FORM TITLE: ENGINEERING REPORT DATA SHEET	FORM NO. 5010.017-ATT-2	REV. 1 PC-1

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95 ML 5/21/96

Report No.: ~~97~~-R-1010-02 Unit: 2 Category: NON-Q

Report Title: ANO-2 PROBABILISTIC SAFETY ANALYSIS (REV. 1) SUMMARY

System(s): N/A

Topic(s): PRAS

Component No(s): N/A

Plt Area: Bldg. N/A Elev. N/A

Room: N/A Wall N/A

Coordinates: N/A

Abstract (Included Purpose/Results):

Summary of the Rev. 1 PSA. Freeze Date 3/19/93. Total CDF = 2.084E-05. The Core Damage Frequency (CDF) results reported in this document supercede the CDF results reported in 94-R-2005-01, Rev. 0 (ANO-2 IPE Submittal).

Revision No: 0

Config. Checklist (per 5010.004) completed? ☒ Yes ☐ No

Pages Revised and/or Added: I,II, 1 through 45, A-1, A-1 through A-282, B-i, B-1 through B-35, B1-1 through B1-5, C-i, C-1 through C-26, D-i, D-1 through D-13, E-i, E-ii, E-1 through E-92

Purpose of Revision:

INITIAL ISSUE

Initiating Documents	Resulting Documents	Key Design Input Documents
		94-R-2005-01,Rev. 0

Supersedes Report(s):

By: Lori Ann Potts / LAP / 5/12/98 Rvw'd: N/A / /

Chk'd: M. Lloyd / ML / 5/12/98 Apv'd: Daniel W. Fouts / DWF / 5/12/98

(Print Name) (Initials) (Date) (Print Name) (Initials) (Date)

Check if Additional Revisions: ☐

FORM TITLE:	FORM NO.	REV.
CONFIGURATION CHECKLIST	5010.004A	1 PC-1

Note:
The Configuration Checklist may not be used instead of a 50.59 Review when a 50.59 Review is required by Procedure 1000.131 or other governing procedures related to the affected documents.

Does the change affect information in any of the following documents or databases?
Conclusions should be substantiated by database queries, contacts with appropriate personnel, review of documents, etc. as applicable. For all questions below that are answered "Yes," the disposition must be documented. When appropriate, this may consist of references to implementing document/revision numbers.

AFFECTED?	LICENSING	BASIS FOR CONCLUSION / DISPOSITION
☐Yes[1] ☒No[2]	Operating License	LRS searches: probab*, risk, "core damage"
☐Yes[1] ☒No[2]	Technical Specifications	LRS searches: probab*, risk, "core damage"
☐Yes[1] ☒No[2]	Emergency Plan	LRS searches: probab*, risk, "core damage"
☐Yes[1] ☒No[2]	Industrial Security Plan	LRS searches: probab*, risk, "core damage"
☐Yes[1] ☒No[2]	Quality Assurance Manual Operations	LRS searches: probab*, risk, "core damage"
☐Yes[1] ☒No[2]	Fire Hazards Analysis (CALC-91-E-0072-01)	LRS searches: probab*, risk, "core damage"
☐Yes[1] ☒No[2]	Tech Spec Bases	LRS searches: probab*, risk, "core damage"
☐Yes[1] ☒No[2]	Safety Evaluation Reports (SERs)	LRS searches: probab*, risk, "core damage"
☐Yes[1] ☒No[2]	Ventilated Storage Cask SAR	LRS searches: probab*, risk, "core damage"
☐Yes[1] ☒No[2]	VSC Certification of Compliance	LRS searches: probab*, risk, "core damage"
☐Yes[1] ☒No[2]	VSC Conditions for System Use	LRS searches: probab*, risk, "core damage"
☐Yes[1] ☒No[2]	Core Operating Limits Report	LRS searches: probab*, risk, "core damage"
☐Yes[1] ☒No[2]	Safety Analysis Report / SAR Figures	LRS searches: probab*, risk, "core damage"
☐Yes ☒No	Offsite Dose Calculation Manual	LRS searches: probab*, risk, "core damage"

[1] If "Yes," a 10CFR50.59 Determination is required in accordance with Procedure 1000.131 unless exempted by Procedure 1000.131.
[2] If "No," the basis for this conclusion must be documented (e.g., LRS search criteria, LBS sections reviewed, etc.)

AFFECTED?	DESIGN	BASIS FOR CONCLUSION / DISPOSITION
☐Yes ☒No	Drawings / DRNs / DTS Database	
☐Yes ☒No	Component Database	
☐Yes ☒No	Vendor Tech Manuals / VTM Database	
☐Yes ☒No	Upper Level Documents (ULDs)	
☐Yes ☒No	Calculations / Code Stress Reports	
☐Yes ☒No	Specifications	
☐Yes ☒No	Engineering Reports	
☐Yes ☒No	EQ Documentation	
☐Yes ☒No	Software (Analysis / Microprocessor)	
☐Yes ☒No	Piping Class Summary	
☐Yes ☒No	Fire Barrier Penetration Log	
☐Yes ☒No	Cable, Raceway or Equipment Numbers (PDMS)	
☐Yes ☒No	ER Responses / Mod Pkgs (active only)	

AFFECTED?	OTHER	BASIS FOR CONCLUSION / DISPOSITION
☐Yes ☒No	Procedures / Engineering Standards	
☐Yes ☒No	Component Labels	
☐Yes ☒No	Fuse Lists	
☐Yes ☒No	Repetitive Task Database	
☐Yes ☒No	Preventive Maintenance Engineering Evaluations (PMEEs)	
☐Yes ☒No	Plant Computer Software	
☐Yes ☒No	Simulator	
☐Yes ☒No	Training / System Training Manuals (STMs)	
☐Yes ☒No	MMIS	

Completed By: Lori Ann Potts LAP Date: 5/12/98

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ENGINEERING REPORT FOR ARKANSAS NUCLEAR ONE RUSSELLVILLE, ARKANSAS

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REV	DATE	REVISIONS	BY	CHECK	APPR

TITLE:	REPORT NO:
ANO2 Probabilistic Safety Analysis (Rev. 1) Summary	~~97~~ 95-R-1010-02

MR 5/21/98

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1.0 INTRODUCTION

The "1993 ANO-2 PSA", commonly called the "ANO-2 Rev. 1 PSA", models the plant as it existed on March 19, 1993, and is summarized in this report. The "1988 ANO-2 PSA", commonly called the "ANO-2 Rev. 0 PSA", models the plant as it existed on August 31, 1988, and is summarized in the "ANO-2 Probabilistic Risk Assessment (PRA) Individual Plant Examination (IPE) Submittal", Reference 1.

The "ANO-2 Rev. 0 PSA" was submitted to the NRC as the ANO-2 Individual Plant Examination (IPE) Submittal. The technical approach for the "ANO-2 Rev. 0 PSA" involved a Level-1 PSA and limited scope Level-2 PSA. An Internal Flood Analysis, an Interfacing System LOCA Analysis and an ATWS analysis were also included in the evaluation.

The "ANO-2 Rev. 1 PSA" was prepared in response to Generic Letter 88-20. However, the model was developed with the intent to maintain a "living PSA", which may be used to assess the consequences of changing plant equipment or procedures. The technical approach for the "ANO-2 Rev. 1 PSA" was the same as the "ANO-2 Rev. 0 PSA" for the Level-1 portion and the ATWS Analysis. The Internal Flood, ISLOCA and Level 2 analyses were not updated in this revision.

2.0 METHODOLOGY

The approach used for the Level-1 portion of the study is often referred to as the "small event tree, large fault tree" approach and relies on the well-established technique called fault tree linking. To begin, potential accident initiators were identified and grouped according to similar plant response. Functional event trees were then developed to characterize accident sequences for each group of initiators. These sequences define the plant responses and the resulting core damage bins. For each plant response function node in the event tree, "top logic" fault trees were developed to convert the functional response to plant specific system responses and human interactions. For each system response, component level fault trees were developed, including front-line and support system relationships plus related human interactions. System related failures that could yield additional accident initiators were fed back into the accident sequences. The system fault trees also included test and maintenance activities that would contribute to system unavailability. Component failure and unavailability data, as well as initiating event frequencies, were constructed from generic and/or available plant specific failure information. Human failure events were generally not incorporated directly into the models. Notable exceptions were "fails to restore following maintenance/calibration" type failures and high level human failure events like "failure to actuate required manually actuated system".

To develop the Level-1 core damage frequencies, the fault tree linking approach was used to combine the system level fault trees and top logic for the specific accident

sequences. This process led to the quantification and identification of accident sequence cutsets -- the combination of an initiating event, component failures, maintenance unavailability, and human failure events that could yield the accident sequence and related core damage end states. At this point in the analysis, each significant cutset was analyzed for potential means of recovering from the combination of events. Considering the specific conditions and timing involved, recovery scenarios were identified and non-recovery probabilities were estimated. By appending the non-recovery events to the sequence cutsets, the final core damage frequency results were estimated.

The "ANO-2 Rev. 1 PSA" was organized around the following key technical tasks.

- Initiating Events / Accident Sequence Analysis,
- Systems Analysis,
- Data Analysis,
- Integration & Quantification,
- Human Reliability Analysis,
- Loss of Offsite Power Analysis,
- Development and Review of Internal Events Results
- ATWS Analysis.

These tasks are summarized in the following sections.

The following tasks were not updated in the ANO-2 Rev. 1 PSA. Therefore, the Rev. 0 results remain current for these tasks.

- Internal Flooding Analysis (Reference 26)
- Interfacing System LOCA Analysis (Reference 27)
- Level 2 Analysis (References 29 and 30)

2.1 INITIATING EVENTS / ACCIDENT SEQUENCE ANALYSIS

2.1.1 Initiating Events:

The list of initiating events identified for inclusion in the "ANO-2 Rev. 1 PSA" is found in Table 1. The selection of initiating events is described in detail in the "ANO-2 PRA Initiating Events and Accident Sequence Analysis Work Package", Reference 2. The development of frequencies for these initiators is documented in the "ANO-2 Initiating Event Frequencies Work Package", Reference 3.

Basic front-line system success criteria for the "ANO-2 Rev. 1 PSA" were also developed in Reference 2. Table 2 lists these criteria.

2.1.2 Functional Event Tree Development:

Five event trees (or categories of events) were developed, in Reference 2, to address the response of ANO-2 to potential events: Transient, Small-Break LOCA, Medium-Break LOCA, Large-Break LOCA and Steam Generator Tube Rupture. The following paragraphs discuss the important aspects of the sequences that lead to core damage and Figure 1 displays the event trees.

Transient Sequence Summary

TQU/TQX - These sequences represent transient initiating events with successful reactor trip and successful primary-to-secondary heat transfer via the steam generators. However, subsequent failures induce a small break LOCA (such as PSVs failing to reclose or RCP seal LOCAs). This event is then treated by a transfer to the small break LOCA event tree (transfer S1) where potential subsequent failures of the HPSI system during injection from the RWT and recirculation from the containment sump are modeled. TQU sequences lead to early core melt, while TQX sequences lead to late core damage.

TBX - This sequence represents a transient initiating event followed by failure of RCS and core heat removal, but successful once-through-cooling. This results in the depletion of the RWT inventory and a requirement for recirculation of the containment sump inventory, which subsequently fails. This sequence represents a transient-induced medium LOCA. This event is treated by transfer S1 to the small break LOCA event tree. This sequence leads to late core damage.

TQBU - This sequence represents a transient initiating with subsequent failures resulting in a small break LOCA (such as PSVs failing to reclose or RCP seal LOCAs) with a subsequent failure of primary to secondary heat transfer via the steam generators and failure of HPSI to inject when aligning once through cooling.

TQBF - This sequence represents a transient initiating with subsequent failures resulting in a small break LOCA (such as PSVs failing to reclose or RCP seal LOCAs) with a subsequent failure of primary to secondary heat transfer via the steam generators and failure of once through cooling as a result of a failure to depressurize the RCS.

TQBX - This sequence represents a transient initiating with subsequent failures resulting in a small break LOCA (such as PSVs failing to reclose or RCP seal LOCAs) with a subsequent failure of primary to secondary heat transfer via the steam generators and failure of long term containment heat removal during once through cooling.

TBF - This sequence involves transient initiating events with a subsequent loss of RCS and core heat removal (i.e., MFW and EFW failures) and failure of once-through-cooling (due to HPSI or ECCS vent and LTOP vent valve failures). This sequence leads to high RCS pressure early core damage.

TK - This sequence represents transient initiating events followed by failure of the reactor trip system. These sequences have been considered separately in the ATWS work package (Reference 28).

Small-Break LOCA Core-Damage Sequence Summary

SX - This sequence represents a small break LOCA with successful RCS inventory control and RCS and core heat removal, with a subsequent failure of HPSI or CS systems during recirculation (after the RWT inventory is exhausted). This leads to a late core damage.

SU - This sequence represents a small break LOCA with failure of the HPSI to replace inventory lost out the break. This event leads to an early core damage.

SBX - This sequence represents a small-break LOCA with successful HPSI, but with initial failure of RCS and core heat removal and recovery via once-through cooling. From this point on, this sequence is similar to SX above with a subsequent failure of the HPSI or CS systems during recirculation (after the RWT inventory is exhausted). This leads to a late core damage.

SBF - This sequence represents a small-break LOCA and failure of RCS and core heat removal through the steam generators and failure of once-through cooling. This leads to repressurization of the RCS above the HPSI shutoff head and early core damage at high RCS pressure.

SBU - This sequence represents a small-break LOCA with failure of the HPSI to replace inventory lost out the break. It also involves failure of the RCS and core heat removal function. Since this event is non-minimal when compared to sequence SU it is bounded by and considered within SU. However, for completeness, this sequence was included. This event leads to an early core damage.

SK - This sequence represents a small break LOCA initiating event followed by failure of the reactor trip system. This sequence is not considered further due to the low frequency compared to transient-initiated ATWS events. (Reference 28).

Medium-Break LOCA Core-Damage Sequence Summary

MX - This sequence represents a medium-break LOCA with successful RCS inventory control and subsequent failure of HPSI or CS systems during recirculation (after the RWT inventory is exhausted). This leads to a late core damage.

MU - This sequence represents a medium-break LOCA with failure of the HPSI to replace inventory lost out the break. This event leads to an early core damage.

MK - This sequence represents a medium-break LOCA initiating event followed by failure of the reactor trip system. This sequence is not considered further due to the low frequency compared to transient-initiated ATWS events (Reference 28).

Large-Break LOCA Core-Damage Sequence Summary

AX - This sequence represents a large-break LOCA with failure of the HPSI system or containment cooling function during recirculation (after the RWT is emptied). Due to the break size, the large flow rate required of low-pressure safety injection (LPSI), coupled with containment spray actuation, results in rapid depletion of the RWT inventory. Therefore, failure of recirculation following a large-break LOCA has been conservatively assumed to result in an early core damage.

AU - This sequence represents a large-break LOCA with failure of LPSI, HPSI or SITs. This sequence results in an early core damage and is assumed to occur very fast such that no operator recoveries are credited.

Steam Generator Tube Rupture Core-Damage Sequence Summary

RX - This sequence represents the case when a SGTR occurs followed by successful reactor trip, primary-secondary heat removal, and inventory make-up. However, the RCS remains at high pressure and inventory is conservatively assumed to be lost through to SG. RCS inventory control will be lost when the RWT is depleted, and the RAS signal causes HPSI suction to be aligned to an empty containment sump. This sequence results in a late core damage.

RU - This sequence represents a SGTR followed by failure of the operators to use the unaffected steam generator to depressurize the RCS below the affected steam generator pressure (i.e., failure to terminate the leak) and failure of the HPSI system to make-up inventory lost out the ruptured tube. Although this sequence is slow to progress it has been conservatively assumed that this sequence results in early core damage.

RBX - This sequence represents the case where the SGTR occurs followed by loss of RCS and core heat removal. This requires once-through cooling, and requires that all decay heat be removed via the containment spray system during recirculation. If the flow path from the affected Steam generator is not isolated prior to the RWT inventory being exhausted from the sump, inventory control will be lost, leading to eventual core uncovering and late core damage.

RBF - This sequence represents a SGTR followed by success of RCS inventory control and loss of RCS and core-heat removal function. This results in RCS pressurization above the HPSI shutoff head. When once-through cooling is not successfully initiated, boiloff of RCS inventory out the SRVs results in a high RCS pressure early core damage.

RBU - This sequence represents the case where the SGTR occurs followed by loss of RCS and core heat removal. This requires once-through cooling, which subsequently fails. This sequence results in high RCS pressure early core damage.

RK - This sequence represents a SGTR followed by failure of the reactivity control function. This sequence is not considered further due to the low frequency compared with transient-initiated ATWS events (Reference 28).

2.2 SYSTEMS ANALYSIS

System models were constructed for a total of 15 systems. These models are documented in the Systems Analysis Work Packages, References 4 through 18. For many systems, more than one "top event" was developed in order to accommodate the various requirements for successful system operation as defined by the success criteria for different event sequences. In addition, alternate system operating modes occurring during an accident sequence at ANO-2 (e.g., injection mode followed by recirculation mode) were addressed in the models through the use of logic flags which can be set to "True" or "False" so as to define a specific system alignment or mode of operation. Therefore, each system model may contain several fault trees. Each system was assigned a letter of the alphabet as a system designator. These letters are used in the system fault trees to distinguish the logic of each system. These designators are listed in Table 3.

2.3 DATA ANALYSIS

The "ANO-2 Rev. 1 PSA" equipment reliability data set includes the estimates of component reliability parameters, maintenance unavailabilities, and common-cause failure probabilities. This data is documented in References 19 through 22.

2.4 INTEGRATION AND QUANTIFICATION

To develop the Level-1 core damage frequencies, the fault tree linking approach was used to combine the system level fault trees and top logic for the specific accident sequences. This process led to the quantification and identification of accident sequence cutsets -- the combinations of component failures, maintenance unavailability, and human failure events that could yield the accident sequence and related core damage end states. This process is documented in the "Integration/Quantification of ANO-2 PSA Level-1 Plant Model, Rev. 1", Reference 23

2.5 HUMAN RELIABILITY ANALYSIS

A human reliability analysis (HRA), including support of the recovery analysis, was performed for the ANO-2 Rev. 1 PSA. This analysis is documented in the "ANO-2 Human Reliability Analysis Work Package", Reference 24. It should be noted that the preliminary core damage frequency results reported in Attachment C of this document were generated via the use of a preliminary set of HRA recovery files. A list of these rule files are provided in Attachment C. As noted below, these rules were revised as a result of an expert panel review of the resulting recovered cutsets. Since the final HRA rules and HRA basic event probability values (reported in Ref. 24) were issued after this review, as the last step in the development of the ANO-2 Rev-1 results, (1) the final HRA rules were compared with the preliminary version of these rules used to generate the preliminary results and (2) the basic event probabilities were compared with those used to generate the preliminary results. These reviews are documented in Attachment E.

A review of the final rules showed that when revised to include changes identified during the cutset review process, these rules resulted in essentially the same core damage frequency results as those of the preliminary HRA rules, similarly amended. Both the HRA rules and core damage results on a sequence basis are provided in Attachment E.

A review of the final HRA event probabilities showed that only two HRA basic events were revised between the preliminary and final versions of the HRA calculation (Ref. 24): events LPSPRAY and OPER-2. The effect of incorporating the final values of these basic events into the cutset results is also documented in Attachment E. <u>The final results reported as the final ANO-2 Rev-1 results are based on use of the amended final HRA rules and basic event probabilities.</u>

Human Failure Events (HFEs) were considered to be events involving failure of human actions that are of a manual actuation nature rather than of a corrective or recovery nature. These were modeled in the fault trees in the same manner as equipment failures because the only difference in the two are that the HFE is failure of the manual

actuation. Therefore, the fault tree logic will indicate that a failure occurs if either the equipment or the manual actuation fails.

Recovery events, on the other hand, were considered to be events involving failure of human actions of a corrective or recovery nature. These events were not modeled in the fault trees but were added to individual cutsets during the cutset review process. Addition of recovery events was limited to one per cutset, except in event sequences where a copious amount of time was available prior to core uncovery such as SGTR events depending on the available RWT inventory. When more than one recovery was possible and a copious amount of time did not exist, the one most likely to be attempted, based on review of procedures and operator interviews, was selected.

2.6 LOSS OF OFF-SITE POWER ANALYSIS

Accidents initiated by the Loss of Off-Site Power (LOSP) event are typically important risk contributors both in terms of core damage frequency and consequence. Thus, to assure an accurate assessment of these accidents, it is important to account for the likelihood of recovering off-site power prior to core damage. The products of this analysis are LOSP recovery factors. These have been applied to the ANO-2 cutsets initiated by the LOSP initiator (T3). The LOSP recovery analysis methodology and calculations are described in the "ANO-2 Loss of Off-Site Power Recovery Factors Work Package", Reference 25.

2.7 DEVELOPMENT AND REVIEW OF INTERNAL EVENTS RESULTS

The development of the internal events cutset results included loading the proper database values, removing selected invalid cutsets, adding and revising HRA recoveries and applying these HRA recoveries, applying Loss of Offsite Power Recovery Factors and combining the files into one combined cutset file @A2COMB1.CUT. An Expert Panel Review of the top cutsets resulted in a few additional corrections to the cutsets. These processes are documented in Attachments B and C. New or Revised HRA Events to support the post-HRA processing and Expert Panel Review are documented in Attachment D.

A list of the preliminary cutset results, the top 100 cutsets, and their associated cutset and database files are provided in Attachment C. These results were considered preliminary, since they are based on preliminary HRA results. The final HRA results were incorporated in the next step, which is discussed in Attachment E.

2.8 ATWS ANALYSIS

The "ANO-2 ATWS Scoping Analysis", Reference 28, discusses the quantification of ATWS event frequencies, the modeling assumptions and input data, and the construction and quantification of the event trees used to perform a scoping assessment of ATWS events at ANO-2.

Reference 28 indicates that 84.21% of the total ATWS mean frequency for core damage of 1.59E-06 is due to the TT (Turbine Trip) transient group. The two transient groups characterized as producing major system disturbances contribute only approximately 15% to the total mean Core Damage Frequency (CDF), with the LOMFW transient group contributing approximately 7.93% and the LOOP transient group contributing about 7.87%.

The major sequence contributor to the total mean CDF is adverse MTC along with failure of borated water and/or long term cooling. The second largest sequence contributor to the total mean CDF are those with the failure of borated water and/or long term cooling only. The third largest sequence contributor is failed EFW along with failure of borated water and/or long term cooling.

3.0 SUMMARY

A summary of the results and major findings is presented below for the Level-1 analysis. Figures 2 and 3 provide a pictorial display of the ANO-2 numerical results.

Table 4 lists the Dominant or Top 100 Cutsets resulting from the ANO-2 Rev. 1 Level-1 PSA. These cutsets are based on use the final versions of all supporting calculations, including the final version of the HRA calculation (Ref. 24). Table 5 lists the Core Damage Frequency Distribution by Accident Sequence. Table 6 lists the Core Damage Frequency Distribution by Initiator.

The Cutsets from Rev. 0 and Rev. 1 were compared to ensure that any differences could be readily accounted for by review of the Rev. 1 documentation. This review is documented in Attachment A.

The As-Left Model Files for Rev. 1 of the ANO-2 PSA are listed in Table 7.

4.0 CONCLUSION

No new significant scenarios were identified and the conclusions of the IPE [Ref. 1] are still valid, as restated below:

- The overall core damage frequency of 2.084E-05/yr. is below the NRC staff's proposed subsidiary safety goal of 1E-04/yr. This indicates that ANO-2 does not present an undue core damage risk.

- The overall ANO-2 core damage frequency is within the range of past published PSAs performed on PWRs. This indicates that the core damage susceptibility of ANO-2 is not significantly unlike other PWRs.

5.0 REFERENCES

1. 94-R-2005-01, "ANO-2 Probabilistic Risk Assessment (PRA) Individual Plant Examination (IPE) Submittal", Rev. 0, 5/6/94.

2. 89-E-0048-20, "ANO-2 PRA Initiating Events and Accident Sequence Analysis Work Package", Rev. 2, 12/22/97.

3. 89-E-0048-19, "ANO-2 Initiating Event Frequencies Work Package", Rev. 1, 12/29/97.

4. 89-E-0048-01, "ANO-2 Engineered Safety Features Actuation System Analysis Work Package", Rev. 1, 12/22/97.

5. 89-E-0048-02, "High Pressure Safety Injection Systems Analysis Work Package", Rev. 1, 12/22/97.

6. 89-E-0048-03, "ANO-2 DC Power Systems Analysis Work Package", Rev. 1, 12/22/97.

7. 89-E-0048-04, "AC Power Systems Analysis Work Package, Rev. 1, 12/22/97.

8. 89-E-0048-05, "ANO-2 Systems Analysis Work Package - Reactor Coolant System", Rev. 1, 12/22/97.

9. 89-E-0048-06, "Systems Analysis Work Package - ANO-2 Low Pressure Safety Injection System", Rev. 1, 12/22/97.

10. 89-E-0048-07, "ANO-2 Emergency Feedwater System Analysis Work Package", Rev. 1, 12/22/97.

11. 89-E-0048-08, "ANO-2 Power Conversion System (PCS) Analysis Work Package", Rev. 1, 12/22/97.

12. 89-E-0048-09, "ANO-2 System Work Package / Containment Isolation System", Rev. 1, 12/22/97.

13. 89-E-0048-10, "Systems Analysis Work Package - Containment Spray System", Rev. 1, 12/22/97.

14. 89-E-0048-11, "ANO-2 Instrument Air System (IA) Analysis Work Package", Rev. 1, 12/22/97.

15. 89-E-0048-12, "ANO-2 Component Cooling Water System Work Package", Rev. 1, 12/22/97.

16. 89-E-0048-13, "ANO-2 Service Water System Analysis Work Package", Rev. 1, 12/22/97.

17. 89-E-0048-14, "ANO-2 Safety Injection Tanks System Analysis Work Package", Rev. 1, 12/22/97.

18. 89-E-0048-15, "Systems Analysis Work Package - ANO-2 Reactor Building Cooling", Rev. 1, 12/22/97.

19. 89-E-0167-13, "Common Cause Failure Data Work Package", Rev. 0, 4/12/94.

20. 89-E-0167-21, "ANO-1 and ANO-2 Common Plant-Specific Data for PRA Use", Rev. 0, 6/2/94.

21. 89-E-0167-24, "Unit-1 and Unit-2 Common Maintenance Unavailabilities for PRA Use", Rev. 0, 6/2/94.

22. 89-E-0047-23, "Generic Data Notebook", Rev. 0, 2/7/91.

23. 89-E-0048-36, "Integration/Quantification of ANO-2 PSA Level-1 Plant Model, Rev. 1", Rev. 0, 7/31/97.

24. 89-E-0048-22, "ANO-2 Human Reliability Analysis Work Package", Rev. 1, 4/1/98.

25. 89-E-0048-25, "ANO-2 Loss of Off-Site Power Recovery Factor Work Package", Rev. 1, 12/22/97.

26. 89-E-0048-35, "ANO-2 Internal Flood Analysis", Rev. 0, 4/8/94.

27. 89-E-0048-18, "ANO-2 Interfacing System LOCA Work Package", Rev. 1, 5/28/92.

28. 89-E-0048-26, "ANO-2 ATWS Scoping Report", Rev. 2, 12/22/97

29. 89-E-0048-28, "ANO-2 Plant Damage States and Binning Criteria", Rev. 0, 4/11/94.

30. 89-E-0048-31, "ANO-2 Reactor Building Failure Pressure Characterization", Rev. 0, 4/11/94.

TABLE 1

ANO-2 INITIATING EVENTS AND FREQUENCIES [Ref. 2 and 3]

Initiator	Description	Yearly Frequency	Error Factor
T1	Turbine trip	0.54	3.42
T2	Loss of power conversion system	0.18	9.60
T3	Loss of off-site power	3.68E-02	3.00
T4	Excessive feedwater	9.4E-04	4.13
T5	Steamline/feedwater line break	1.10E-03	15.0
T6	Reactor trip	1.44	1.96
T7	Total loss of SW flow	1.00E-03	5.0
T8	Loss of SW pump 2P4A train	3.16E-02	5.0
T9	Loss of SW pump 2P4B train	3.16E-02	5.0
T10	Loss of DC bus 2D01	3.94E-04	11.0
T11	Loss of DC bus 2D02	3.94E-04	11.0
T12	Loss of AC bus 2A3	3.94E-04	11.0
T13	Loss of AC bus 2A4	3.94E-04	11.0
T14	Loss of 480V Load Center 2B5	1.04E-03	14.1
T15	Loss of 480V Load Center 2B6	1.04E-03	14.1
S	Small LOCA (0.3"-1.9")	5.00E-03	15.0
M	Medium LOCA (1.9"- 4.3")	1.00E-03	15.0
A	Large LOCA (>4.3")	1.00E-04	15.0
R	Steam generator tube rupture	9.77E-03	2.43

TABLE 2

ANO-2 FRONT LINE SYSTEM SUCCESS CRITERIA
[Ref. 2]

INITIATOR	REACTIVITY CONTROL	RCS AND CORE HEAT REMOVAL	RCS PRESSURE CONTROL/PRESSURE BOUNDARY INTEGRITY	ONCE-THROUGH COOLING	COMMENTS
Transient (T1 to T15)	RPS	1/2 EFW Pumps OR 1/2 MFW Pumps within 10 minutes OR AFW Pump	SRVs reclosed (if opened) AND CCW to RCP seal cooling or Operator trips RCPs within 40 minutes of loss of RCP seal cooling	1/3 HPSI pumps from RWT and LTOP or ECCS vent valves open and Operator initiates once-through cooling within 55 minutes of a loss of all feedwater (T2) event or within 70 minutes of a (non-T2) loss of all feedwater	1. Secondary Steam Relief assumed available 2. EFW or MFW to 1 SG is sufficient 3. Failure of RPS transfers to ATWS tree 4. 3/4 injection lines adequate for HPSI

TABLE 2 (cont.)

ANO-2 FRONT LINE SYSTEM SUCCESS CRITERIA
[Ref. 2]

INITIATOR	REACTIVITY CONTROL	RCS AND CORE HEAT TRANSFER	RCS INVENTORY CONTROL	LONG TERM RCS INVENTORY CONTROL & HEAT REMOVAL	COMMENTS
Small LOCA 0.3" to 1.9" (S)	RPS	1/2 EFW Pumps or 1/2 MFW Pumps or AFW Pump	1/3 HPSI Pumps within 44 minutes of a LOCA (secondary cooling available) and within 30 minutes of a LOCA (no secondary cooling)	1/3 HPSR Pumps and 1/2 CS Trains [1 pump and 1 of 1 SDCHX or 1 pump and 2 of 4 CFC] (no secondary cooling) or 1/3 HPSR pumps and Secondary cooling available	1. Initiator assumed to require SG cooling to depressurize to HPSI conditions 2. Failure of RPS considered and eliminated in ATWS Work Package 3. RCS Integrity lost as a result of the initiator 4. 3/4 injection lines adequate for HPSI (with 1 of 3 potentially lost out break) 5. Containment cooler and spray requirement may be relaxed based on future analyses

TABLE 2 (cont.)

ANO-2 FRONT LINE SYSTEM SUCCESS CRITERIA
[Ref. 2]

INITIATOR	REACTIVITY CONTROL	RCS INVENTORY CONTROL	LONG TERM RCS INVENTORY CONTROL & HEAT REMOVAL	COMMENTS
Medium LOCA 1.9" to 4.3" (M)	RPS	1/3 HPSI Pumps immediately give SIT failure or 1/3 HPSI Pumps restored (given HPSI start failure) within 60 minutes of MLOCA given SITs are successful	1/3 HPSR Pumps and 1/2 CS Trains [1 pump and 1 of 1 SDCHX or 1 pump and 2 of 4 CFC]	1. 3/4 injection lines adequate for HPSI (with 1 of 3 potentially lost out break) 2. Failure of RPS considered and eliminated in ATWS Work Package 3. RCS Integrity lost as a result of the initiator 4. Containment cooler and spray requirement may be relaxed based on future analyses

TABLE 2 (cont.)

ANO-2 FRONT LINE SYSTEM SUCCESS CRITERIA
[Ref. 2]

INITIATOR	REACTIVITY CONTROL	ADEQUATE PRIMARY SYSTEM INVENTORY	LOW PRESSURE RECIRCULATION	COMMENTS
Large LOCA >4.3" (A)	Not Required	1/3 HPSI Pumps and 1/2 LPSI Pumps and 3/4 SITs available (2 to inject, 1 lost out break)	1/3 HPSR Pumps and 1/2 CS Trains [1 pump and 1 of 1 SDCHX or 1 pump and 2 of 4 CFC]	1. 3/4 injection lines adequate for HPSI (with 1 of 3 potentially lost out break) 2. 2/4 injection lines adequate for LPSI (per SAR analysis) 3. Reactivity Control is not explicitly required. If RPS fails, the reactor will be maintained subcritical by injection of RWT inventory and/or core voids. 4. RCS Integrity lost as a result of the initiator 5. Containment cooler and spray requirement may be relaxed based on future analyses

TABLE 2 (cont.)

ANO-2 FRONT LINE SYSTEM SUCCESS CRITERIA
[Ref. 2]

INITIATOR	REACTIVITY CONTROL	RCS AND CORE HEAT REMOVAL	RCS INVENTORY CONTROL	ONCE-THROUGH COOLING	LONG-TERM RCS INVENTORY CONTROL AND HEAT REMOVAL	COMMENTS
Steam Generator Tube Rupture (R)	RPS	[1/2 EFW Pumps or 1/2 MFW Pumps or AFW Pump] and Steam relief path or 1/2 MFW Pumps and Steam relief path	1/3 HPSI Pumps within 3 hours of SGTR (secondary cooling available) or within 30 minutes of SGTR (no secondary cooling)	LTOP or ECCS vent valves open and Operator initiates once-through cooling within 30 minutes of a loss of all feedwater	RCS pressure control AND Secondary steam relief isolated (affected SG) or 1/2 DHR trains (Secondary Cooling Available) OR Secondary Steam relief isolated (affected SG) and 1/3 HPSI Pumps	1. Secondary steam relief assumed available (unaffected SG) 2. EFW or MFW to 1 SG is sufficient 3. Failure of RPS considered & eliminated in ATWS Work Package 4. Secondary steam relief isolation required to mitigate primary to secondary inventory loss 5. 1/4 injection lines adequate for HPSI (modeled as 3/4 required) 6. RCS Integrity lost as a result of the initiator

TABLE 3

ANO-2 SYSTEM DESIGNATORS
[Ref. 4 through 18]

Designator	System
A	Engineered Safety Feature Actuation System (ESFAS)
C	Safety Injection Tanks
D	DC Electric Power
E	AC Electric Power (includes EDGs)
F	Main Feedwater
G	Reactor Building Cooling
H	High Pressure Safety Injection (HPSI)
I	Instrument Air
J	Containment Isolation
L	Low Pressure Safety Injection (LPSI)
N	Condensate
P	Power Conversion -- Main Steam
Q	Emergency Feedwater
R	Reactor Coolant System (RCS)
S	Service Water System
W	Circulating Water
X	Component Cooling Water
Y	Containment Spray

Table 4. ANO-2 PSA DOMINANT OR TOP 100 CUTSETS

#	Inputs	Description	Rate	Exposure	Event Prob	Probability
1	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	6.10E-06
	T10	LOSS OF DC BUS 2D01 <IE>		3.94E-04	3.94E-04	
	ACXTP7BMN2	OPS FAILS TO X-TIE 2A3/2A4 AND MAN CONTROL 2P7B VALVES, 2P7A MISSION FAILURE		1.07E-01	1.07E-01	
2	T12	LOSS OF AC BUS 2A3 <IE>		3.94E-04	3.94E-04	2.09E-06
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	P7AMANRECD	Operators fails to man cntrl 2P7A speed and discharge valves:post battery disch		6.70E-02	6.70E-02	
3	HMM2CCF003	COMMON CAUSE FAILURE OF HPSI MOV'S TO OPEN		9.23E-04	9.23E-04	1.06E-06
	S	SMALL BREAK LOCA <IE>		5.00E-03	5.00E-03	
	HOTLEGINJS	Operators fail to align HPSI to hot leg inj after SBLOCA & loss of normal path		2.30E-01	2.30E-01	
4	QHF2REFILL	OPERATORS FAIL TO ALIGN EFW SUCTION TO ALTERNATE CONDENSATE STORAGE TANK		1.20E-02	1.20E-02	8.52E-07
	T7	Total Loss of Service Water Flow <IE>		1.00E-03	1.00E-03	
	T7REC	Operator fails to start standby SW pump & align ECP, w/QHF2REFILL		7.10E-02	7.10E-02	
5	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	6.12E-07
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	ETM2A3XXXX	4160V SWGR 2A3 IN TEST OR MAINTENANCE		5.66E-05	5.66E-05	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	ACREALIGND	Operators fail to realign 2B5 from 2A3 to 2A4. For use only after battery disch		9.50E-02	9.50E-02	
6	T10	LOSS OF DC BUS 2D01 <IE>		3.94E-04	3.94E-04	5.51E-07
	QMM2STMADM	STEAM ADMISSION VALVE 2CV-0340-2 OR BYPASS VALVE 2SV-0205 FAIL		1.08E-02	1.08E-02	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
7	QTM2EFWTAF	EFW PUMP TRAIN A UNAVAILABLE DUE TO MAINTENANCE		9.09E-03	9.09E-03	4.66E-07
	T10	LOSS OF DC BUS 2D01 <IE>		3.94E-04	3.94E-04	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
8	QMM2TRANAA	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 1 FAULTS)		7.73E-03	7.73E-03	3.96E-07
	T10	LOSS OF DC BUS 2D01 <IE>		3.94E-04	3.94E-04	

Table 4. ANO-2 PSA DOMINANT OR TOP 100 CUTSETS

#	Inputs	Description	Rate	Exposure	Event Prob	Probability
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
9	T1	Turbine Trip <IE>		5.40E-01	5.40E-01	2.29E-07
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	ETM2A3XXXX	4160V SWGR 2A3 IN TEST OR MAINTENANCE		5.66E-05	5.66E-05	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	ACREALIGND	Operators fail to realign 2B5 from 2A3 to 2A4. For use only after battery disch		9.50E-02	9.50E-02	
10	HMM2CCF003	COMMON CAUSE FAILURE OF HPSI MOV'S TO OPEN		9.23E-04	9.23E-04	2.12E-07
	HPSIMUREC0	FLAG TO INDICATE RECOVERABLE MU SEQUENCE		1.00E+00	1.00E+00	
	M	MEDIUM BREAK LOCA <IE>		1.00E-03	1.00E-03	
	HOTLEGINJS	Operators fail to align HPSI to hot leg inj after SBLOCA & loss of normal path		2.30E-01	2.30E-01	
11	QMM2CSTNKA	NO FLOW FROM CST (TYPE-1 FAULTS)		2.97E-03	2.97E-03	1.37E-07
	T7	Total Loss of Service Water Flow <IE>		1.00E-03	1.00E-03	
	QCSTKXFER	Operators fails to align EFW suction to alternate ANO-1 condensate source		4.60E-02	4.60E-02	
12	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	1.33E-07
	T14	LOSS OF AC BUS 2B5 <IE>		1.04E-03	1.04E-03	
	YMM2CSBXXA	INDEPENDENT FAILURES OF CS TRAIN B (TYPE-1 FAILURES)		1.05E-02	1.05E-02	
	P7BMANREC	OPERATORS FAIL TO MANUALLY CONTROL EFW PUMP (2P7B) DISCHARGE VALVES		8.40E-02	8.40E-02	
13	T10	LOSS OF DC BUS 2D01 <IE>		3.94E-04	3.94E-04	1.29E-07
	QMM2COOLTB	LOSS OF BEARING COOLING TO P7A TURBINE(2K3)		2.53E-03	2.53E-03	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
14	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	1.24E-07
	T14	LOSS OF AC BUS 2B5 <IE>		1.04E-03	1.04E-03	
	YMM2CSTRNB	INDEPENDENT FAILURES OF CONT SUMP TRAIN B Y□		9.81E-03	9.81E-03	
	P7BMANREC	OPERATORS FAIL TO MANUALLY CONTROL EFW PUMP (2P7B) DISCHARGE VALVES		8.40E-02	8.40E-02	
15	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	1.22E-07
	T14	LOSS OF AC BUS 2B5 <IE>		1.04E-03	1.04E-03	

Table 4. ANO-2 PSA DOMINANT OR TOP 100 CUTSETS

#	Inputs	Description	Rate	Exposure	Event Prob	Probability
	YMM2RECIRC	RWT MINIFLOW ISOLATION VALVE 2CV-5628-2 FAILURE		9.68E-03	9.68E-03	
	P7BMANREC	OPERATORS FAIL TO MANUALLY CONTROL EFW PUMP (2P7B) DISCHARGE VALVES		8.40E-02	8.40E-02	
16	M	MEDIUM BREAK LOCA <IE>		1.00E-03	1.00E-03	1.11E-07
	YMM2CSAXXA	INDEPENDENT FAILURES OF CS TRAIN A (TYPE-1 FAILURES)		1.05E-02	1.05E-02	
	YMM2CSBXXA	INDEPENDENT FAILURES OF CS TRAIN B (TYPE-1 FAILURES)		1.05E-02	1.05E-02	
17	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	1.06E-07
	EDG2DG1XXF	2DG1 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	EDG2DG2XXF	2DG2 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	T3	Loss of Offsite Power <IE>		3.68E-02	3.68E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
	SBO04	STATION BLACKOUT FACTOR		2.81E-03	2.81E-03	
18	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	1.02E-07
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	ERE2A3LXXK	2A3 LO RELAY 186-2A3 SPURIOUS TRIP	3.94E-07	2.40E+01	9.46E-06	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	ACREALIGND	Operators fail to realign 2B5 from 2A3 to 2A4. For use only after battery disch		9.50E-02	9.50E-02	
19	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	1.02E-07
	DBT2DSCD12	BATTERY 2D12 DISCHARGED		1.00E+00	1.00E+00	
	ERE2A4LXXK	2A4 LO RELAY 186-2A4 SPURIOUS TRIP	3.94E-07	2.40E+01	9.46E-06	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	ACREALIGND	Operators fail to realign 2B5 from 2A3 to 2A4. For use only after battery disch		9.50E-02	9.50E-02	
20	A	LARGE BREAK LOCA <IE>		1.00E-04	1.00E-04	9.23E-08
	HMM2CCF003	COMMON CAUSE FAILURE OF HPSI MOV'S TO OPEN		9.23E-04	9.23E-04	
21	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	8.24E-08
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	EDG2DG1XXF	2DG1 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	EMM2CB309S	4160V AC BKR 152-309 SPUR TRIP SIGNAL FAULT MODULE		6.62E-05	6.62E-05	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
22	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	8.24E-08
	DBT2DSCD12	BATTERY 2D12 DISCHARGED		1.00E+00	1.00E+00	
	EDG2DG2XXF	2DG2 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	EMM2CB409S	4160V AC BKR 152-409 SPUR TRIP SIGNAL FAULT MODULE		6.62E-05	6.62E-05	

Table 4. ANO-2 PSA DOMINANT OR TOP 100 CUTSETS

#	Inputs	Description	Rate	Exposure	Event Prob	Probability
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
23	HMM2CCF001	COMMON CAUSE FAILURE OF 2 HPSI PUMPS TO START <module>		3.94E-04	3.94E-04	7.89E-08
	S	SMALL BREAK LOCA <IE>		5.00E-03	5.00E-03	
	SHPSISWING	Operators fails to align HPSI swing pp following a SBLOCA and HPSI pps failure		4.00E-02	4.00E-02	
24	T2	Loss of PCS <IE>		1.80E-01	1.80E-01	7.65E-08
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	ETM2A3XXXX	4160V SWGR 2A3 IN TEST OR MAINTENANCE		5.66E-05	5.66E-05	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	ACREALIGND	Operators fail to realign 2B5 from 2A3 to 2A4. For use only after battery disch		9.50E-02	9.50E-02	
25	DMM2CCFBTA	BATTERY COMMON CAUSE FAILURE (TYPE-1) MODULE		8.08E-06	8.08E-06	7.56E-08
	T3	Loss of Offsite Power <IE>		3.68E-02	3.68E-02	
	SBO06	STATION BLACKOUT FACTOR		2.54E-01	2.54E-01	
26	A	LARGE BREAK LOCA <IE>		1.00E-04	1.00E-04	7.38E-08
	LMM2CCF004	COMMON CAUSE FAILURE OF 2CV-5017, 5037, 5057 & 5077		7.38E-04	7.38E-04	
27	QMM2PMSUCA	NO FLOW THROUGH COMMON PUMP SUCTION LINE (TYPE-1 FAULTS)		1.55E-03	1.55E-03	7.13E-08
	T7	Total Loss of Service Water Flow <IE>		1.00E-03	1.00E-03	
	QCSTKXFER	Operators fails to align EFW suction to alternate ANO-1 condensate source		4.60E-02	4.60E-02	
28	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	7.04E-08
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	DTM202D21X	125VDC BUS 2D21 IN TEST OR MAINTENANCE		5.66E-05	5.66E-05	
	EDG2DG1XXF	2DG1 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
29	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	7.04E-08
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	EDG2DG1XXF	2DG1 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	ETM2A1XXXX	4160V SWGR 2A1 IN TEST OR MAINTENANCE		5.66E-05	5.66E-05	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
30	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	7.04E-08
	DBT2DSCD12	BATTERY 2D12 DISCHARGED		1.00E+00	1.00E+00	
	DTM202D22X	125VDC BUS 2D22 IN TEST OR MAINTENANCE		5.66E-05	5.66E-05	

Table 4. ANO-2 PSA DOMINANT OR TOP 100 CUTSETS

#	Inputs	Description	Rate	Exposure	Event Prob	Probability
	EDG2DG2XXF	2DG2 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
31	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	7.04E-08
	DBT2DSCD12	BATTERY 2D12 DISCHARGED		1.00E+00	1.00E+00	
	EDG2DG2XXF	2DG2 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	ETM2A2XXXX	4160V SWGR 2A2 IN TEST OR MAINTENANCE		5.66E-05	5.66E-05	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
32	T3	Loss of Offsite Power <IE>		3.68E-02	3.68E-02	7.00E-08
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	EMM2CCFDGF	2DG1/2 COMMON CAUSE FAILURE TO RUN		4.68E-03	4.68E-03	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
	SBO05	STATION BLACKOUT FACTOR		3.48E-03	3.48E-03	
33	S	SMALL BREAK LOCA <IE>		5.00E-03	5.00E-03	6.38E-08
	SMV201460K	MOTOR-OPERATED VALVE 2CV-1460 TRANSFERS CLOSED	5.32E-06	2.40E+01	1.28E-04	
	SWDISCHREC	Removal of excessive modeling conservatism		1.00E-01	1.00E-01	
34	HMM2RECIRC	FAILURE OF HPSI PUMP MINIFLOW RECIRC ISOLATION VALVES		1.87E-02	1.87E-02	5.60E-08
	S	SMALL BREAK LOCA <IE>		5.00E-03	5.00E-03	
	YMM2RECIRC	RWT MINIFLOW ISOLATION VALVE 2CV-5628-2 FAILURE		9.68E-03	9.68E-03	
	HRECIRCREC	OP FAILS TO ISOLATE RWT RECIRC LINE AFTER MOVS FAIL TO AUTOCLOSE ON RAS		6.20E-02	6.20E-02	
35	M	MEDIUM BREAK LOCA <IE>		1.00E-03	1.00E-03	5.16E-08
	YMM2CCFMOV	COMMON CAUSE FAILURE OF CS MOTOR OPERATED VALVES		7.06E-04	7.06E-04	
	SUMP_REC	OP FAILS TO MANUALLY OPEN OUTBOARD CONT SUMP VALVE 2CV-5649-1 OR 2CV-5650-2		7.30E-02	7.30E-02	
36	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	5.14E-08
	T14	LOSS OF AC BUS 2B5 <IE>		1.04E-03	1.04E-03	
	YMM2CSPMBA	INDEP ACTIVE FAULTS OF CONTAINMENT SPRAY PUMP TRAIN B		4.07E-03	4.07E-03	
	P7BMANREC	OPERATORS FAIL TO MANUALLY CONTROL EFW PUMP (2P7B) DISCHARGE VALVES		8.40E-02	8.40E-02	
37	A	LARGE BREAK LOCA <IE>		1.00E-04	1.00E-04	3.94E-08
	HMM2CCF001	COMMON CAUSE FAILURE OF 2 HPSI PUMPS TO START <module>		3.94E-04	3.94E-04	

Table 4. ANO-2 PSA DOMINANT OR TOP 100 CUTSETS

#	Inputs	Description	Rate	Exposure	Event Prob	Probability
38	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	3.92E-08
	QMV200789K	MOTOR-OPERATED VALVE 2CV-0789-1 TRANSFERS CLOSED	5.32E-06	1.00E+00	3.82E-03	
	T7	Total Loss of Service Water Flow <IE>		1.00E-03	1.00E-03	
	T7REC	Operator fails to start standby SW pump & align ECP, w/QHF2REFILL		7.10E-02	7.10E-02	
39	T8	Loss of Service Water Pump 2P4A <IE>		3.16E-02	3.16E-02	3.91E-08
	DBT2DSCD12	BATTERY 2D12 DISCHARGED		1.00E+00	1.00E+00	
	EMM2B6XXXX	480V LC 2B6 FAULT MODULE		1.12E-04	1.12E-04	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	T8PREREC	Operator fail to start the stdby SW pp prior to a Rx/turbine trip:Loss of SW A		1.40E-01	1.40E-01	
40	T3	Loss of Offsite Power <IE>		3.68E-02	3.68E-02	3.86E-08
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	EDG2DG2XXF	2DG2 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	EMM2DG1SWC	2DG1 SERVICE WATER COOLING FAULT MODULE		1.03E-02	1.03E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
	SBO03	STATION BLACKOUT FACTOR		9.28E-03	9.28E-03	
41	T1	Turbine Trip <IE>		5.40E-01	5.40E-01	3.83E-08
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	ERE2A3LXXK	2A3 LO RELAY 186-2A3 SPURIOUS TRIP	3.94E-07	2.40E+01	9.46E-06	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	ACREALIGND	Operators fail to realign 2B5 from 2A3 to 2A4. For use only after battery disch		9.50E-02	9.50E-02	
42	T1	Turbine Trip <IE>		5.40E-01	5.40E-01	3.83E-08
	DBT2DSCD12	BATTERY 2D12 DISCHARGED		1.00E+00	1.00E+00	
	ERE2A4LXXK	2A4 LO RELAY 186-2A4 SPURIOUS TRIP	3.94E-07	2.40E+01	9.46E-06	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	ACREALIGND	Operators fail to realign 2B5 from 2A3 to 2A4. For use only after battery disch		9.50E-02	9.50E-02	
43	T10	LOSS OF DC BUS 2D01 <IE>		3.94E-04	3.94E-04	3.62E-08
	QMM2CCF1DC	COMMON CAUSE FAILURE MODULE OF EFW DC INJECTION VALVES		7.06E-04	7.06E-04	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
44	S	SMALL BREAK LOCA <IE>		5.00E-03	5.00E-03	3.51E-08
	YMM2CSTRNA	INDEPENDENT FAILURES OF CONT SUMP TRAIN A		9.81E-03	9.81E-03	

Table 4. ANO-2 PSA DOMINANT OR TOP 100 CUTSETS

#	Inputs	Description	Rate	Exposure	Event Prob	Probability
	YMM2CSTRNB	INDEPENDENT FAILURES OF CONT SUMP TRAIN B Y□		9.81E-03	9.81E-03	
	SUMP_REC	OP FAILS TO MANUALLY OPEN OUTBOARD CONT SUMP VALVE 2CV-5649-1 OR 2CV-5650-2		7.30E-02	7.30E-02	
45	A	LARGE BREAK LOCA <IE>		1.00E-04	1.00E-04	3.26E-08
	LMM2CCF001	COMMON CAUSE FAILURE OF 2P-60A AND 2P-60B		3.26E-04	3.26E-04	
46	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	3.22E-08
	QMM2TRANBA	EFW PUMP TRAIN B FAILS TO DELIVER FLOW (TYPE 1 FAULTS)		3.14E-03	3.14E-03	
	T7	Total Loss of Service Water Flow <IE>		1.00E-03	1.00E-03	
	T7REC	Operator fails to start standby SW pump & align ECP, w/QHF2REFILL		7.10E-02	7.10E-02	
47	T1	Turbine Trip <IE>		5.40E-01	5.40E-01	3.09E-08
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	EDG2DG1XXF	2DG1 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	EMM2CB309S	4160V AC BKR 152-309 SPUR TRIP SIGNAL FAULT MODULE		6.62E-05	6.62E-05	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
48	T1	Turbine Trip <IE>		5.40E-01	5.40E-01	3.09E-08
	DBT2DSCD12	BATTERY 2D12 DISCHARGED		1.00E+00	1.00E+00	
	EDG2DG2XXF	2DG2 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	EMM2CB409S	4160V AC BKR 152-409 SPUR TRIP SIGNAL FAULT MODULE		6.62E-05	6.62E-05	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
49	EMM2B5XXXX	480V LC 2B5 FAULT MODULE		1.12E-04	1.12E-04	2.86E-08
	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	
	T9	Loss of Service Water Pump 2P4C <IE>		3.16E-02	3.16E-02	
	T9PREREC	Operator fail to start the stby SW pump prior to a Rx/turbine trip.Loss of SW B		5.60E-02	5.60E-02	
50	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	2.78E-08
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	ECB2A309XR	4160V AC BKR 152-309 TRANSFERS OPEN	9.31E-07	2.40E+01	2.23E-05	
	EDG2DG1XXF	2DG1 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
51	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	2.78E-08

Table 4. ANO-2 PSA DOMINANT OR TOP 100 CUTSETS

#	Inputs	Description	Rate	Exposure	Event Prob	Probability
	DBT2DSCD12	BATTERY 2D12 DISCHARGED		1.00E+00	1.00E+00	
	ECB2A409XR	4160V AC BKR 152-409 TRANSFERS OPEN	9.31E-07	2.40E+01	2.23E-05	
	EDG2DG2XXF	2DG2 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
52	S	SMALL BREAK LOCA <IE>		5.00E-03	5.00E-03	2.76E-08
	YTK2RW2T3J	REFUELING WATER TANK 2T3 RUPTURE	5.52E-06	1.00E+00	5.52E-06	
53	QHF2REFILL	OPERATORS FAIL TO ALIGN EFW SUCTION TO ALTERNATE CONDENSATE STORAGE TANK		1.20E-02	1.20E-02	2.70E-08
	STF2SCRNSP	ANO-2 TRAVELING SCRNS PLUGGED	4.07E-06	2.40E+01	9.77E-05	
	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	
	SWECPRECD	Operators fail to transfer to ECP upon loss of SW Pp suction w/QHF2REFILL		1.60E-02	1.60E-02	
54	T3	Loss of Offsite Power <IE>		3.68E-02	3.68E-02	2.68E-08
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	EDG2DG2XXF	2DG2 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	EMM2DG1FXA	2DG1 FUEL XFER PUMP FAILS TO START <module>		7.17E-03	7.17E-03	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
	SBO03	STATION BLACKOUT FACTOR		9.28E-03	9.28E-03	
55	T1	Turbine Trip <IE>		5.40E-01	5.40E-01	2.64E-08
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	DTM202D21X	125VDC BUS 2D21 IN TEST OR MAINTENANCE		5.66E-05	5.66E-05	
	EDG2DG1XXF	2DG1 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
56	T1	Turbine Trip <IE>		5.40E-01	5.40E-01	2.64E-08
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	EDG2DG1XXF	2DG1 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	ETM2A1XXXX	4160V SWGR 2A1 IN TEST OR MAINTENANCE		5.66E-05	5.66E-05	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
57	T1	Turbine Trip <IE>		5.40E-01	5.40E-01	2.64E-08
	DBT2DSCD12	BATTERY 2D12 DISCHARGED		1.00E+00	1.00E+00	
	DTM202D22X	125VDC BUS 2D22 IN TEST OR MAINTENANCE		5.66E-05	5.66E-05	
	EDG2DG2XXF	2DG2 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
58	T1	Turbine Trip <IE>		5.40E-01	5.40E-01	2.64E-08

Table 4. ANO-2 PSA DOMINANT OR TOP 100 CUTSETS

#	Inputs	Description	Rate	Exposure	Event Prob	Probability
	DBT2DSCD12	BATTERY 2D12 DISCHARGED		1.00E+00	1.00E+00	
	EDG2DG2XXF	2DG2 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	ETM2A2XXXX	4160V SWGR 2A2 IN TEST OR MAINTENANCE		5.66E-05	5.66E-05	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
59	T2	Loss of PCS <IE>		1.80E-01	1.80E-01	2.55E-08
	OPER-2	Operator fails to initiate Once-Thru-Cooling (non-SBLOCAs)		2.70E-03	2.70E-03	
	QHF2REFILL	OPERATORS FAIL TO ALIGN EFW SUCTION TO ALTERNATE CONDENSATE STORAGE TANK		1.20E-02	1.20E-02	
	QMM2SWBSUP	LOSS OF SUPPLY FROM SW TO TRAIN B DUE TO BREAKERS AND VALVES		3.03E-02	3.03E-02	
	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	
60	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	2.47E-08
	QMM2TRANBF	EFW PUMP TRAIN B FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		2.41E-03	2.41E-03	
	T7	Total Loss of Service Water Flow <IE>		1.00E-03	1.00E-03	
	T7REC	Operator fails to start standby SW pump & align ECP, w/QHF2REFILL		7.10E-02	7.10E-02	
61	EDG2DG1XXF	2DG1 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	2.43E-08
	EDG2DG2XXF	2DG2 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	
	T3	Loss of Offsite Power <IE>		3.68E-02	3.68E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
	SBO16	STATION BLACKOUT FACTOR		4.48E-03	4.48E-03	
62	T3	Loss of Offsite Power <IE>		3.68E-02	3.68E-02	2.33E-08
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	EDG2DG1XXF	2DG1 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
	OSP05	DEGRADED POWER FACTOR		7.32E-04	7.32E-04	
63	T3	Loss of Offsite Power <IE>		3.68E-02	3.68E-02	2.33E-08
	DBT2DSCD12	BATTERY 2D12 DISCHARGED		1.00E+00	1.00E+00	
	EDG2DG2XXF	2DG2 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	

Table 4. ANO-2 PSA DOMINANT OR TOP 100 CUTSETS

#	Inputs	Description	Rate	Exposure	Event Prob	Probability
	OSP05	DEGRADED POWER FACTOR		7.32E-04	7.32E-04	
64	T3	Loss of Offsite Power <IE>		3.68E-02	3.68E-02	2.28E-08
	EMM2CCFDGF	2DG1/2 COMMON CAUSE FAILURE TO RUN		4.68E-03	4.68E-03	
	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	
	EDGAACREC	Operator fails to supply power to 2A3 or 2A4 using SBO EDG		1.17E-01	1.17E-01	
	SBO15	STATION BLACKOUT FACTOR		7.85E-03	7.85E-03	
65	HMM2CCF002	COMMON CAUSE FAILURE OF 2 HPSI PUMPS TO RUN <module>		1.09E-04	1.09E-04	2.19E-08
	S	SMALL BREAK LOCA <IE>		5.00E-03	5.00E-03	
	SHPSISWING	Operators fails to align HPSI swing pp following a SBLOCA and HPSI pps failure		4.00E-02	4.00E-02	
66	T10	LOSS OF DC BUS 2D01 <IE>		3.94E-04	3.94E-04	2.15E-08
	QHF2EFWTAF	OPERATOR FAILS TO PROPERLY RESTORE EFW PUMP TRAIN A		4.20E-04	4.20E-04	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
67	QMM2PMSUCF	NO FLOW THROUGH COMMON PUMP SUCTION LINE (TYPE-2 FAULTS)		4.58E-04	4.58E-04	2.11E-08
	T7	Total Loss of Service Water Flow <IE>		1.00E-03	1.00E-03	
	QCSTKXFER	Operators fails to align EFW suction to alternate ANO-1 condensate source		4.60E-02	4.60E-02	
68	AHFCALRASL	OPERATOR MISCALIBRATES THE RWT LEVEL SENSORS		4.20E-06	4.20E-06	2.10E-08
	S	SMALL BREAK LOCA <IE>		5.00E-03	5.00E-03	
69	EMM2B5XXXX	480V LC 2B5 FAULT MODULE		1.12E-04	1.12E-04	2.06E-08
	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	
	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	
	YMM2CSBXXA	INDEPENDENT FAILURES OF CS TRAIN B (TYPE-1 FAILURES)		1.05E-02	1.05E-02	
	P7BMANREC	OPERATORS FAIL TO MANUALLY CONTROL EFW PUMP (2P7B) DISCHARGE VALVES		8.40E-02	8.40E-02	
70	EMM2B6XXXX	480V LC 2B6 FAULT MODULE		1.12E-04	1.12E-04	1.99E-08
	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	
	RMM20LTOPN	LTOP/ECCS VALVE FAILS TO OPEN FOR FEED AND BLEED		1.02E-02	1.02E-02	
	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	
	P7BMANREC	OPERATORS FAIL TO MANUALLY CONTROL EFW PUMP		8.40E-02	8.40E-02	

Table 4. ANO-2 PSA DOMINANT OR TOP 100 CUTSETS

#	Inputs	Description	Rate	Exposure	Event Prob	Probability
		(2P7B) DISCHARGE VALVES				
71	OPER-1	Operator fails to trip RCPs after CCS loss		2.80E-04	2.80E-04	1.99E-08
	T7	Total Loss of Service Water Flow <IE>		1.00E-03	1.00E-03	
	T7REC	Operator fails to start standby SW pump & align ECP, w/QHF2REFILL		7.10E-02	7.10E-02	
72	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	1.99E-08
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	EDG2DG1XXF	2DG1 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	EMM2CB112X	4160V AC BKR 152-112 FAULT MODULE		6.67E-04	6.67E-04	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	MANOSPREBD	Operators fail to align offsite power to 2A1/2A2 after failed post trip auto-re		2.80E-03	2.80E-03	
73	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	1.99E-08
	DBT2DSCD12	BATTERY 2D12 DISCHARGED		1.00E+00	1.00E+00	
	EDG2DG2XXF	2DG2 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	EMM2CB212X	4160V AC BKR 152-212 FAULT MODULE		6.67E-04	6.67E-04	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	MANOSPREBD	Operators fail to align offsite power to 2A1/2A2 after failed post trip auto-re		2.80E-03	2.80E-03	
74	T8	Loss of Service Water Pump 2P4A <IE>		3.16E-02	3.16E-02	1.98E-08
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	ETM2A3XXXX	4160V SWGR 2A3 IN TEST OR MAINTENANCE		5.66E-05	5.66E-05	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	T8PREREC	Operator fail to start the stdby SW pp prior to a Rx/turbine trip:Loss of SW A		1.40E-01	1.40E-01	
75	QMM2CSTNKA	NO FLOW FROM CST (TYPE-1 FAULTS)		2.97E-03	2.97E-03	1.92E-08
	STF2SCRNSP	ANO-2 TRAVELING SCRNS PLUGGED	4.07E-06	2.40E+01	9.77E-05	
	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	
	QCSTKXFER	Operators fails to align EFW suction to alternate ANO-1 condensate source		4.60E-02	4.60E-02	
76	EMM2B5XXXX	480V LC 2B5 FAULT MODULE		1.12E-04	1.12E-04	1.92E-08
	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	
	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	
	YMM2CSTRNB	INDEPENDENT FAILURES OF CONT SUMP TRAIN B Y□		9.81E-03	9.81E-03	
	P7BMANREC	OPERATORS FAIL TO MANUALLY CONTROL EFW PUMP (2P7B) DISCHARGE VALVES		8.40E-02	8.40E-02	

Table 4. ANO-2 PSA DOMINANT OR TOP 100 CUTSETS

#	Inputs	Description	Rate	Exposure	Event Prob	Probability
77	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	1.92E-08
	T14	LOSS OF AC BUS 2B5 <IE>		1.04E-03	1.04E-03	
	YTM22P35B	CS PUMP 2P35B UNAVAILABLE DUE TO TEST/MAINTENANCE		1.52E-03	1.52E-03	
	P7BMANREC	OPERATORS FAIL TO MANUALLY CONTROL EFW PUMP (2P7B) DISCHARGE VALVES		8.40E-02	8.40E-02	
78	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	1.91E-08
	T14	LOSS OF AC BUS 2B5 <IE>		1.04E-03	1.04E-03	
	GMM2SWVL2M	SERVICE WATER LOOP 2 VALVE FAILURE <MODULE>		1.87E-02	1.87E-02	
	YMM2SWHEXB	INDEPENDENT FAILURES OF TRAIN B SDCHX SERVICE WATER SUPPLY		8.09E-02	8.09E-02	
	P7BMANREC	OPERATORS FAIL TO MANUALLY CONTROL EFW PUMP (2P7B) DISCHARGE VALVES		8.40E-02	8.40E-02	
79	EMM2B5XXXX	480V LC 2B5 FAULT MODULE		1.12E-04	1.12E-04	1.89E-08
	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	
	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	
	YMM2RECIRC	RWT MINIFLOW ISOLATION VALVE 2CV-5628-2 FAILURE		9.68E-03	9.68E-03	
	P7BMANREC	OPERATORS FAIL TO MANUALLY CONTROL EFW PUMP (2P7B) DISCHARGE VALVES		8.40E-02	8.40E-02	
80	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	1.80E-08
	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	
	EMM2A3XXXX	4160V SWGR 2A3 FAULT MODULE		1.67E-06	1.67E-06	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	ACREALIGND	Operators fail to realign 2B5 from 2A3 to 2A4. For use only after battery disch		9.50E-02	9.50E-02	
81	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	1.80E-08
	DBT2DSCD12	BATTERY 2D12 DISCHARGED		1.00E+00	1.00E+00	
	EMM2A4XXXX	4160V SWGR 2A4 FAULT MODULE		1.67E-06	1.67E-06	
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	ACREALIGND	Operators fail to realign 2B5 from 2A3 to 2A4. For use only after battery disch		9.50E-02	9.50E-02	
82	DBT2DSCD12	BATTERY 2D12 DISCHARGED		1.00E+00	1.00E+00	1.73E-08
	OPER-15	Operator fails to realign 2D02 or 2D01 to 2D34 (swg bat chg)		7.90E-02	7.90E-02	
	QMM2TRANBA	EFW PUMP TRAIN B FAILS TO DELIVER FLOW (TYPE 1 FAULTS)		3.14E-03	3.14E-03	

Table 4. ANO-2 PSA DOMINANT OR TOP 100 CUTSETS

#	Inputs	Description	Rate	Exposure	Event Prob	Probability
	T15	LOSS OF AC BUS 2B6 <IE>		1.04E-03	1.04E-03	
	P7AMANRECD	Operators fails to man cntrl 2P7A speed and discharge valves:post battery disch		6.70E-02	6.70E-02	
83	M	MEDIUM BREAK LOCA <IE>		1.00E-03	1.00E-03	1.73E-08
	YMM2CCFPMA	CS PUMP COMMON CAUSE FAILURE TO START <module>		1.13E-04	1.13E-04	
	LPSPRAY	OPERATORS FAIL TO ALIGN AN LPSI PP TO PROVIDE CS FLOW WITH BOTH CS PPS UNAVAIL		1.53E-01	1.53E-01	
84	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	1.72E-08
	EDG2DG1XXF	2DG1 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	EMM2CB112X	4160V AC BKR 152-112 FAULT MODULE		6.67E-04	6.67E-04	
	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	
	RMM20ECCSN	ECCS VALVE FOR FEED AND BLEED FAILS TO OPEN		1.02E-02	1.02E-02	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
85	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	1.72E-08
	EDG2DG1XXF	2DG1 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	EMM2CB112X	4160V AC BKR 152-112 FAULT MODULE		6.67E-04	6.67E-04	
	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	
	RMM20LTOPN	LTOP/ECCS VALVE FAILS TO OPEN FOR FEED AND BLEED		1.02E-02	1.02E-02	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
86	T6	REACTOR TRIP INITIATING EVENT <IE>		1.44E+00	1.44E+00	1.72E-08
	EDG2DG2XXF	2DG2 FAILS TO RUN	4.09E-03	2.40E+01	9.35E-02	
	EMM2CB212X	4160V AC BKR 152-212 FAULT MODULE		6.67E-04	6.67E-04	
	QMM2TRANAF	EFW PUMP TRAIN A FAILS TO DELIVER FLOW (TYPE 2 FAULTS)		1.44E-01	1.44E-01	
	RMM20LTOPN	LTOP/ECCS VALVE FAILS TO OPEN FOR FEED AND BLEED		1.02E-02	1.02E-02	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
87	PMM2302FTC	TURBINE BYPASS VALVE 2CV-0302 FAILS TO RECLOSE		2.14E-02	2.14E-02	1.71E-08
	QMM2SGAP7B	NO FLOW TO SGA (2E24A) FROM 2P7B		1.56E-02	1.56E-02	
	T11	LOSS OF DC BUS 2D02 <IE>		3.94E-04	3.94E-04	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
88	PMM2302FTC	TURBINE BYPASS VALVE 2CV-0302 FAILS TO RECLOSE		2.14E-02	2.14E-02	1.71E-08
	QMM2SGBP7B	NO FLOW TO SGB (2E24B) FROM 2P7B		1.56E-02	1.56E-02	

Table 4. ANO-2 PSA DOMINANT OR TOP 100 CUTSETS

#	Inputs	Description	Rate	Exposure	Event Prob	Probability
	T11	LOSS OF DC BUS 2D02 <IE>		3.94E-04	3.94E-04	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
89	PMM2303FTC	TURBINE BYPASS VALVE 2CV-0303 FAILS TO RECLOSE		2.14E-02	2.14E-02	1.71E-08
	QMM2SGAP7B	NO FLOW TO SGA (2E24A) FROM 2P7B		1.56E-02	1.56E-02	
	T11	LOSS OF DC BUS 2D02 <IE>		3.94E-04	3.94E-04	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
90	PMM2303FTC	TURBINE BYPASS VALVE 2CV-0303 FAILS TO RECLOSE		2.14E-02	2.14E-02	1.71E-08
	QMM2SGBP7B	NO FLOW TO SGB (2E24B) FROM 2P7B		1.56E-02	1.56E-02	
	T11	LOSS OF DC BUS 2D02 <IE>		3.94E-04	3.94E-04	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
91	PMM2306FTC	TURBINE BYPASS VALVE 2CV-0306 FAILS TO RECLOSE		2.14E-02	2.14E-02	1.71E-08
	QMM2SGAP7B	NO FLOW TO SGA (2E24A) FROM 2P7B		1.56E-02	1.56E-02	
	T11	LOSS OF DC BUS 2D02 <IE>		3.94E-04	3.94E-04	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
92	PMM2306FTC	TURBINE BYPASS VALVE 2CV-0306 FAILS TO RECLOSE		2.14E-02	2.14E-02	1.71E-08
	QMM2SGBP7B	NO FLOW TO SGB (2E24B) FROM 2P7B		1.56E-02	1.56E-02	
	T11	LOSS OF DC BUS 2D02 <IE>		3.94E-04	3.94E-04	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
93	T10	LOSS OF DC BUS 2D01 <IE>		3.94E-04	3.94E-04	1.71E-08
	PMM2302FTC	TURBINE BYPASS VALVE 2CV-0302 FAILS TO RECLOSE		2.14E-02	2.14E-02	
	QMM2SGAP7A	NO FLOW TO SGA (2E24A) FROM 2P7A		1.56E-02	1.56E-02	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
94	T10	LOSS OF DC BUS 2D01 <IE>		3.94E-04	3.94E-04	1.71E-08
	PMM2302FTC	TURBINE BYPASS VALVE 2CV-0302 FAILS TO RECLOSE		2.14E-02	2.14E-02	
	QMM2SGBP7A	NO FLOW TO SGB (2E24B) FROM 2P7A		1.56E-02	1.56E-02	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
95	T10	LOSS OF DC BUS 2D01 <IE>		3.94E-04	3.94E-04	1.71E-08
	PMM2303FTC	TURBINE BYPASS VALVE 2CV-0303 FAILS TO RECLOSE		2.14E-02	2.14E-02	
	QMM2SGAP7A	NO FLOW TO SGA (2E24A) FROM 2P7A		1.56E-02	1.56E-02	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	

Table 4. ANO-2 PSA DOMINANT OR TOP 100 CUTSETS

#	Inputs	Description	Rate	Exposure	Event Prob	Probability
96	T10	LOSS OF DC BUS 2D01 <IE>		3.94E-04	3.94E-04	1.71E-08
	PMM2303FTC	TURBINE BYPASS VALVE 2CV-0303 FAILS TO RECLOSE		2.14E-02	2.14E-02	
	QMM2SGBP7A	NO FLOW TO SGB (2E24B) FROM 2P7A		1.56E-02	1.56E-02	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
97	T10	LOSS OF DC BUS 2D01 <IE>		3.94E-04	3.94E-04	1.71E-08
	PMM2306FTC	TURBINE BYPASS VALVE 2CV-0306 FAILS TO RECLOSE		2.14E-02	2.14E-02	
	QMM2SGAP7A	NO FLOW TO SGA (2E24A) FROM 2P7A		1.56E-02	1.56E-02	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
98	T10	LOSS OF DC BUS 2D01 <IE>		3.94E-04	3.94E-04	1.71E-08
	PMM2306FTC	TURBINE BYPASS VALVE 2CV-0306 FAILS TO RECLOSE		2.14E-02	2.14E-02	
	QMM2SGBP7A	NO FLOW TO SGB (2E24B) FROM 2P7A		1.56E-02	1.56E-02	
	MANOSPREC	Operators fail to align offsite power to bus 2A1 or 2A2 after auto-realign fail		1.30E-01	1.30E-01	
99	DBT2DSCD11	BATTERY 2D11 DISCHARGED		1.00E+00	1.00E+00	1.70E-08
	ECB264D5XD	480V AC BKR 52-64D5 FAILS TO CLOSE	6.45E-04	1.00E+00	6.45E-04	
	T12	LOSS OF AC BUS 2A3 <IE>		3.94E-04	3.94E-04	
	P7AMANRECD	Operators fails to man cntrl 2P7A speed and discharge valves:post battery disch		6.70E-02	6.70E-02	
100	M	MEDIUM BREAK LOCA <IE>		1.00E-03	1.00E-03	1.66E-08
	STF2SCRNSP	ANO-2 TRAVELING SCRNS PLUGGED	4.07E-06	2.40E+01	9.77E-05	
	SWECPREC	OPERATOR FAILS TO TRANSFER TO THE ECP UPON LOSS OF SW PUMP SUCTION		1.70E-01	1.70E-01	

TABLE 5

ACCIDENT SEQUENCE CORE DAMAGE FREQUENCY CONTRIBUTION

Accident Sequence	Base Model Core Damage
TBF	1.511E-05
TBX	2.667E-06
SU	1.199E-06
MX	4.898E-07
SX	4.313E-07
AU	4.061E-07
MU	2.600E-07
RBF	1.150E-07
SBF	6.127E-08
AX	4.363E-08
TQX	2.173E-08
RX	1.768E-08
TQBF	7.211E-09
RBU	5.275E-09
RBX	1.937E-09
SBU	1.144E-09
SBX	6.456E-10
TQBX	4.321E-10
TQU	3.538E-10
TQBU	1.215E-10
RU	5.885E-12
Total Frequency	2.084E-05

Additional analyses that have performed and their respective core damage contributions are:

ISLOCA Evaluation	3.27E-07
ATWS Scoping Analysis	1.59E-06
Internal Flooding Screening Analysis, all scenarios	< 1.0E-06

When combined with the base PSA model results the resulting total core damage frequency is 2.28E-05.

Note that the ATWS and Internal Flooding Analyses are conservative when compared to the base PSA model and ISLOCA results, and caution should be used when comparing these results.

TABLE 6

INITIATOR CORE DAMAGE FREQUENCY CONTRIBUTION

Initiator	Initiator Description	Base Model Core Damage Frequency (/rx-yr)
S	Small Break LOCA (0.3"-1.9")	1.692E-06
M	Medium Break LOCA (1.9"- 4.3")	7.498E-07
A	Large Break LOCA (>4.3")	4.501E-07
R	Steam Generator Tube Rupture	1.398E-07
T1	Turbine Trip	1.129E-06
T2	Loss of Power Conversion System	4.595E-07
T3	Loss of Off-Site Power	1.055E-06
T4	Excessive Feedwater	7.648E-10
T5	Steamline/Feedwater Line Break	1.703E-08
T6	Reactor Trip	2.449E-06
T7	Total Loss of SW Flow	1.295E-06
T8	Loss of SW Loop 1	9.715E-08
T9	Loss of SW Loop 2	1.636E-07
T10	Loss of DC Bus 2D01	7.859E-06
T11	Loss of DC Bus 2D02	1.749E-07
T12	Loss of AC Bus 2A3	2.226E-06
T13	Loss of AC Bus 2A4	2.867E-08
T14	Loss of 480V Load Center 2B5	7.693E-07
T15	Loss of 480V Load Center 2B6	8.212E-08
Total Frequency (Internal Events)		2.084E-05
ATWS	ATWS	1.59E-06
ISLOCA	ISLOCA	3.36E-07
Total Frequency (Internal Events + ATWS + ISLOCA)		2.28E-05

FIGURE 1

FUNCTIONAL EVENT TREES
[Ref. 2]

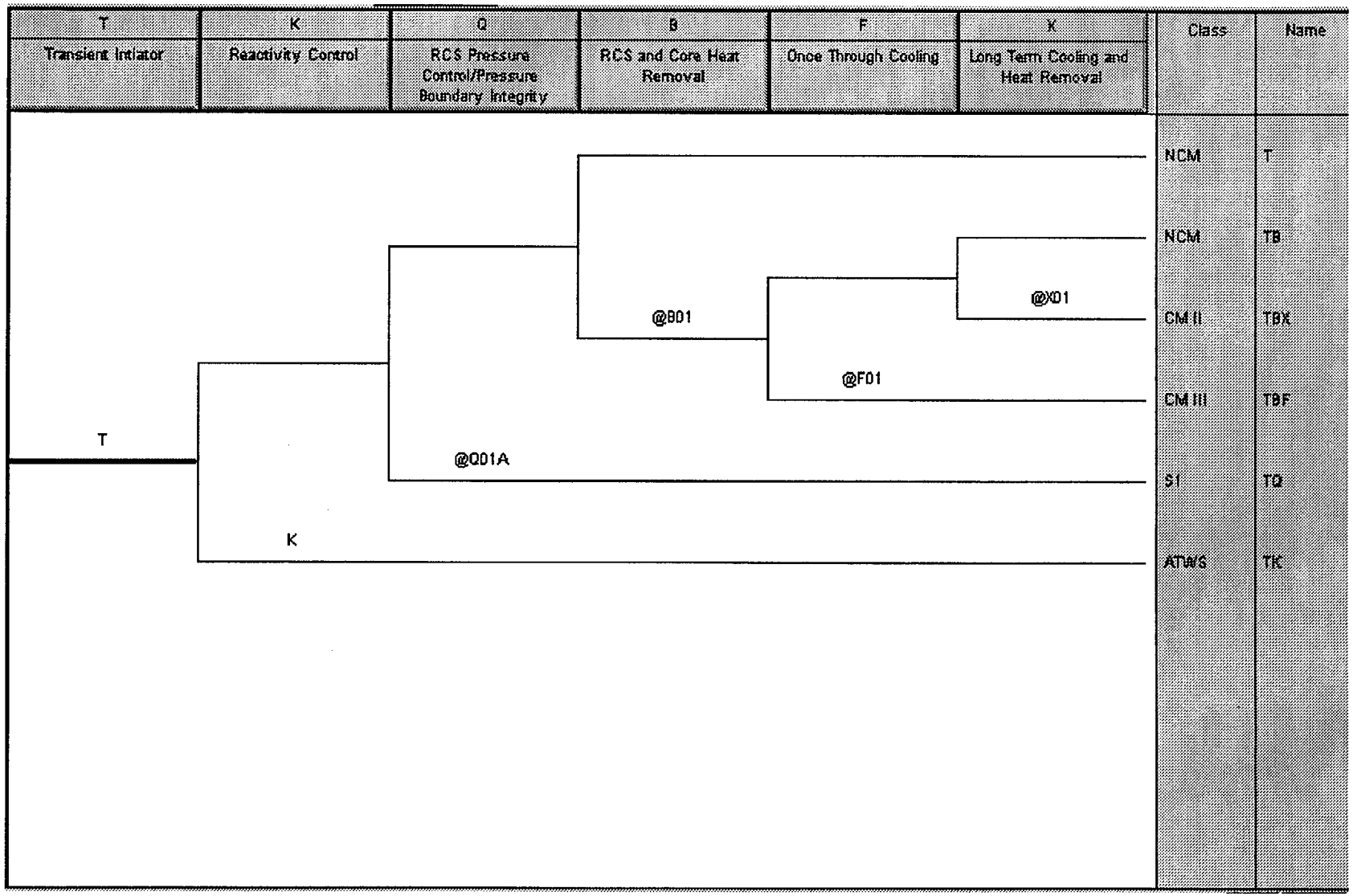

FIGURE 1 (cont.)

FUNCTIONAL EVENT TREES
[Ref. 2]

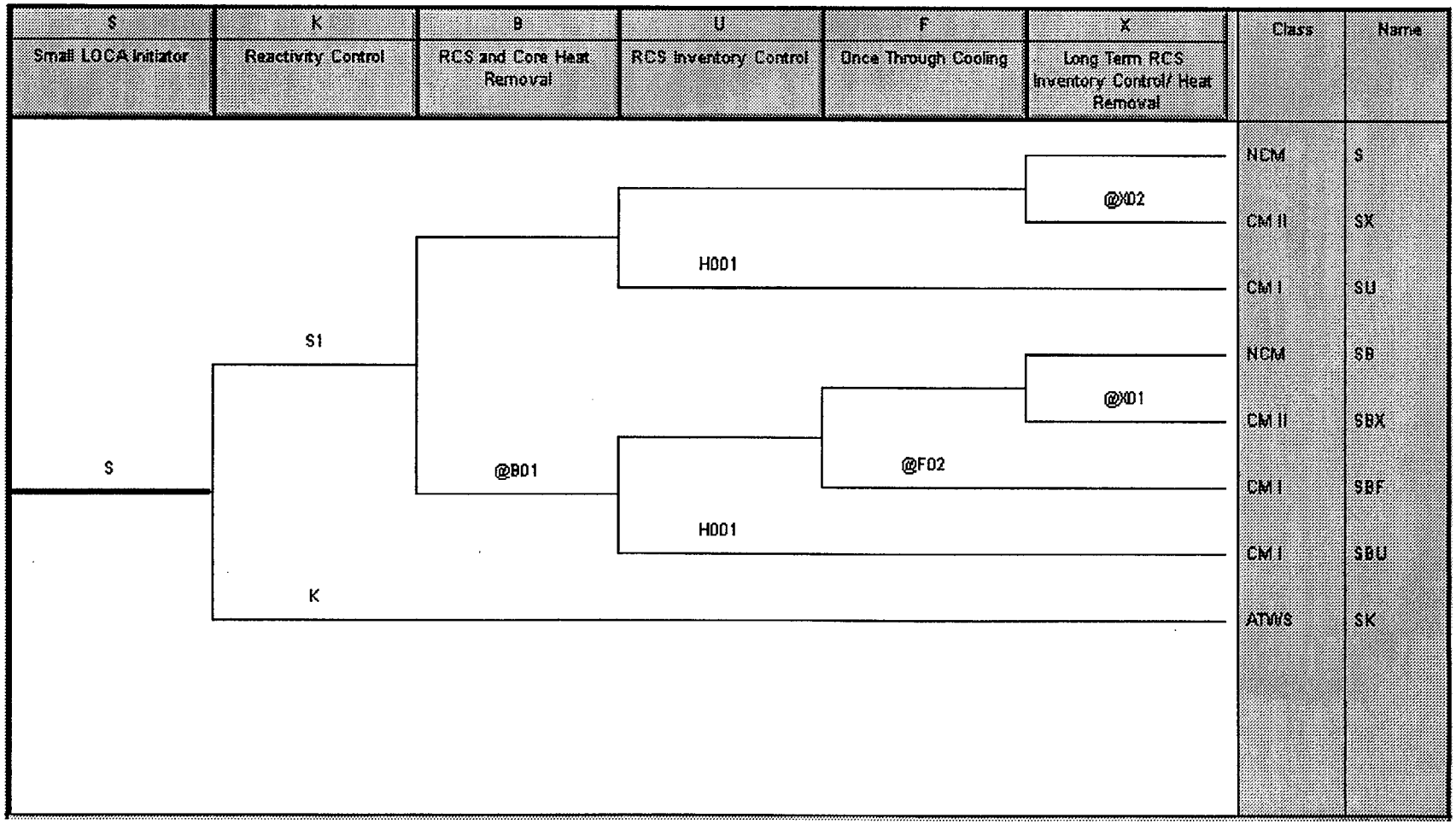

FIGURE 1 (cont.)

FUNCTIONAL EVENT TREES
[Ref. 2]

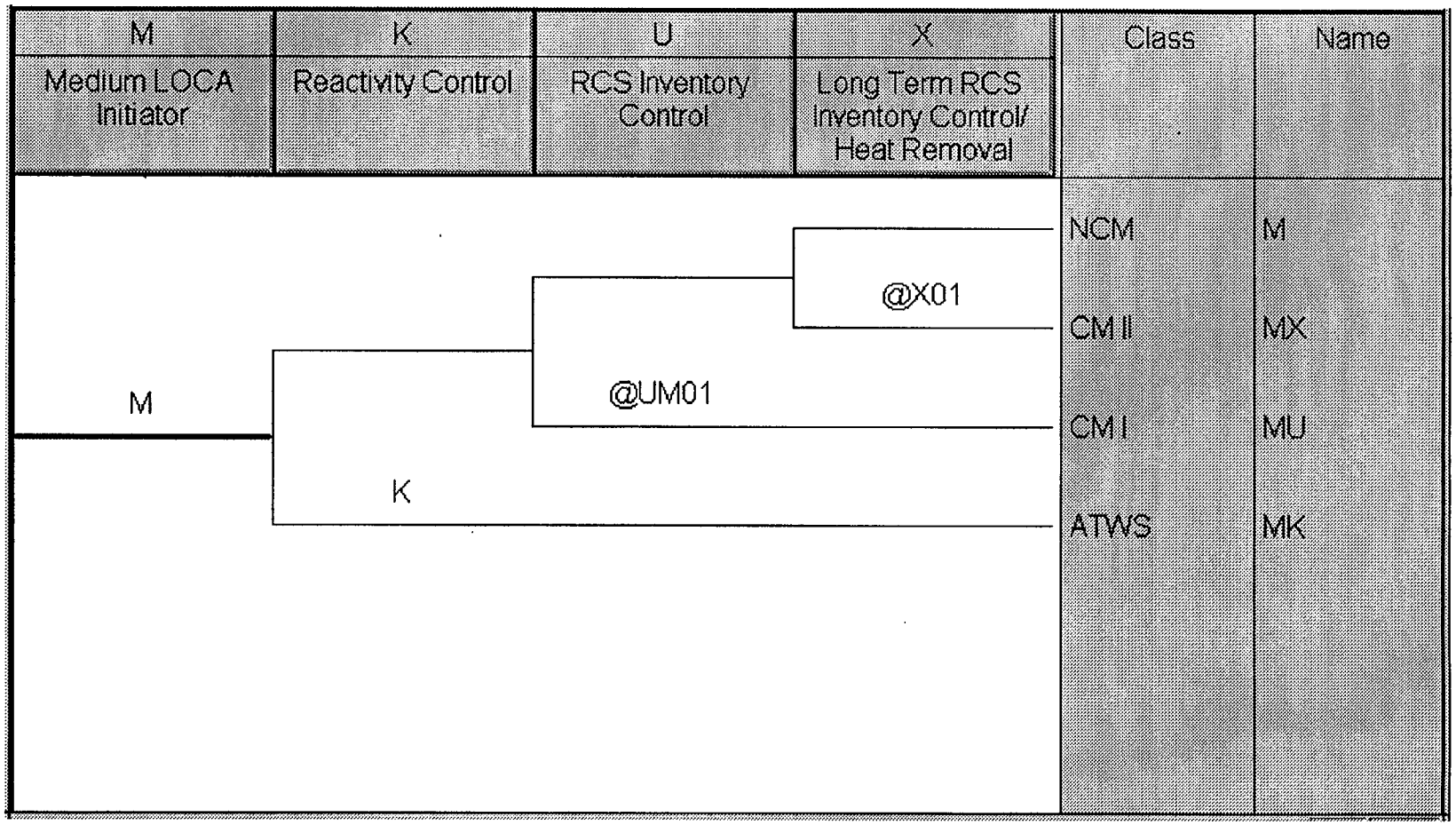

FIGURE 1 (cont.)

FUNCTIONAL EVENT TREES
[Ref. 2]

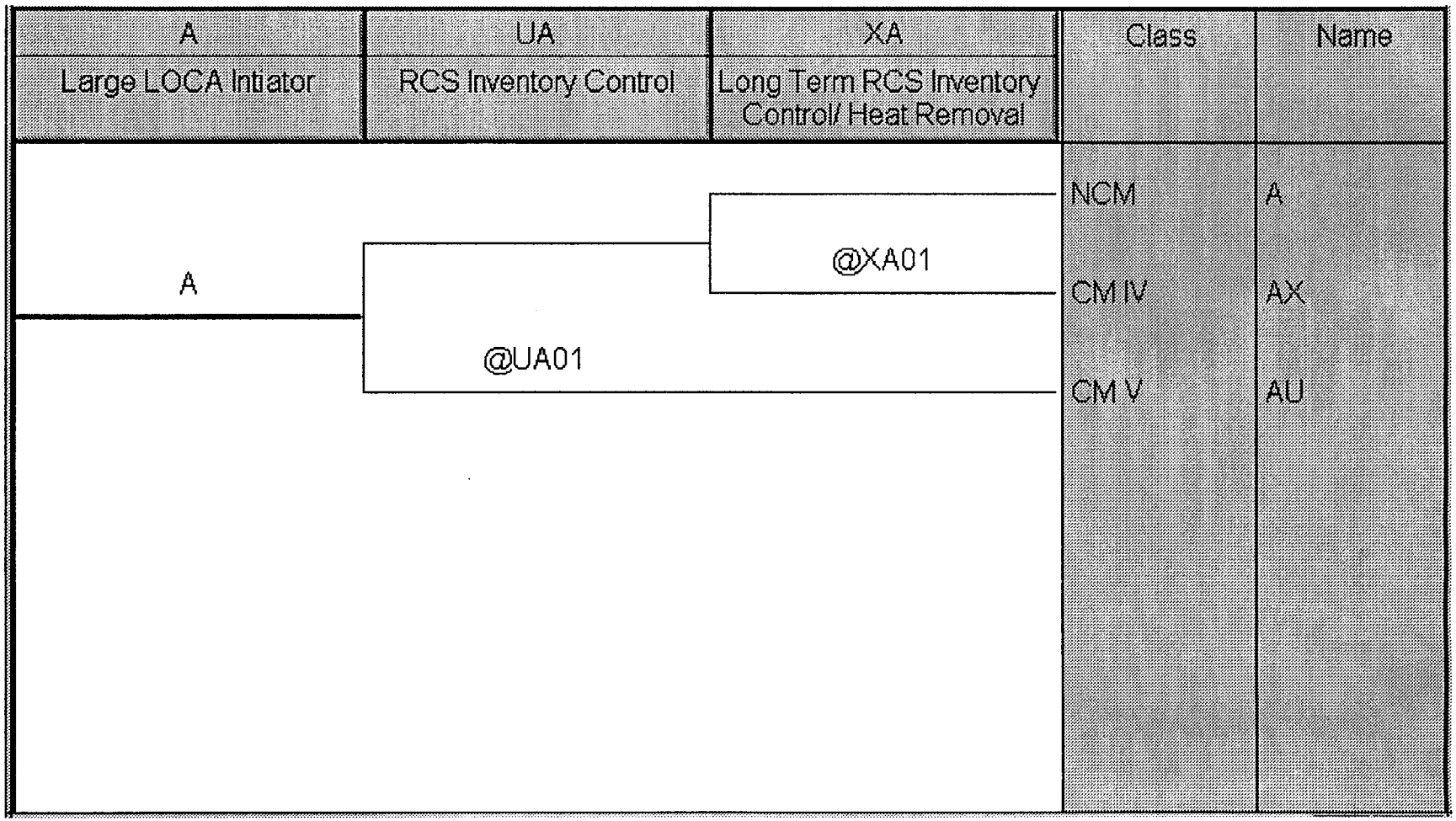

FIGURE 1 (cont.)

FUNCTIONAL EVENT TREES
[Ref. 2]

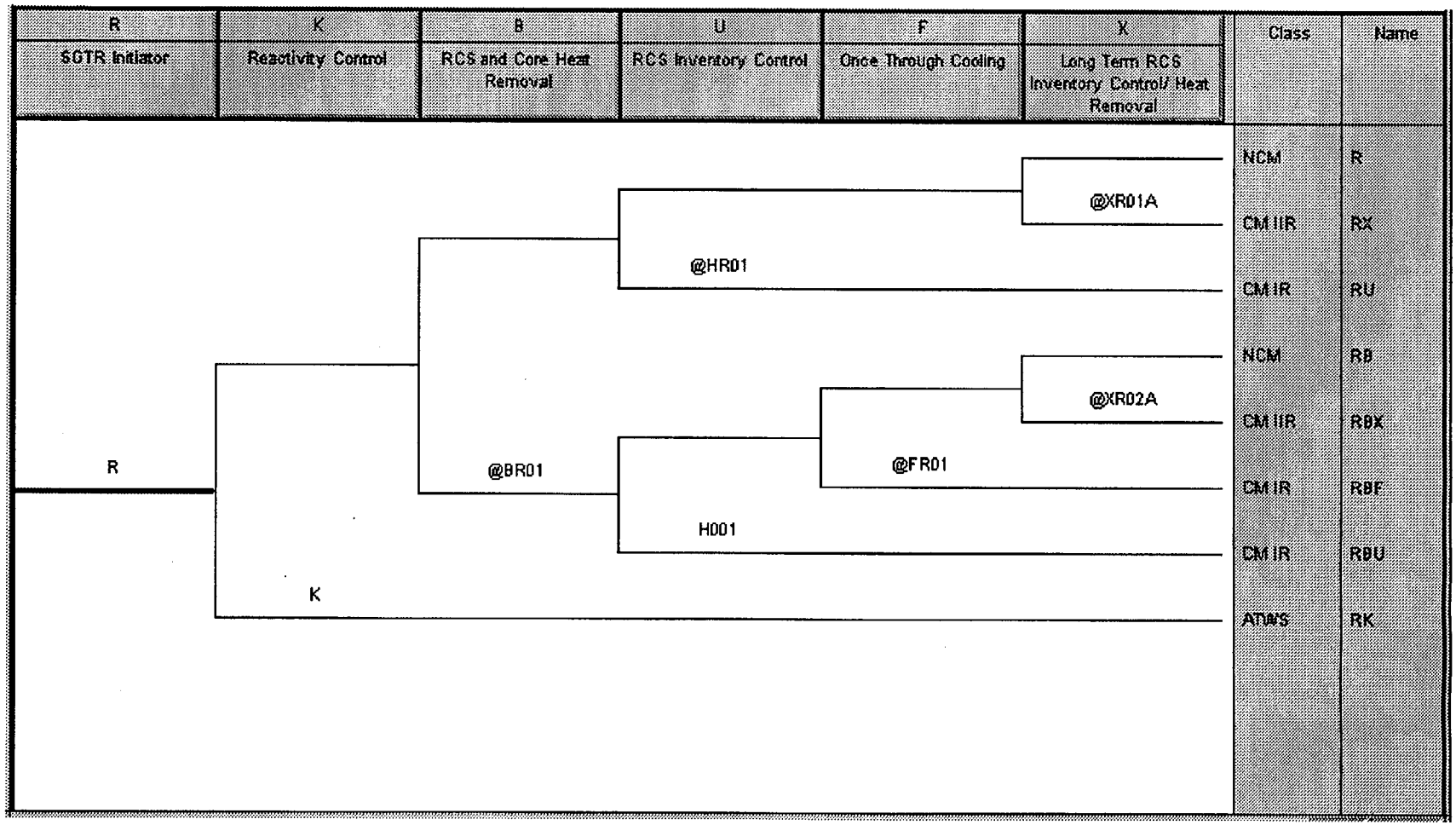

FIGURE 2 - SUMMARY OF ANO-2 PSA NUMERICAL RESULTS
(% of total CDF, 2.28E-05/rx-yr)

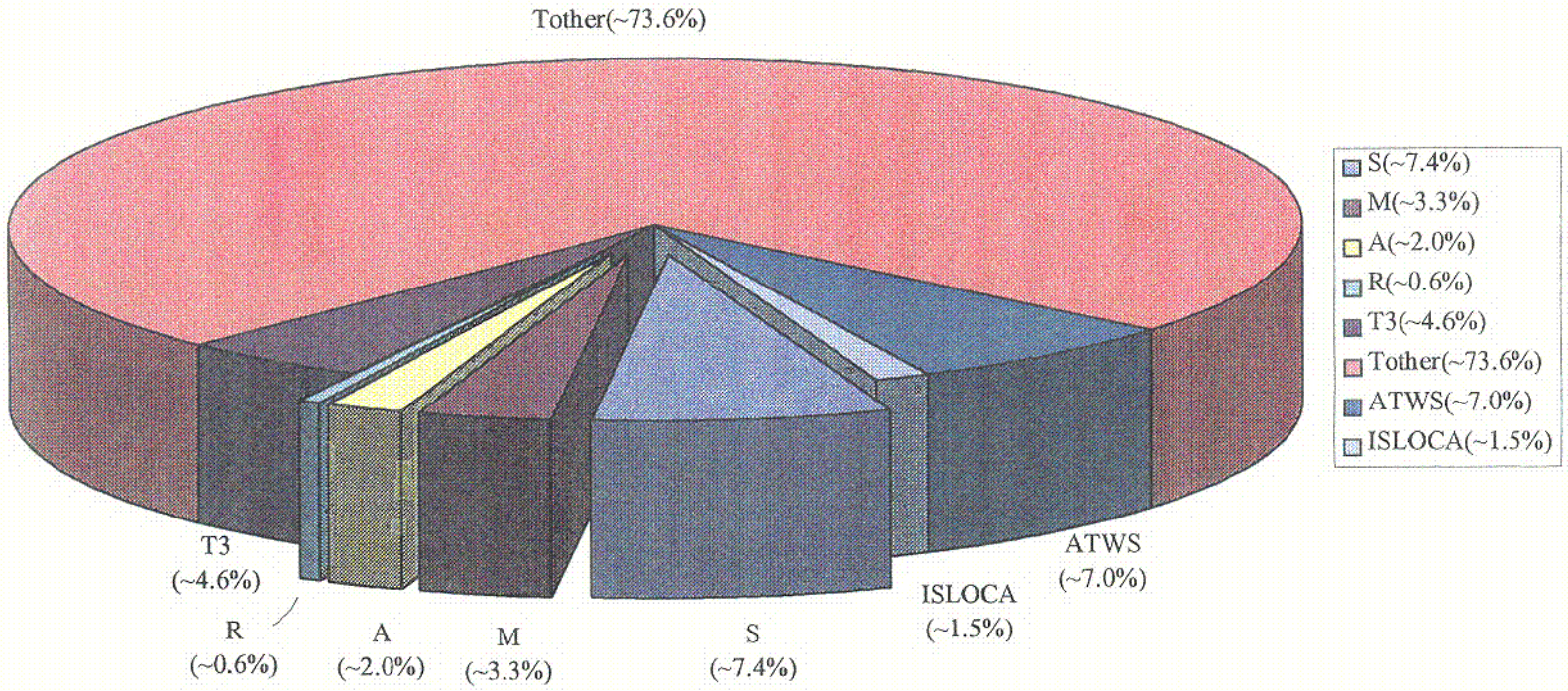

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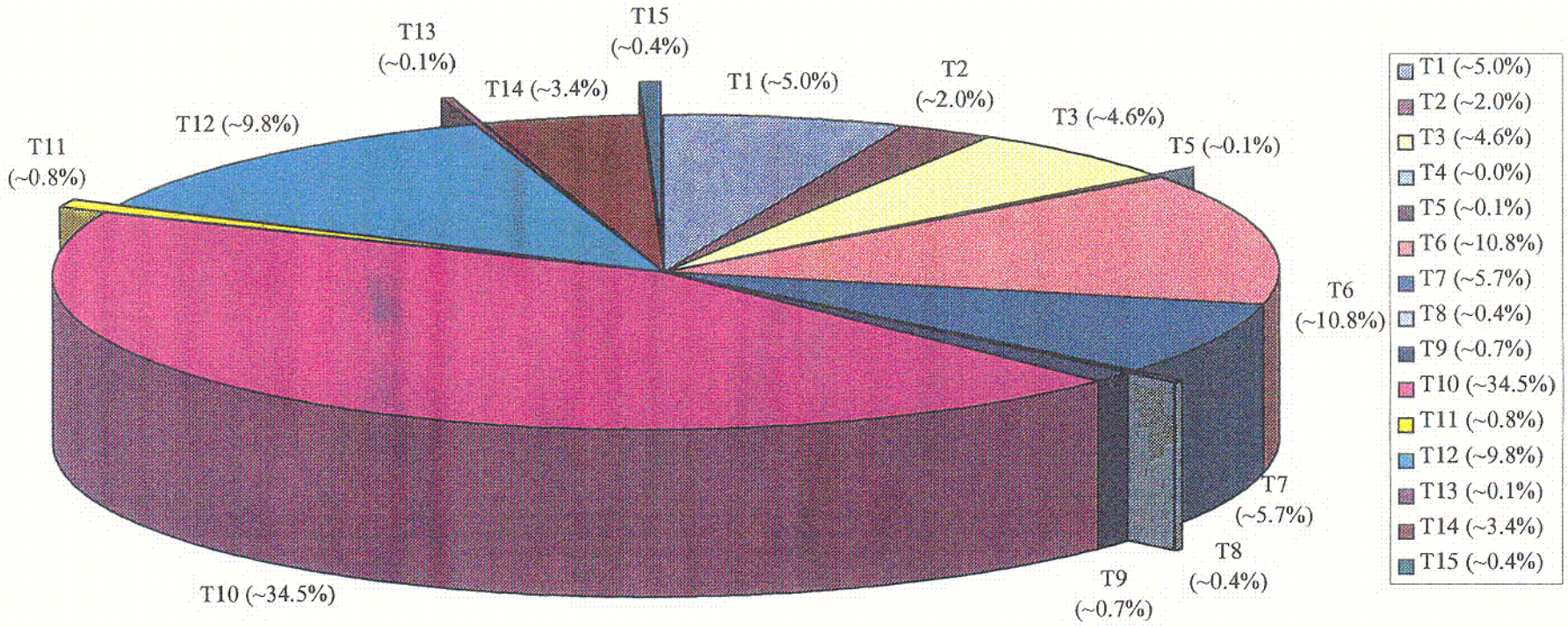
FIGURE 3 - SUMMARY OF ANO-2 PSA TRANSIENT RESULTS
(% of total CDF, 2.28E-05/rx-yr)



C-2

TABLE 7
AS-LEFT MODEL FILES

DISK 1:

A2R1MODL ZIP 05-11-98 11:06p

A2R1 Model Files:

ANO2R1.CAF	04-16-97	08:12:32 am
ANO2R1PS.BE	11-04-97	10:58:16 am
ANO2R1PS.GT	06-05-97	10:31:50 am
ANO2R1PS.TC	01-01-97	01:00:00 am

A2R1 Module Files:

C2R1.CUT	10-24-97	11:13:40 am
D2R1.CUT	10-24-97	11:16:30 am
E2R1.CUT	10-24-97	11:18:40 am
F2R1.CUT	11-04-97	10:58:10 am
G2R1.CUT	10-24-97	11:19:34 am
H2R1.CUT	10-24-97	11:19:58 am
I2R1.CUT	10-24-97	11:20:20 am
J2R1.CUT	10-24-97	11:20:56 am
L2R1.CUT	10-24-97	11:21:26 am
Q2R1.CUT	10-24-97	11:21:52 am
R2R1.CUT	10-24-97	11:22:20 am
S2R1.CUT	10-24-97	11:22:44 am
X2R1.CUT	10-24-97	11:23:00 am
Y2R1.CUT	10-24-97	11:58:40 am

A2R1 Delterm and Mutually Exclusive Files:

MUTEXC-2.CUT	11-11-97	08:58:08 am
EA3&4A&F.CUT	6-26-95	10:56:16 am
@B1NFMFM.CUT	10-19-95	2:49:20 pm
@DISCHG.CUT	4-15-97	9:55:50 am

A2R1SEQS ZIP 05/11/98 11:09p

A2R1 Final Recovered Sequence Cutset Files:

@AUREC.CUT	05/10/98	08:28p
@AXREC.CUT	05/10/98	08:30p
@MUREC.CUT	05/10/98	08:31p
@MXREC.CUT	05/10/98	08:37p
@RBFREC.CUT	05/10/98	08:39p
@RBUREC.CUT	05/10/98	08:41p
@RBXREC.CUT	05/10/98	08:42p
@RUREC.CUT	05/10/98	08:44p
@RXREC.CUT	05/10/98	08:46p
@SBFREC.CUT	05/10/98	08:48p
@SBUREC.CUT	05/10/98	09:13p
@SBXREC.CUT	05/10/98	08:51p
@SUREC.CUT	05/10/98	08:52p
@SXREC.CUT	05/10/98	08:55p
@TBFREC.CUT	05/10/98	08:59p
@TBXREC.CUT	05/10/98	09:01p
@TQBFREC.CUT	05/10/98	09:02p
@TQBUREC.CUT	05/10/98	09:03p

TABLE 7 (continued)

@TQBXREC.CUT	05/10/98	09:04p
@TQXRE .CUT	05/10/98	09:07p

DISK 2:

A2R1RULE ZIP 05-11-98 11:14p

HRA Rule Files:

AX.TXT	05-04-98	11:35p
MU.TXT	05-04-98	11:50p
MX.TXT	05-04-98	11:51p
RBF.TXT	05-05-98	11:47a
RBU.TXT	05-05-98	12:06a
RBX.TXT	05-05-98	12:06a
RU.TXT	05-05-98	12:06a
RX.TXT	05-05-98	12:07a
SBF.TXT	05-05-98	12:21a
SBU.TXT	05-05-98	12:22a
SBX.TXT	05-05-98	12:22a
SU.DOC	05-05-98	12:21a
SX.DOC	05-05-98	12:15a
SX.TXT	05-05-98	12:22a
TBF.TXT	05-05-98	9:54a
TBX.TXT	05-05-98	9:54a
TQBF.TXT	05-05-98	9:54a
TQBU.TXT	05-05-98	9:55a
TQBX.TXT	05-05-98	9:55a
TQU.TXT	05-05-98	9:55a
TQX.TXT	05-05-98	9:55a

LOSP Rule File:

A2RULENU CAF	04-16-98	12:38p

Other Rules:

SRV_RULE.TXT	11-10-97	12:31:24 pm

A2R1COM ZIP 05-11-98 10:08p

A2R1 Final Combined Recovered Cutset File

@A2R1COM.CUT	05/10/98	10:50 pm
ANO2R1PS.BE	11-04-97	10:58:16 am
ANO2R1PS.GT	06-05-97	10:31:50 am
ANO2R1PS.TC	01-01-97	01:00:00 am

SUMMARY ZIP 05-12-98

Summary Report (Main Report):

SUMMARY.DOC	05-12-98

Attachment 7