysis: Combination of hand calculation, modified Phase 2 Screening Sheet and SPAR run in the GEM mode.

Significant Influence Factor(s) [if any]: The failure of the SWS to EFW function is always lost when called upon and the tornado severity at which the CST function as a suction source to EFW is lost.

IV. Calculations

BASE CASE - N/A

NON-CONFORMING CASE

a. Internal Events

In the non-conforming case two broad conditions will be analyzed. First the full demand spectrum from all initiating events normally included in an internal events model will be considered. In this case the normal EFW suction path fails upon demand. The SPAR model is used to calculate the delta CDF by setting the basic event EFW-XHE-XA-SWS, OPERATOR FAILS TO ALIGN SW TO EFW, to always fail (TRUE). The model quantification details are provided in Attachment 2. Summarizing the delta CDF was 4.7E-8/yr. Due to its small contribution it will be excluded from the quantification.

Second there is a special case not explicitly covered by the internals event model that must be included. This involves the special case where the normal EFW suction source is known to be out of service and requires plant shutdown with an ensuing reactor trip. The failure of the CST and the failure the piping segments from the CST to EFW pump suctions will be quantified to estimate this initiating event. As indicated in the assumptions section, tank failure is set at 8.76E-4 and the piping segment failure is set at 1.45E-5. The collective loss of the CST function is estimated at 8.9E-4/yr. This represents the Initiating Event frequency.

To acquire the CCDP portion of the CDF the SPAR model in the GEM mode was solved for the transient initiating event with:

EFW-TNK-FC-CST1 set to TRUE - this sets the CST to always fail this will later be substituted with the new initiating event frequency that correlates to tank loss.

EFW-XHE-XA-SWS set to TRUE - this sets the Service Water System supply to the EFW pumps to always fail - the performance deficiency.

MFW-XHE-XL-TRANS & MFW-XHE-XL-TRIP set to 0.1 - this provides a possible site- specific use of MFW as a viable secondary side heat removal mechanism (consistent with assumption 3).

The details of the computer run is provided as Attachment 3. In summary the derived CCDP was 6.2E-3. The non-conforming CDF is 8.9E-4/yr * 6.2E-3 = 5.5E-6

Correlation with the Phase 2 Screening Sheets - The Phase 2 Screening Sheet for Transients is solved using the 8.9E-4 IEL converted to a 3 and the EFW function set to zero. The accident sequences are shown in Attachment 4 and result in a 6,6 & 7 or White. This is consistent with the computerized calculation.

b. External Events

Earthquake - Based upon the licensee's IPEEE (page 13-2) estimated that the High Confidence of Low Probability of Failure (HCLPF) for the Service Water Pond Dam was 0.22g while the CST was estimated at > 0.3g. Therefore, Service Water is estimated to fail before the CST due to earthquake and will be excluded from quantification.

Fire - Fully developed fire with operators shutting down from the MCR - Compartment 1DA is the surrogate and considered the dominant fire since there are almost 40 ignition sources capable of causing a fully developed fire and the compartment does not contain a fixed suppression system. A fire of 16 minutes duration will be postulated to cause operators to enact the mitigation strategy which includes inducing a Station Blackout and re-establishing power to the B train via the B Emergency Diesel Generator. Therefore, MFW recovery will not be considered. From 0609, Appendix F page F8-6 the non-suppression probability of an electrical fire is 0.15. Possible mechanisms that could cause EFW suction transference to SWS are spurious valve operations, spurious failure of 2 of the 4 level transmitters or tank failure. For purposes of scoping only a single valve or level transmitter failure will be quantified at 5E-7/hr for the valve (NUREG 4550) + 5E-6/hr for an instrument + 1E-7/hr for tank failure over a 24 hr mission time yields 1E-4. A conservative scoping quantification would be:

The fully developed fire frequency would be 2.3E-3 (fire frequency) * 1.5E-1 (suppression failure Pr) * 1E-4 (EFW transfer to SWS) = 3E-8

Fully developed fire with operators shutting down from outside the MCR. Use the MCR fire as the screen. From SDP Appendix F, MCR fire frequency is 8E-3. Assuming a fire of approximately 16 minutes would be needed to cause spurious operation of the applicable valves, the manual suppression failure probability is estimated to be 0.02 (Appendix F page F8-6).

Partitioning the MCR into the critical panel portion that could impact these valves to be 1/4 of the MCR panels would provide an addition 0.25 reduction factor. Two valves in the train to be used for shutdown from outside the MCR would have to change state in this critical portion of the MCR panel. Appendix F page F-48 estimates a spurious operation of 0.6. Calculating 8E-3 * 2E-2 * 2.5E-1 * 6E-1 * 6E-1 = 1.4E-5. This would be a fully developed fire requiring MCR evacuation with subsequent failure of the EFW System due to transferring onto the SWS suction source. However, even though not procedurialized there would be adequate time to establish feed & bleed as a mitigation strategy. Using a 2E-2 failure probability as representative of this strategy failing (1E-2 for the F&B portion and 1E-2 for the HPR portion), the CDF would screen at 3E-7.

These two scoping quantifications provide the perspective that the fire initiating event would not be a major risk contributor for this performance deficiency.

Tornado - The CST was not designed to withstand a tornado or the effects of a tornado. Using the exceedence probability for wind speeds at an F2 median frequency as the initiating event, yields 6E-5/yr. SPAR was run in the GEM mode with:

> the LOSP initiating event for severe weather set at 6E-5
>
> EFW-TNK-FC-CST1 set to TRUE - this sets the CST to always fail due to a tornado
>
> EFW-XHE-XA-SWS set to TRUE - this sets the Service Water System supply to the EFW pumps to always fail - the performance deficiency

The non-conforming CDF result was 1.4E-6. See Attachment 5 for th details of the computer run.

As a sensitivity analysis for tornado wind speeds in excess of 150 mph (the upper end of the F2 scale) correlates to a 1E-6 CDF..

Correlation with the Phase 2 Screening Sheets - The surrogate for external events is LOSP. By altering the LOOP Screening Sheet from the Phase 2 Notebook to 6E-5 for the initiating event correlates to a 4 for the IEL, the EFW function is set to zero and the REC functions are set to zero. The accident sequences are shown in Attachment 6 and resulted in a 6, 6, 7 & 7 or White and consistent with the computerized calculation.

External Events Summary - The external events analysis was to ascertain whether the White result of the internal events is altered by the external events. Evaluation of the external events contribution indicates that the risk significance is not sufficient to increase internal events results.

DELTA CDF FOR EXPOSURE TIME

Since the exposure time is for one year there is no alteration of the delta CDF from the previous section.

LERF CONSIDERATION

The dominant accident sequences involving this performance deficiency do not include SGTR or ISLOCA as the initiating event. Therefore, the LERF contribution is considered not to exceed the CDF risk bands.

V. Conclusions/Recommendations - Risk increase over the base case was >1E-6 but <1E-5.

VI. Attachments
1. Phase I Screening Sheets
2. Sws to efw.wpd *
3. CCDP for Loss of CST as Initiating Event
4. Phase 2 Screening Sheet - Trans Initiating Event
5. Tornado SWS to EFW.wpd
6. Phase 2 Screening Sheet - LOOP Initiating Event

Analyst:	W. Rogers	Date: 12/22/04
Reviewed By:	R. Bernhard	Date: 12/22/04
	M. Franovich	Date: 12/29/04 per telecon

C O N D I T I O N   A S S E S S M E N T

```
Code Version: 7:22                                    Model Version  : 2004/12/10
Project     : SUMM_3                                  Duration (hrs) :  8.8E+003
User Name   : IDAHO NATIONAL LABORATORY (INL)         Total CCDP     :  1.4E-005
Event ID    : SWS-TO-EFW-OOS                          Total CDP      :  1.4E-005
                                                      Importance     :  4.7E-008
Description : Condition Assessment sws to efw failed for one year
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BASIC EVENT CHANGES

Event Name	Description	Base Prob	Curr Prob	Type
EFW-XHE-XA-SWS	OPERATOR FAILS TO ALIGN SW T	1.0E-003	1.0E+000	TRUE

SEQUENCE PROBABILITIES

Truncation : Cummulative : 100.0% Individual :   1.0%

Event Tree Name	Sequence Name	CCDP	CDP	Importance
TRANS	17	4.5E-007	4.1E-007	3.4E-008
LDCA	20	7.8E-007	7.7E-007	6.0E-009
TRANS	16	5.0E-008	4.6E-008	3.7E-009
LOOP	17	3.3E-008	3.1E-008	1.6E-009

NOTE: Percent contribution to total Importance.

SEQUENCE LOGIC

Event Tree	Sequence Name	Logic	
TRANS	17	/RPS MFW	EFW FAB
LDCA	20	/RPS FAB	EFW
TRANS	16	/RPS MFW HPR	EFW /FAB
LOOP	17	/RPS EFW-L	/EPS FAB-L

Fault Tree Name	Description
EFW	EMERGENCY FEEDWATER
EFW-L	SUMMER PWR B EMERGENCY FEEDWATER SYSTEM DURING LOOP

EPS	EMERGENCY POWER
FAB	FEED AND BLEED
FAB-L	FEED AND BLEED DURING LOOP
HPR	HPR PRESSURE RECIRCULATION
MFW	MAIN FEEDWATER SYSTEM
RPS	REACTOR TRIP

SEQUENCE CUT SETS

Truncation: Cummulative: 100.0% Individual: 1.0%

Event Tree: TRANS CCDF: 4.5E-007
Sequence: 17

CCDF	% Cut Set	Cut Set Events	
1.6E-007	36.04	EFW-MDP-CF-FRAB	EFW-TDP-FR
		MFW-SYS-FC-TRIP	HPI-XHE-XM-FB
4.1E-008	9.22	EFW-MDP-CF-FRAB	EFW-TDP-TM
		MFW-SYS-FC-TRIP	HPI-XHE-XM-FB
4.0E-008	9.01	EFW-MDP-CF-FRAB	EFW-TDP-FR
		MFW-SYS-FC-TRANS	HPI-XHE-XM-FB
3.4E-008	7.68	EFW-MDP-CF-FRAB	EFW-TDP-FS-1
		MFW-SYS-FC-TRIP	HPI-XHE-XM-FB
2.7E-008	6.04	EFW-TNK-FC-CST1	MFW-SYS-FC-TRIP
		HPI-XHE-XM-FB	
2.5E-008	5.62	EFW-MDP-CF-FSAB	EFW-TDP-FR
		MFW-SYS-FC-TRIP	HPI-XHE-XM-FB
1.0E-008	2.30	EFW-MDP-CF-FRAB	EFW-TDP-TM
		MFW-SYS-FC-TRANS	HPI-XHE-XM-FB
8.6E-009	1.92	EFW-MDP-CF-FRAB	EFW-TDP-FS-1
		MFW-SYS-FC-TRANS	HPI-XHE-XM-FB
7.6E-009	1.70	EFW-CKV-CF-DIS	MFW-SYS-FC-TRIP
		HPI-XHE-XM-FB	
7.6E-009	1.70	EFW-CKV-CF-SUCT	MFW-SYS-FC-TRIP
		HPI-XHE-XM-FB	
7.6E-009	1.70	EFW-CKV-CF-SGS	MFW-SYS-FC-TRIP
		HPI-XHE-XM-FB	
7.4E-009	1.66	EFW-PMP-CF-ALL	MFW-SYS-FC-TRIP
		HPI-XHE-XM-FB	
6.7E-009	1.51	EFW-TNK-FC-CST1	MFW-SYS-FC-TRANS
		HPI-XHE-XM-FB	
6.4E-009	1.44	EFW-MDP-CF-FSAB	EFW-TDP-TM
		MFW-SYS-FC-TRIP	HPI-XHE-XM-FB
6.3E-009	1.40	EFW-MDP-CF-FSAB	EFW-TDP-FR
		MFW-SYS-FC-TRANS	HPI-XHE-XM-FB
5.7E-009	1.28	EFW-MDP-CF-FRAB	EFW-XHE-XR-TDP1
		MFW-SYS-FC-TRIP	HPI-XHE-XM-FB
5.3E-009	1.20	EFW-MDP-CF-FSAB	EFW-TDP-FS-1
		MFW-SYS-FC-TRIP	HPI-XHE-XM-FB

Event Tree: LDCA CCDF: 7.8E-007
Sequence: 20

CCDF	% Cut Set	Cut Set Events	
3.5E-007	45.34	EFW-MDP-TM-1B	EFW-TDP-FR
7.5E-008	9.66	EFW-MDP-TM-1B	EFW-TDP-FS-1
7.0E-008	9.07	EFW-TDP-FR	EFW-XHE-XR-MDP1B
3.6E-008	4.62	EFW-MDP-CF-FRAB	EFW-TDP-FR
2.8E-008	3.63	EFW-PMP-FR-1A	EFW-TDP-FR
2.7E-008	3.50	EFW-MDP-FR-1B EFW-XHE-XL-MDPFRB	EFW-TDP-FR
1.8E-008	2.32	EFW-TDP-TM	EFW-XHE-XR-MDP1B
1.8E-008	2.29	EFW-MDP-FS-1B EFW-XHE-XL-MDPFSB	EFW-TDP-FR
1.5E-008	1.93	EFW-TDP-FS-1	EFW-XHE-XR-MDP1B
1.3E-008	1.61	EFW-MDP-TM-1B	EFW-XHE-XR-TDP1
1.2E-008	1.55	DCP-BDC-LP-1B	
9.2E-009	1.18	EFW-MDP-CF-FRAB	EFW-TDP-TM

Event Tree: TRANS CCDF: 5.0E-008
Sequence: 16

CCDF	% Cut Set	Cut Set Events	
1.6E-008	32.19	HPR-XHE-XM EFW-TDP-FR	EFW-MDP-CF-FRAB MFW-SYS-FC-TRIP
4.1E-009	8.23	HPR-XHE-XM EFW-TDP-TM	EFW-MDP-CF-FRAB MFW-SYS-FC-TRIP
4.0E-009	8.05	HPR-XHE-XM EFW-TDP-FR	EFW-MDP-CF-FRAB MFW-SYS-FC-TRANS
3.4E-009	6.86	HPR-XHE-XM EFW-TDP-FS-1	EFW-MDP-CF-FRAB MFW-SYS-FC-TRIP
2.7E-009	5.39	HPR-XHE-XM MFW-SYS-FC-TRIP	EFW-TNK-FC-CST1
2.5E-009	5.02	HPR-XHE-XM EFW-TDP-FR	EFW-MDP-CF-FSAB MFW-SYS-FC-TRIP
1.0E-009	2.06	HPR-XHE-XM EFW-TDP-TM	EFW-MDP-CF-FRAB MFW-SYS-FC-TRANS
8.6E-010	1.72	HPR-XHE-XM EFW-TDP-FS-1	EFW-MDP-CF-FRAB MFW-SYS-FC-TRANS
7.6E-010	1.52	HPR-XHE-XM MFW-SYS-FC-TRIP	EFW-CKV-CF-SGS
7.6E-010	1.52	HPR-XHE-XM MFW-SYS-FC-TRIP	EFW-CKV-CF-DIS
7.6E-010	1.52	HPR-XHE-XM MFW-SYS-FC-TRIP	EFW-CKV-CF-SUCT
7.4E-010	1.49	HPR-XHE-XM MFW-SYS-FC-TRIP	EFW-PMP-CF-ALL
6.7E-010	1.35	HPR-XHE-XM MFW-SYS-FC-TRANS	EFW-TNK-FC-CST1

6.4E-010	1.28	HPR-XHE-XM	EFW-MDP-CF-FSAB
		EFW-TDP-TM	MFW-SYS-FC-TRIP
6.3E-010	1.25	HPR-XHE-XM	EFW-MDP-CF-FSAB
		EFW-TDP-FR	MFW-SYS-FC-TRANS
5.7E-010	1.14	HPR-XHE-XM	EFW-MDP-CF-FRAB
		EFW-XHE-XR-TDP1	MFW-SYS-FC-TRIP
5.3E-010	1.07	HPR-XHE-XM	EFW-MDP-CF-FSAB
		EFW-TDP-FS-1	MFW-SYS-FC-TRIP

Event Tree: LOOP CCDF: 3.3E-008
Sequence: 17

CCDF	% Cut Set	Cut Set Events	
9.5E-009	29.09	EFW-MDP-CF-FRAB	EFW-TDP-FR
		HPI-XHE-XM-FB	
2.4E-009	7.44	EFW-MDP-CF-FRAB	EFW-TDP-TM
		HPI-XHE-XM-FB	
2.0E-009	6.20	EFW-MDP-CF-FRAB	EFW-TDP-FS-1
		HPI-XHE-XM-FB	
2.0E-009	6.05	EFW-MDP-TM-1B	EFW-TDP-FR
		EPS-DGN-FR-1A	HPI-XHE-XM-FB
2.0E-009	6.05	EFW-MDP-TM-1A	EFW-TDP-FR
		EPS-DGN-FR-1B	HPI-XHE-XM-FB
1.6E-009	4.87	EFW-TNK-FC-CST1	HPI-XHE-XM-FB
1.5E-009	4.53	EFW-MDP-CF-FSAB	EFW-TDP-FR
		HPI-XHE-XM-FB	
4.5E-010	1.37	EFW-CKV-CF-SUCT	HPI-XHE-XM-FB
4.5E-010	1.37	EFW-CKV-CF-DIS	HPI-XHE-XM-FB
4.5E-010	1.37	EFW-CKV-CF-SGS	HPI-XHE-XM-FB
4.4E-010	1.34	EFW-PMP-CF-ALL	HPI-XHE-XM-FB
4.2E-010	1.29	EFW-MDP-TM-1B	EFW-TDP-FS-1
		EPS-DGN-FR-1A	HPI-XHE-XM-FB
4.2E-010	1.29	EFW-MDP-TM-1A	EFW-TDP-FS-1
		EPS-DGN-FR-1B	HPI-XHE-XM-FB
4.0E-010	1.21	EFW-TDP-FR	EFW-XHE-XR-MDP1B
		EPS-DGN-FR-1A	HPI-XHE-XM-FB
4.0E-010	1.21	EFW-TDP-FR	EFW-XHE-XR-MDP1A
		EPS-DGN-FR-1B	HPI-XHE-XM-FB
3.8E-010	1.16	EFW-MDP-CF-FSAB	EFW-TDP-TM
		HPI-XHE-XM-FB	
3.7E-010	1.14	EFW-MDP-TM-1B	EFW-TDP-FR
		EPS-DGN-FS-1A	HPI-XHE-XM-FB
3.7E-010	1.14	EFW-MDP-TM-1A	EFW-TDP-FR
		EPS-DGN-FS-1B	HPI-XHE-XM-FB
3.4E-010	1.03	EFW-MDP-CF-FRAB	EFW-XHE-XR-TDP1
		HPI-XHE-XM-FB	

BASIC EVENTS (Cut Sets Only)

Event Name	Description	Curr Prob
DCP-BDC-LP-1B	DIVISION 1B 125VDC BUS DP-1B ED FAILS	4.8E-006
EFW-CKV-CF-DIS	COMMON CAUSE FAILURE OF EFW PUMPS DISCHARGE C	6.8E-007
EFW-CKV-CF-SGS	COMMON CAUSE FAILURE OF SGS EFW CHECK VALVES	6.8E-007
EFW-CKV-CF-SUCT	COMMON CAUSE FAILURE OF EFW PUMPS SUCTION CHE	6.8E-007
EFW-MDP-CF-FRAB	CCF FAILURE OF EFW MDPS TO RUN	5.1E-004
EFW-MDP-CF-FSAB	CCF EFW MDP FAIL TO START	7.9E-005
EFW-MDP-FR-1B	EFW MDP 1B FAILS TO RUN	5.2E-004
EFW-MDP-FS-1B	EFW MDP 1B FAILS TO START	1.2E-003
EFW-MDP-TM-1A	EFW MDP 1A UNAVAILABLE DUE TO TEST AND MAINTE	5.0E-003
EFW-MDP-TM-1B	EFW MDP 1B UNAVAILABLE DUE TO TEST AND MAINTE	5.0E-003
EFW-PMP-CF-ALL	COMMON CAUSE FAILURE OF EFW PUMPS	6.6E-007
EFW-PMP-FR-1A	FAILURE OF EFW PUMP 1A TO RUN (PUMP UNIT ONLY	4.0E-004
EFW-TDP-FR	EFW TDP FAILS TO RUN	2.8E-002
EFW-TDP-FS-1	EFW TDP FAILS TO START	6.0E-003
EFW-TDP-TM	EFW TDP UNAVAILABLE DUE TO TEST AND MAINTENAN	7.2E-003
EFW-TNK-FC-CST1	FAILURE OF CONDENSATE STORAGE TANK	2.4E-006
EFW-XHE-XL-MDPFRB	OPERATOR FAILS TO RECOVER EFW MDP 1B (FAILS T	7.5E-001
EFW-XHE-XL-MDPFSB	OPERATOR FAILS TO RECOVER EFW MDP 1B (FAILS T	2.1E-001
EFW-XHE-XR-MDP1A	OP FAILS TO RESTORE EFW MDP 1A AFTER T&M	1.0E-003
EFW-XHE-XR-MDP1B	OP FAILS TO RESTORE EFW MDP 1B	1.0E-003
EFW-XHE-XR-TDP1	OP FAILS TO RESTORE EFW TDP AFTER T&M	1.0E-003
EPS-DGN-FR-1A	DIESEL GENERATOR A FAILS TO RUN	2.1E-002
EPS-DGN-FR-1B	DIESEL GENERATOR B FAILS TO RUN	2.1E-002
EPS-DGN-FS-1A	DIESEL GENERATOR A FAILS TO START	4.0E-003
EPS-DGN-FS-1B	DIESEL GENERATOR B FAILS TO START	4.0E-003
HPI-XHE-XM-FB	OPERATOR FAILS TO INITIATE FEED AND BLEED COO	2.0E-002
HPR-XHE-XM	OPERTATOR FAILS TO INITIATE HPR	2.0E-003
MFW-SYS-FC-TRANS	MFW IS UNAVAILABLE (TRANSIENT INTIATOR)	2.0E-001
MFW-SYS-FC-TRIP	MFW IS UNAVAILABLE (TRANSIENT INTIATOR)	8.0E-001

CCDP FOR LOSS OF CST FUNCTION AS THE INITIATING EVENT

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

Code Ver : 7:22
Model Ver : 2004/12/10
Init Event: IE-TRANS
Total CCDP: 6.2E-003

Fam : SUMM_3
User : IDAHO NATIONAL LABORATORY (INL)
Ev ID: TRANS-W-O-CST--SWAFW
Desc : Initiating Event Assessment

BASIC EVENT CHANGES

Event Name	Description	Base Prob	Curr Prob	Type
EFW-TNK-FC-CST1	FAILURE OF CONDENSATE STORAG	2.4E-006	1.0E+000	TRUE
EFW-XHE-XA-SWS	OPERATOR FAILS TO ALIGN SW T	1.0E-003	1.0E+000	TRUE
IE-LDCA	LOSS OF DC POWER BUS 1A INIT	2.5E-003	+0.0E+000	
IE-LLOCA	LARGE LOSS OF COOLANT ACCIDE	5.0E-006	+0.0E+000	
IE-LOCCW	LOSS OF COMPONENT COOLING WA	2.0E-004	+0.0E+000	
IE-LOOP	LOSS OF OFFSITE POWER	3.3E-002	+0.0E+000	
IE-LOSW	LOSS OF SERVICE WATER INITIA	4.0E-004	+0.0E+000	
IE-MLOCA	MEDIUM LOSS OF COOLANT ACCID	4.0E-005	+0.0E+000	
IE-RHR-CLDIS-V	ISLOCA OCCURS WITH REACTOR A	1.0E+000	+0.0E+000	
IE-RHR-HLDIS-V	ISLOCA OCCURS WITH REACTOR A	1.0E+000	+0.0E+000	
IE-RHR-SUC-V	ISLOCA OCCURS WITH REACTOR A	1.0E+000	+0.0E+000	
IE-SGTR	STEAM GENERATOR TUBE RUPTURE	4.0E-003	+0.0E+000	
IE-SI-CLDIS-V	ISLOCA OCCURS WITH REACTOR A	1.0E+000	+0.0E+000	
IE-SI-HLDIS-V	ISLOCA OCCURS WITH REACTOR A	1.0E+000	+0.0E+000	
IE-SLOCA	SMALL LOSS OF COOLANT ACCIDE	4.0E-004	+0.0E+000	
IE-TRANS	TRANSIENT	7.0E-001	1.0E+000	
MFW-XHE-XL-TRANS	OPERATOR FAILS TO RECOVER MF	1.0E+000	1.0E-001	
MFW-XHE-XL-TRIP	OPERATOR FAILS TO RECOVER MF	1.0E+000	1.0E-001	

SEQUENCE PROBABILITIES

Truncation : Cummulative : 100.0% Individual : 1.0%

Event Tree Name	Sequence Name	CCDP	%Cont
TRANS	17	5.9E-003	
TRANS	16	2.3E-004	

SEQUENCE LOGIC

Event Tree	Sequence Name	Logic	
TRANS	17	/RPS MFW	EFW FAB
TRANS	16	/RPS MFW HPR	EFW /FAB

Attachment 3

Fault Tree Name	Description
EFW	EMERGENCY FEEDWATER
FAB	FEED AND BLEED
HPR	HPR PRESSURE RECIRCULATION
MFW	MAIN FEEDWATER SYSTEM
RPS	REACTOR TRIP

SEQUENCE CUT SETS

Truncation: Cummulative: 100.0% Individual: 1.0%

Event Tree: TRANS CCDP: 5.9E-003
Sequence: 17

CCDP	% Cut Set	Cut Set Events	
5.5E-003	92.92	MFW-SYS-FC-TRIP HPI-XHE-XM-FB1	MFW-XHE-XL-TRIP
4.0E-004	6.73	MFW-SYS-FC-TRANS HPI-XHE-XM-FB	MFW-XHE-XL-TRANS

Event Tree: TRANS CCDP: 2.3E-004
Sequence: 16

CCDP	% Cut Set	Cut Set Events	
1.6E-004	71.03	HPR-XHE-XM MFW-XHE-XL-TRIP	MFW-SYS-FC-TRIP
4.0E-005	17.76	HPR-XHE-XM MFW-XHE-XL-TRANS	MFW-SYS-FC-TRANS
4.3E-006	1.92	MFW-SYS-FC-TRIP RHR-MDP-CF-FSAB	MFW-XHE-XL-TRIP

BASIC EVENTS (Cut Sets Only)

Event Name	Description	Curr Prob
HPI-XHE-XM-FB	OPERATOR FAILS TO INITIATE FEED AND BLEED COO	2.0E-002
HPI-XHE-XM-FB1	OPERATOR FAILS TO INITIATE FEED AND BLEED COO	6.9E-002
HPR-XHE-XM	OPERTATOR FAILS TO INITIATE HPR	2.0E-003
MFW-SYS-FC-TRANS	MFW IS UNAVAILABLE (TRANSIENT INTIATOR)	2.0E-001
MFW-SYS-FC-TRIP	MFW IS UNAVAILABLE (TRANSIENT INTIATOR)	8.0E-001
MFW-XHE-XL-TRANS	OPERATOR FAILS TO RECOVER MFW (TRANSIENT INIT	1.0E-001
MFW-XHE-XL-TRIP	OPERATOR FAILS TO RECOVER MFW (TRANSIENT INIT	1.0E-001
RHR-MDP-CF-FSAB	COMMON CAUSE FAILURE OF RHR MDPS TO START	5.4E-005

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

	Code Ver : 7:22
Fam : SUMM_3	Model Ver : 2004/12/10
User : IDAHO NATIONAL LABORATORY (INL)	Init Event: IE-LOOP
Ev ID: LOOP-SEVERE-TEST	Total CCDP: 1.4E-006
Desc : Initiating Event Assessment	

BASIC EVENT CHANGES

Event Name	Description	Base Prob	Curr Prob	Type
EFW-TNK-FC-CST1	FAILURE OF CONDENSATE STORAG	2.4E-006	1.0E+000	TRUE
EFW-XHE-XA-SWS	OPERATOR FAILS TO ALIGN SW T	1.0E-003	1.0E+000	TRUE
IE-LDCA	LOSS OF DC POWER BUS 1A INIT	2.5E-003	+0.0E+000	
IE-LLOCA	LARGE LOSS OF COOLANT ACCIDE	5.0E-006	+0.0E+000	
IE-LOCCW	LOSS OF COMPONENT COOLING WA	2.0E-004	+0.0E+000	
IE-LOOP	LOSS OF OFFSITE POWER	3.3E-002	6.0E-005	
IE-LOSW	LOSS OF SERVICE WATER INITIA	4.0E-004	+0.0E+000	
IE-MLOCA	MEDIUM LOSS OF COOLANT ACCID	4.0E-005	+0.0E+000	
IE-RHR-CLDIS-V	ISLOCA OCCURS WITH REACTOR A	1.0E+000	+0.0E+000	
IE-RHR-HLDIS-V	ISLOCA OCCURS WITH REACTOR A	1.0E+000	+0.0E+000	
IE-RHR-SUC-V	ISLOCA OCCURS WITH REACTOR A	1.0E+000	+0.0E+000	
IE-SGTR	STEAM GENERATOR TUBE RUPTURE	4.0E-003	+0.0E+000	
IE-SI-CLDIS-V	ISLOCA OCCURS WITH REACTOR A	1.0E+000	+0.0E+000	
IE-SI-HLDIS-V	ISLOCA OCCURS WITH REACTOR A	1.0E+000	+0.0E+000	
IE-SLOCA	SMALL LOSS OF COOLANT ACCIDE	4.0E-004	+0.0E+000	
IE-TRANS	TRANSIENT	7.0E-001	+0.0E+000	
OEP-XHE-XL-NR01H	OPERATOR FAILS TO RECOVER OF	5.3E-001	4.6E-001	
OEP-XHE-XL-NR02H	OPERATOR FAILS TO RECOVER OF	3.7E-001	3.6E-001	
OEP-XHE-XL-NR03H	OPERATOR FAILS TO RECOVER OF	2.8E-001	3.0E-001	
OEP-XHE-XL-NR04H	OPERATOR FAILS TO RECOVER OF	2.2E-001	2.5E-001	
OEP-XHE-XL-NR05H	OPERATOR FAILS TO RECOVER OF	1.9E-001	2.2E-001	
OEP-XHE-XL-NR06H	OPERATOR FAILS TO RECOVER OF	1.6E-001	2.0E-001	
OEP-XHE-XL-NR07H	OPERATOR FAILS TO RECOVER OF	1.4E-001	1.8E-001	
OEP-XHE-XL-NR08H	OPERATOR FAILS TO RECOVER OF	1.2E-001	1.6E-001	
OEP-XHE-XL-NR09H	OPERATOR FAILS TO RECOVER OF	1.1E-001	1.4E-001	
OEP-XHE-XL-NR10H	OPERATOR FAILS TO RECOVER OF	1.0E-001	1.3E-001	
OEP-XHE-XL-NR10H2	OPERATOR FAILS TO RECOVER OF	2.7E-001	3.7E-001	
OEP-XHE-XL-NR10H4	OPERATOR FAILS TO RECOVER OF	4.5E-001	5.2E-001	
OEP-XHE-XL-NR11H	OPERATOR FAILS TO RECOVER OF	9.5E-002	1.2E-001	
OEP-XHE-XL-NR12H	OPERATOR FAILS TO RECOVER OF	8.9E-002	1.1E-001	
OEP-XHE-XL-NR13H	OPERATOR FAILS TO RECOVER OF	8.5E-002	1.0E-001	
OEP-XHE-XL-NR14H	OPERATOR FAILS TO RECOVER OF	8.2E-002	9.7E-002	
OEP-XHE-XL-NR15H	OPERATOR FAILS TO RECOVER OF	7.9E-002	9.0E-002	
OEP-XHE-XL-NR16H	OPERATOR FAILS TO RECOVER OF	7.6E-002	8.4E-002	
OEP-XHE-XL-NR17H	OPERATOR FAILS TO RECOVER OF	7.4E-002	7.9E-002	
OEP-XHE-XL-NR18H	OPERATOR FAILS TO RECOVER OF	7.2E-002	7.4E-002	
OEP-XHE-XL-NR19H	OPERATOR FAILS TO RECOVER OF	7.1E-002	7.0E-002	
OEP-XHE-XL-NR20H	OPERATOR FAILS TO RECOVER OF	6.9E-002	6.6E-002	
OEP-XHE-XL-NR21H	OPERATOR FAILS TO RECOVER OF	6.8E-002	6.2E-002	
OEP-XHE-XL-NR22H	OPERATOR FAILS TO RECOVER OF	6.7E-002	5.9E-002	

OEP-XHE-XL-NR23H	OPERATOR FAILS TO RECOVER OF	6.6E-002	5.6E-002
OEP-XHE-XL-NR24H	OPERATOR FAILS TO RECOVER OF	6.5E-002	5.3E-002
OEP-XHE-XL-NR30M	OPERATOR FAILS TO RECOVER OF	6.6E-001	5.6E-001
OEP-XHE-XL-NR90M	OPERATOR FAILS TO RECOVER OF	4.4E-001	4.0E-001
ZV-LOOP-EW-LAMBDA	EXTREME WEATHER RELATED LOSS	2.3E-003	+0.0E+000
ZV-LOOP-GR-LAMBDA	GRID RELATED LOSS OF OFFSITE	1.7E-002	+0.0E+000
ZV-LOOP-PC-LAMBDA	PLANT CENTERED LOSS OF OFFSI	2.4E-003	+0.0E+000
ZV-LOOP-SC-LAMBDA	SWITCHYARD CENTERED LOSS OF	8.7E-003	+0.0E+000
ZV-LOOP-SW-LAMBDA	SEVERE WEATHER RELATED LOSS	3.0E-003	1.0E+000

SEQUENCE PROBABILITIES

Truncation : Cummulative : 100.0% Individual : 1.0%

Event Tree Name	Sequence Name	CCDP	%Cont
LOOP	17	1.2E-006	
LOOP	14	1.1E-007	
LOOP	18-45	4.3E-008	
LOOP	16	3.8E-008	

SEQUENCE LOGIC

Event Tree	Sequence Name	Logic	
LOOP	17	/RPS	/EPS
		EFW-L	FAB-L
LOOP	14	/RPS	/EPS
		EFW-L	/FAB-L
		/OPR-06H	HPR
LOOP	18-45	/RPS	EPS
		EFW-B	OPR-01H
		DGR-01H	
LOOP	16	/RPS	/EPS
		EFW-L	/FAB-L
		OPR-06H	HPR-L

Fault Tree Name	Description
DGR-01H	OPERATOR FAILS TO RECOVER EMERGENCY DIESEL IN 1 HOUR
EFW-B	SUMMER PWR B EMERGENCY FEEDWATER SYSTEM DURING SBO
EFW-L	SUMMER PWR B EMERGENCY FEEDWATER SYSTEM DURING LOOP
EPS	EMERGENCY POWER
FAB-L	FEED AND BLEED DURING LOOP
HPR	HIGH PRESSURE RECIRC
HPR-L	HIGH PRESSURE RECIRC
OPR-01H	OPERATOR FAILS TO RECOVER OFFSITE POWER IN 1 HOUR

OPR-06H OFFSITE POWER RECOVERY IN 6 HRS
RPS REACTOR SHUTDOWN

SEQUENCE CUT SETS

Truncation: Cummulative: 100.0% Individual: 1.0%

Event Tree: LOOP CCDP: 1.2E-006
Sequence: 17

CCDP	% Cut Set	Cut Set Events	
1.2E-006	98.00	HPI-XHE-XM-FB	

Event Tree: LOOP CCDP: 1.1E-007
Sequence: 14

CCDP	% Cut Set	Cut Set Events	
9.7E-008	89.00	HPR-XHE-XM	/OEP-XHE-XL-NR06H
2.6E-009	2.41	/OEP-XHE-XL-NR06H	RHR-MDP-CF-FSAB

Event Tree: LOOP CCDP: 4.3E-008
Sequence: 18-45

CCDP	% Cut Set	Cut Set Events	
1.4E-008	32.02	EPS-XHE-XL-NR01H	OEP-XHE-XL-NR01H
		EPS-DGN-CF-FRAB	
1.1E-008	24.48	EPS-XHE-XL-NR01H	OEP-XHE-XL-NR01H
		EPS-DGN-FR-1A	EPS-DGN-FR-1B
4.5E-009	10.41	EPS-XHE-XL-NR01H	OEP-XHE-XL-NR01H
		EPS-DGN-TM-1A	EPS-DGN-FR-1B
4.5E-009	10.41	EPS-XHE-XL-NR01H	OEP-XHE-XL-NR01H
		EPS-DGN-TM-1B	EPS-DGN-FR-1A
2.0E-009	4.62	EPS-XHE-XL-NR01H	OEP-XHE-XL-NR01H
		EPS-DGN-FS-1A	EPS-DGN-FR-1B
2.0E-009	4.62	EPS-XHE-XL-NR01H	OEP-XHE-XL-NR01H
		EPS-DGN-FS-1B	EPS-DGN-FR-1A
2.0E-009	4.57	EPS-XHE-XL-NR01H	OEP-XHE-XL-NR01H
		EPS-DGN-CF-FSAB	
8.4E-010	1.97	EPS-XHE-XL-NR01H	OEP-XHE-XL-NR01H
		EPS-DGN-TM-1B	EPS-DGN-FS-1A
8.4E-010	1.97	EPS-XHE-XL-NR01H	OEP-XHE-XL-NR01H
		EPS-DGN-TM-1A	EPS-DGN-FS-1B
5.0E-010	1.16	EPS-XHE-XL-NR01H	OEP-XHE-XL-NR01H
		EPS-XHE-XR-DGN1A	EPS-DGN-FR-1B
5.0E-010	1.16	EPS-XHE-XL-NR01H	OEP-XHE-XL-NR01H
		EPS-XHE-XR-DGN1B	EPS-DGN-FR-1A

Event Tree: LOOP CCDP: 3.8E-008
Sequence: 16

CCDP	% Cut Set	Cut Set Events	
2.3E-008	61.34	HPR-XHE-XM	OEP-XHE-XL-NR06H
1.5E-009	3.90	OEP-XHE-XL-NR06H	EPS-DGN-FR-1A
		RHR-MDP-TM-1B	
1.5E-009	3.90	OEP-XHE-XL-NR06H	EPS-DGN-FR-1B
		RHR-MDP-TM-1A	
6.3E-010	1.66	OEP-XHE-XL-NR06H	RHR-MDP-CF-FSAB
6.2E-010	1.62	OEP-XHE-XL-NR06H	EPS-DGN-FR-1A
		CCW-HTX-TM-1B	

BASIC EVENTS (Cut Sets Only)

Event Name	Description	Curr Prob
CCW-HTX-TM-1B	CCW HTX 1B UNAVAILABLE DUE TO T&M	2.5E-003
EPS-DGN-CF-FRAB	DIESEL GENERATOR COMMON CAUSE FAILS TO RUN	5.9E-004
EPS-DGN-CF-FSAB	DIESEL GENERATOR COMMON CAUSE FAILS TO START	8.4E-005
EPS-DGN-FR-1A	DIESEL GENERATOR A FAILS TO RUN	2.1E-002
EPS-DGN-FR-1B	DIESEL GENERATOR B FAILS TO RUN	2.1E-002
EPS-DGN-FS-1A	DIESEL GENERATOR A FAILS TO START	4.0E-003
EPS-DGN-FS-1B	DIESEL GENERATOR B FAILS TO START	4.0E-003
EPS-DGN-TM-1A	DIESEL GENERATOR 1A UNAVAILABLE DUE TO T&M	9.0E-003
EPS-DGN-TM-1B	DIESEL GENERATOR 1B UNAVAILABLE DUE TO T&M	9.0E-003
EPS-XHE-XL-NR01H	OPERATOR FAILS TO RECOVER EMERGENCY DIESEL IN	8.4E-001
EPS-XHE-XR-DGN1A	OPERATOR FAILS TO RESTORE DIESEL GENERATOR A	1.0E-003
EPS-XHE-XR-DGN1B	OPERATOR FAILS TO RESTORE DIESEL GENERATOR B	1.0E-003
HPI-XHE-XM-FB	OPERATOR FAILS TO INITIATE FEED AND BLEED COO	2.0E-002
HPR-XHE-XM	OPERTATOR FAILS TO INITIATE HPR	2.0E-003
OEP-XHE-XL-NR01H	OPERATOR FAILS TO RECOVER OFFSITE POWER IN 1	4.6E-001
OEP-XHE-XL-NR06H	OPERATOR FAILS TO RECOVER OFFSITE POWER IN 6	2.0E-001
RHR-MDP-CF-FSAB	COMMON CAUSE FAILURE OF RHR MDPS TO START	5.4E-005
RHR-MDP-TM-1A	RHR MDP 1A UNAVAILABLE DUE TO TEST AND MAINTE	6.0E-003
RHR-MDP-TM-1B	RHR MDP 1B UNAVAILABLE DUE TO TEST AND MAINTE	6.0E-003