AMERICAN ELECTRIC POWER *Service Corporation*

AEP

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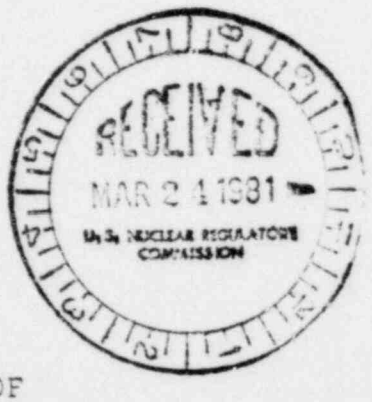
March 18, 1981
OG-54



Dr. Stephen H. Hanauer, Director
Division of Human Factors Safety
U.S. Nuclear Regulatory Commission
Phillips Building
7920 Norfolk Avenue
Bethesda, Maryland 20014

Dear Dr. Hanauer:

WESTINGHOUSE OWNERS GROUP UPDATE OF
ITEM I.C.1 OF NUREG-0737 ACTIVITIES

The program to achieve compliance with NUREG-0737, I.C.1, was discussed with your staff in a meeting on November 12, 1980, and described in Owners Group letter, OG-47, to S. H. Hanauer dated December 15, 1980. That letter identified generic procedural guidelines and supporting material already submitted to the NRC and identified three phases of proposed future action. Your letter, S. H. Hanauer to R. A. Newton dated December 17, 1980, responded to the November 12 meeting and identified several additional items of concern. Owners Group letter, OG-48, dated January 28, 1981, responded to the items listed in NRC's December 17 letter. The three letters described above are enclosed as background information in Attachment 1.

The three phases outlined in OG-47 were nearing completion during the end of February and the meeting on February 20, 1981, between the Westinghouse Owners Group and members of your staff, was intended to update you and your staff on our activities to date, get feedback from your staff with regard to the program activities, and to identify the items that are needed to complete the program. It is our understanding, as a result of the February 20 meeting, that completion of the items set forth herein will fully address the NRC requirements in the procedures evaluation and development areas, as set forth in I.C.1. The following information is intended to transmit to you the material presented to members of your staff during the February 20 meeting.

The results of the Owners Group Procedures Evaluation and Development Program completed to date were presented. The first phase consisted of an extension of the coverage evaluation methodology used in WCAP-9691, which applied fault tree techniques to achieve a systematic review of procedural coverage provided by the Westinghouse Reference Operating Instruction set.

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The effort reported upon updated procedure evaluation results of WCAP-9691 through consideration of the extended coverage provided by the current Emergency Operating Instruction Guidelines (i.e., Revision 2) and the recently-issued Inadequate Core Cooling Guidelines. The results of our evaluation showed that 79 of the 115 event sequences contained in the WCAP-9691 event trees had benefited by having augmented procedural coverage provided since the March 1980 original submittal of WCAP-9691. With the existing guidelines, 21 of the event sequences are now fully covered procedurally. The coverage evaluation tables relating to our completed phase 1 work accompany this letter as Attachment 2, along with the summary description and status slides used for this portion of our February 20 presentation.

The succeeding portion of the February 20 meeting consisted of a preliminary status report on the second phase of the Westinghouse Owners Group procedures evaluation effort. A cut-off probability limit is identified to establish the extent of the sequences not now having full procedural coverage for which further procedure development should be considered. The selection of this cut-off limit is based upon the identification of a failure probability value for which those sequences having a smaller combined functional failure probability have no significant contribution to the overall risk associated with the operation of the reactor plant. WASH-1400-type analyses, which are currently being used for licensing decisions in several near-term proceedings, have indicated that those sequences with combined functional failure probabilities of greater than 10^{-8} per reactor year constitute more than 99 percent of the overall risk. A survey of proposed safety criteria tends to support functional failure probability limits of approximately 10^{-8}, when uncertainties in the probability estimations are included. Therefore, we are proposing to provide full procedural coverage for all sequences exhibiting a combined functional failure probability equal to or greater than 10^{-8} per reactor year (including the initiating event). Sequences with probabilities less than 10^{-8} per reactor year do not require additional procedural coverage beyond that already provided. This approach may indeed result in full procedural coverage for a number of event sequences with probabilities less than 10^{-8} per reactor year, due to procedure development for sequences of higher probability or because of the prior existence of procedures for those sequences of lesser probability.

The use of this cut-off probability value of 10^{-8} will be further justified through a relative risk assessment for all sequences in the WCAP-9691 event trees which do not presently have full procedural coverage. Additional guideline development which could result in a meaningful reduction in overall risk, based upon the relative risk assessment results, will be identified and carried out.

Preliminary risk assessments have been carried out for the small break LOCA sequences, and for the combined secondary break sequences (both feedline and steamline breaks). The results of these analyses, as presented to the NRC on February 20, have been used to identify and prioritize additional guideline development efforts, and to identify those paths for which no

further guideline development will be necessary. The complete set of presentation slides used to describe this portion of our effort during the February 20 meeting has been submitted as Attachment 3 to this letter.

A task-level block diagram of the current Westinghouse Owners Group Operating Instruction Guideline set has been developed and was discussed as an additional topic at the February 20 meeting. This high-level diagram will be used to identify where additional contingency actions need to be provided within the existing guidelines, and in this application, it supplements the results of the relative risk assessment efforts. The block diagram also provides a means to delineate needed transitions among the various Reference Operating Instructions and to the contingency procedures. This diagram, in preliminary form, has been submitted as Attachment 4.

Event tree evaluation tables, as provided in Attachment 5 to this letter, summarize the present extent of the Westinghouse Owners Group's effort to comply with the requirements of NUREG-0737, I.C.1. For each distinct sequence addressed, the last two columns on the right-hand side express the preliminary results of the guideline development activity and the relative risk assessment. Where full procedural coverage is not yet provided and where the affected sequences meet the relative risk/probability criterion for further guideline development work, specific guidelines necessary to achieve full coverage are identified. The method of addressing containment considerations has also been separately provided in Attachment 5. No results of the probabilistic risk assessment efforts are available for the steam generator tube rupture sequences at this writing; therefore, extended coverage through procedure development has been indicated for each sequence not fully covered. This situation may be modified after quantification of this event tree has been carried out and the relative risk levels and probabilities have been evaluated. However, it is anticipated that all event tree paths requiring additional guideline coverage will be fully covered following development of the identified set of guidelines and inclusion of appropriate transitions among the guidelines as identified by the task-level block diagram.

The proposed program which fully meets the requirements of NUREG-0737, Item I.C.1, is shown in Attachment 6. These items were identified as a result of the three-phase program described in Westinghouse Owner's Group letter, OG-47. The remaining material will be submitted in three stages, spaced about six months apart, with the first submittal due in early July 1981. The items listed in this remaining portion of the program may seem numerous, but when put in perspective with respect to the amount of risk addressed by these procedures when compared to the total risk, these remaining procedures address less than two percent of the total risk that is not covered by procedures already submitted to the NRC. Unfortunately, the law of diminishing return applies. The effort needed to provide coverage for the last small areas of risk is very large in proportion to the benefit of possible risk reduction. The result is the schedule shown in Attachment 6. Based upon our discussions with the staff at the February 20, 1981 meeting, we are confident that this extensive program satisfies all requirements in the procedure evaluation and development areas and constitutes a systematic approach to addressing these issues.

In order to complete these activities within the timeframe indicated in Attachment 6, we have made the necessary arrangements for initiating the near-term efforts relating to this program. However, prior to committing the very substantial resources required to accomplish the program in its entirety, we would require your acknowledgement as to the acceptability of our proposed approach. Should you need any additional information with regard to the program, we would be willing to discuss again the specifics of our effort with you and all necessary members of the NRC staff.

Very truly yours,

R. W. Jurgensen

Robert W. Jurgensen, Chairman
Westinghouse Owners Group

ATTACHMENT 2

PROGRAM OBJECTIVES

- OVERALL OBJECTIVES

  1. ASSURE OPERATOR PREPAREDNESS FOR EVENTS BEYOND DESIGN BASIS

  2. ASSURE COMPLIANCE WITH NUREG-0737 (I.C.1)

METHODOLOGY

- APPLICATION OF WCAP-9691 TECHNIQUES PERMITS SYSTEMATIC EVALUATION OF COVERAGE WITHIN MAJOR EVENT CATEGORIES
- SUBSTANTIAL AUGMENTATION HAS BEEN PROVIDED BY THE INADEQUATE CORE COOLING PROCEDURES SINCE ISSUANCE OF WCAP-9691
- REMAINING AREAS WITH PARTIAL PROCEDURES COVERAGE HAVE BEEN IDENTIFIED
- RELATIVE RISK ASSESSMENTS OF SEQUENCES CAN IDENTIFY THE REMAINING PROCEDURES DEVELOPMENT EFFORT
- PRIORITY FOR REMAINING PROCEDURES WORK CAN ALSO BE INFERRED FROM THE RESULTS OF THE RELATIVE RISK ASSESSMENTS
- A TASK-LEVEL BLOCK DIAGRAM CONSOLIDATING THE EOIs AND E^2OIs HAS BEEN DEVELOPED
- THE CONSOLIDATED BLOCK DIAGRAM DELINEATES THE TRANSITIONS BETWEEN PROCEDURES AND FACILITATES IDENTIFICATION OF ADDITIONAL CONTINGENCY ACTIONS

PRESENT STATUS

- COVERAGE EVALUATION RESULTS AVAILABLE

- SUBSTANTIAL AUGMENTATION PROVIDED BY INADEQUATE CORE COOLING PROCEDURES
  - 79 OF 115 SEQUENCES IMPROVED

- AREAS WHERE ADDITIONAL COVERAGE COULD BE OBTAINED:
  - -LOSS OF ECR
  - -LOSS OF AC POWER
  - -LOSS OF RPS
  - -UNISOLABLE STEAM GENERATOR TUBE RUPTURE
  - -MULTIPLE STEAM GENERATOR BLOWDOWN
  - -LOSS OF RCS DEPRESSURIZATION CAPABILITY FOR STEAM GENERATOR TUBE RUPTURE
  - -LOSS OF SECONDARY SIDE COOLDOWN CAPABILITY FOR STEAM GENERATOR TUBE RUPTURE
  - -IMPROPER ECI OPERATION DURING STEAM GENERATOR TUBE RUPTURE

- IMPROVED TRANSITIONS TO ICC PROCEDURES MAY BE NECESSARY
  - -BLOCK DIAGRAMS SUPPLEMENT EVENT TREE EVALUATIONS IN THIS AREA

- RELATIVE RISK EVALUATION NOT FINALIZED
  - -PRELIMINARY RESULTS SHOW CONSISTENCY WITH PRIOR JUDGEMENTS ON PROCEDURE DEVELOPMENT PRIORITIES

2.1.9.c ANALYSIS OF DESIGN AND OFF-NORMAL TRANSIENTS AND ACCIDENTS

SUMMARY

REVISE AS REQUIRED OPERATOR TRAINING AND EMERGENCY PROCEDURES TO IMPROVE OPERATOR PERFORMANCE DURING TRANSIENT AND ACCIDENT CONDITIONS. SHORT-TERM EFFORT REQUIRES THE IDENTIFICATION OF OPERATOR ACTIONS (TO BE REQUIRED OR TO BE PROHIBITED) ASSOCIATED WITH IMPORTANT SAFETY CONSIDERATIONS DURING ACCIDENT CONDITIONS.

EVENT SEQUENCES

PURPOSE

* PROVIDE A VEHICLE FOR SYSTEMATICALLY ASSESSING THE ADEQUACY OF AOIs AND EOIs

* SHOW CRITICAL DECISION POINTS FOR THE OPERATOR

* IDENTIFY THE POTENTIAL FOR ADDITIONAL FAILURES AFTER TRIP

* IDENTIFY INSTRUMENTATION AVAILABLE FOR OPERATOR TO MONITOR SAFETY FUNCTIONS

LOSS OF PRIMARY OR SECONDARY COOLANT ACCIDENTS

* LARGE LOCA
* SMALL LOCA
* FEEDLINE BREAK
* STEAMLINE BREAK
* STEAM GENERATOR TUBE RUPTURE

TABLE A.1 Glossary of Safety Functions

SYMBOL	FUNCTION	DEFINITION OF FUNCTION FAILURE
EP	ELECTRICAL POWER	FAILURE TO PROVIDE AC POWER TO BUSES THAT FURNISH POWER TO ESFS
RPS	REACTOR PROTECTION SYSTEM	FAILURE OF MORE THAN 2 CONTROL ROD ASSEMBLIES TO INSERT IN CORE--ELECTRICAL/MECHANICAL FAULT
AFWS	AUXILIARY FEEDWATER SYSTEM	FAILURE TO DELIVER THE EQUIVALENT OF FULL FLOW OF ONE MOTOR-DRIVEN AFW PUMP
SSR	SECONDARY STEAM RELIEF	
SD/S/R-VO		FAILURE TO OPEN OF ALL STEAM GENERATOR STEAM DUMP, SAFETY AND RELIEF VALVES*
SD/S/R-VR		FAILURE TO RE-CLOSE OF ALL STEAM GENERATOR STEAM DUMP, SAFETY AND RELIEF VALVES
SDC		FAILURE TO OPERATE OF ALL STEAM DUMP VALVES*
PPC	PRIMARY PRESSURE CONTROL	
SPRAY/AUXILIARY SPRAY		FAILURE TO DELIVER SPRAY FLOW FROM REACTOR COOLANT LOOP COLD LEGS VCVCS
S/R-VO		FAILURE TO OPEN OF ALL PRESSURIZER SAFETY AND RELIEF VALVES*
S/R-VR		FAILURE TO RE-CLOSE OF ALL PRESSURIZER SAFETY AND RELIEF VALVES
CVCS	CHEMICAL VOLUME AND CONTROL SYSTEM	FAILURE OF CHARGING AND LETDOWN FUNCTIONS THAT PREVENT COOLDOWN OF RCS TO COLD SHUTDOWN
ECI	EMERGENCY COOLANT INJECTION	FAILURE TO DELIVER BORATED WATER FROM AT LEAST 3 ACCUMULATORS OR 1 LHSI PUMP TO RCS COLD LEGS (LARGE LOCA) OR FAILURE TO DELIVER FLOW FROM AT LEAST 1 TRAIN OF HHSI SYSTEM
ECR	EMERGENCY COOLANT RECIRCULATION	FAILURE TO INJECT WATER INTO RCS FROM AT LEAST 1 HHSI OR LHSI PUMP, OR FAILURE TO RE-ALIGN TO HOT LEG INJECTION
ECI TERMINATION		OPERATOR ACTIONS AND/OR EQUIPMENT FAILURES THAT PREVENT TERMINATION OF FLOW FROM HHSI PUMPS OR FAILURE TO ALIGN VALVES FOR NORMAL CHARGING AND LETDOWN VIA CVCS
MSI	MAIN STEAM ISOLATION	FAILURE TO ISOLATE MAIN STEAM LINE TO FAULTED STEAM GENERATOR OR FAILURE TO TERMINATE AUXILIARY FEEDWATER TO THAT STEAM GENERATOR
RHRS	RESIDUAL HEAT REMOVAL SYSTEM	FAILURE TO DELIVER WATER TO RCS COLD LEG BY AT LEAST 1 TRAIN OF RHRS

*Note that operation of one or more safety or relief valves constitutes success.

POOR ORIGINAL

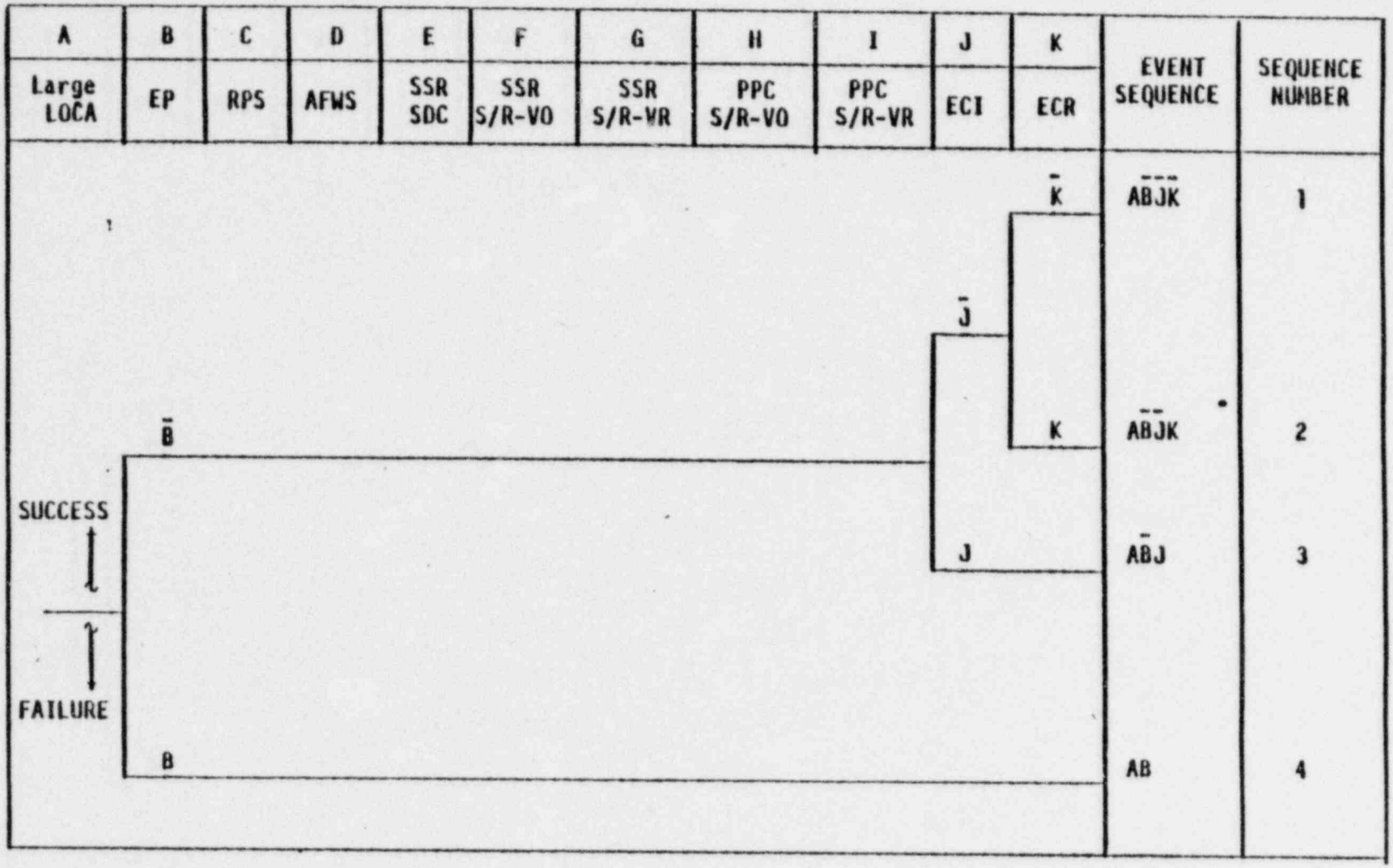


FIGURE A.1 Large LOCA Event Tree
10" < Equiv. Dia. < DECLG

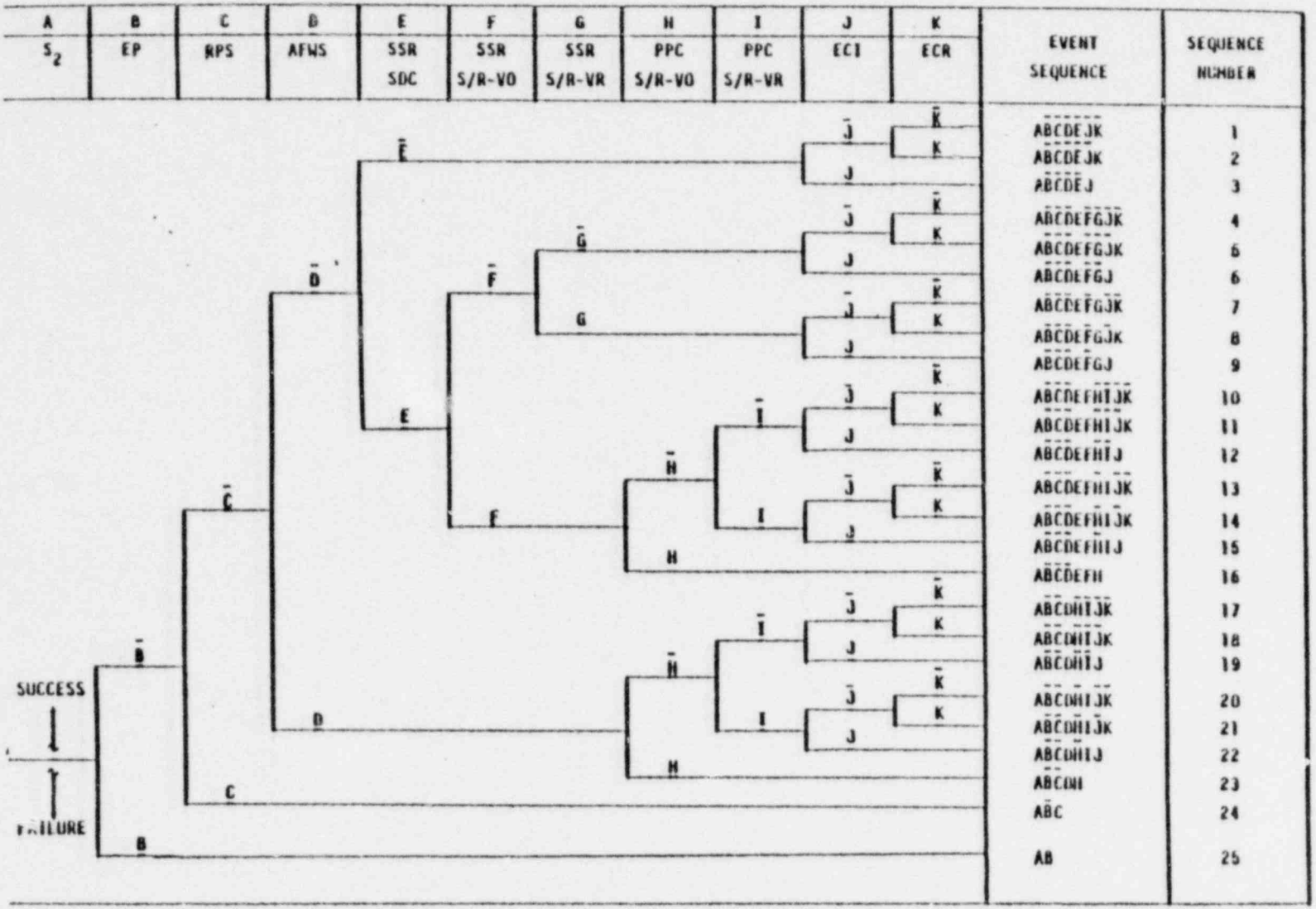
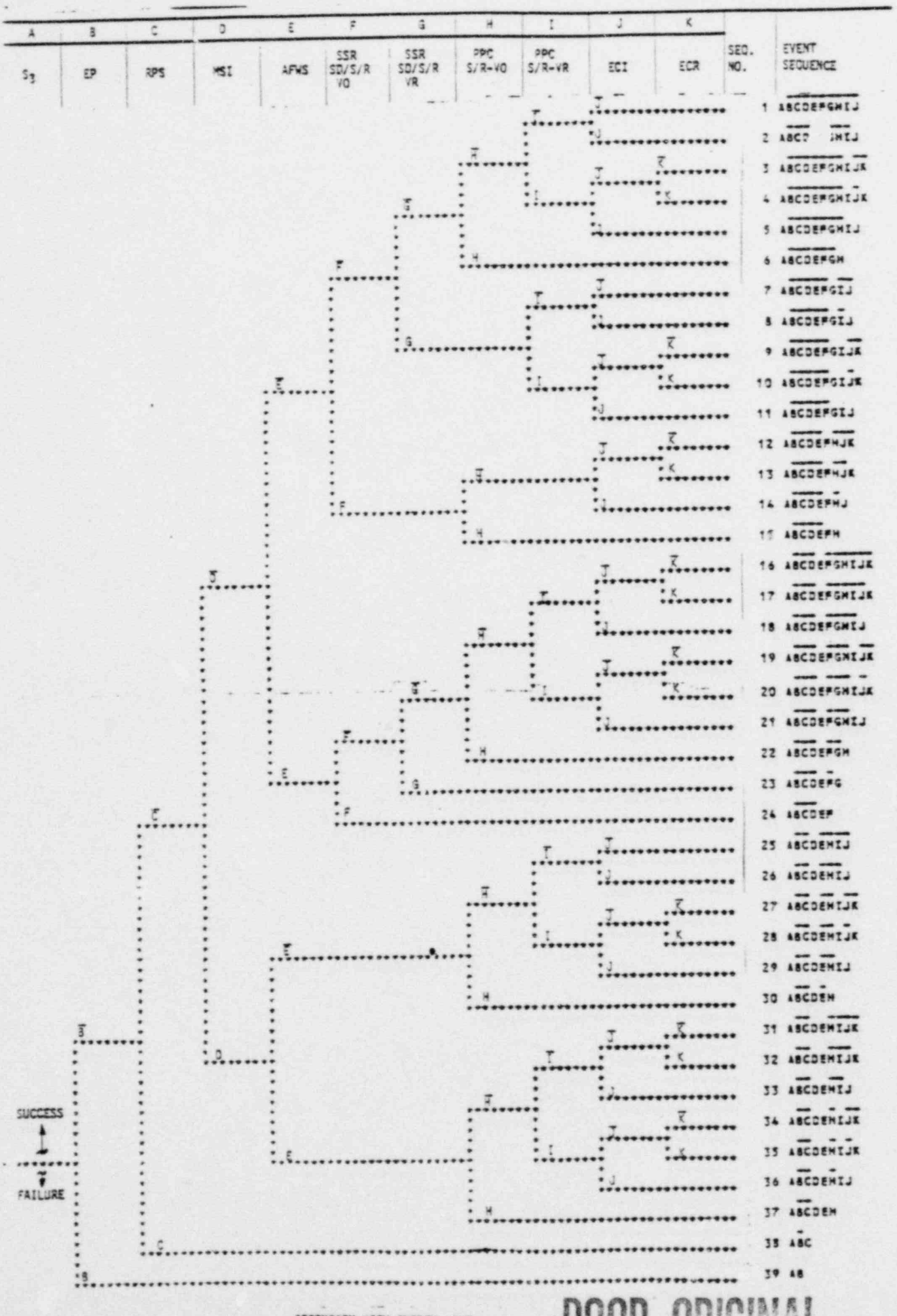


FIGURE A.2 Small LOCA Event Tree
0.5" < Equiv. Dia. < 2.0"

POOR ORIGINAL



SECONDARY HIGH ENERGY LINE

POOR ORIGINAL

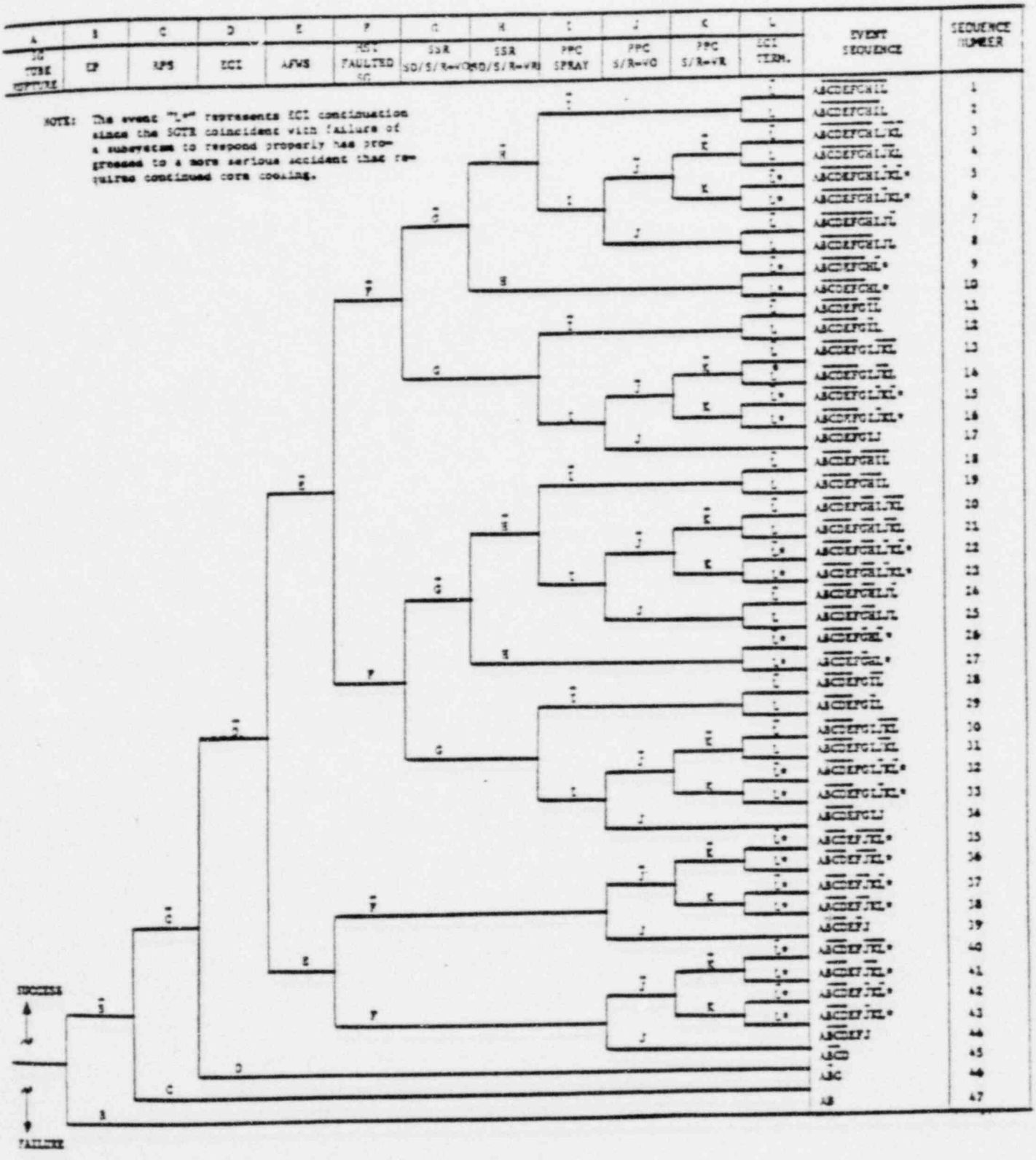


FIGURE A.5 Steam Generator Tube Rupture Event Tree - No. 1

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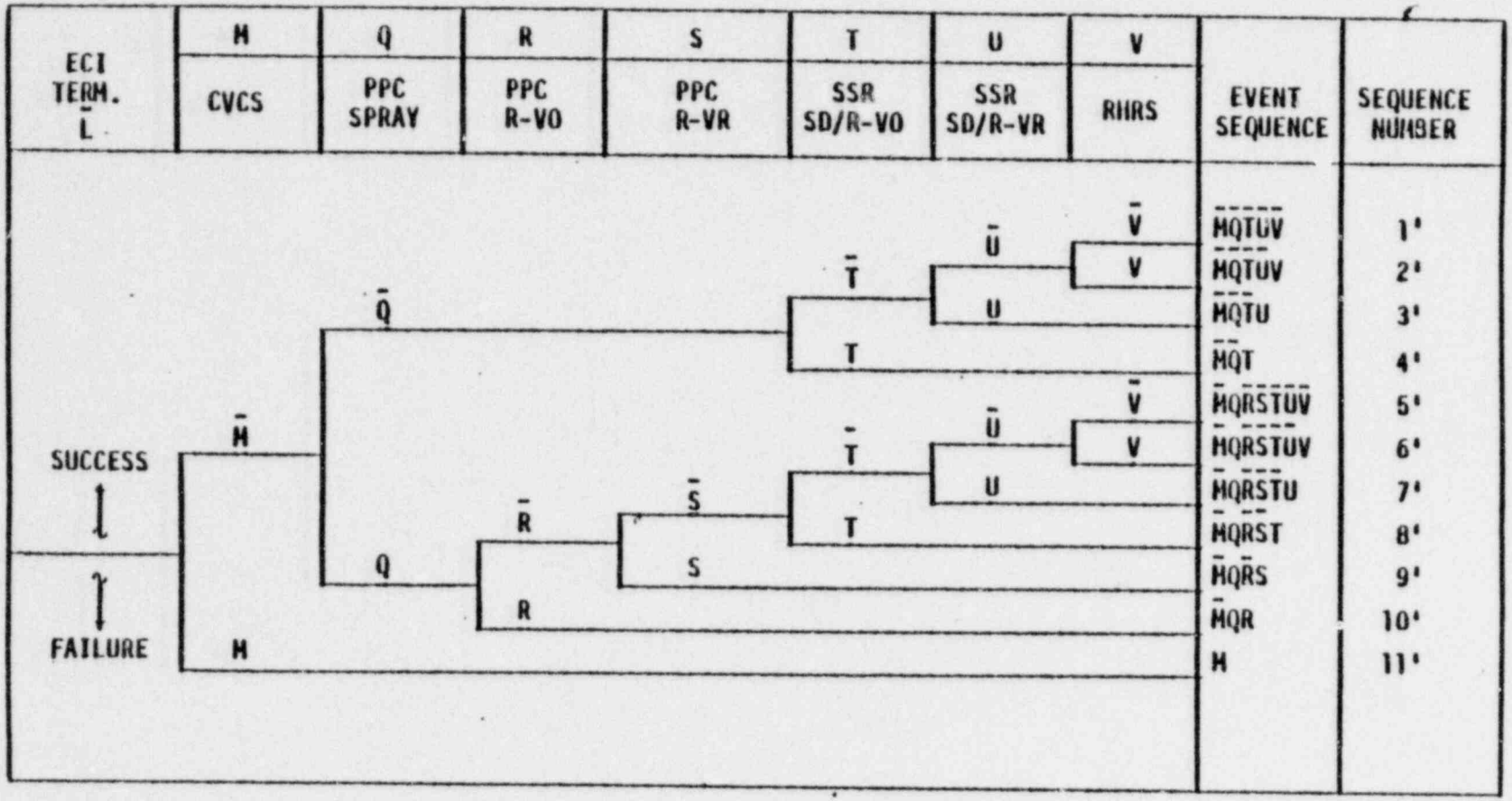


FIGURE A.6 Steam Generator Tube Rupture Event Tree - No. 2

COVERAGE DEFINITIONS

FULL: CONTINGENCY ACTIONS INDEPENDENT OF FAILED SAFETY FUNCTION(S) HAVE BEEN IDENTIFIED.

PARTIAL: CONTINGENCY ACTIONS ARE NOT COMPLETELY INDEPENDENT OF RESTORATION OF FAILED SAFETY FUNCTION(S).

NONE: NO CONTINGENCY ACTION HAS BEEN SPECIFIED TO ADDRESS FAILED SAFETY FUNCTION(S).

POOR ORIGINAL

LARGE LOCA EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage
1	None	Full	No	Full
2	ECR	Partial	No	Partial
3	ECI	Partial	Yes (E^2OI-1)	Partial
4	EP	Partial	No	Partial

SMALL LOCA EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage
1	None	Full	No	Full
2	ECR	Partial	No	Partial
3	ECI	Partial	Yes (E^2OI-1)	Full
4	SSR-SDC	Full	No	Full
5	SSR-SDC +ECR	Partial	No	Partial
6	SSR-SDC +ECI	Partial	Yes (E^2OI-1)	Full
7	SSR-SDC +SSR-SD/S/R-VR	Partial	Yes (EOI-2, Rev. 2)	Partial
8	SSR-SDC +SSR-SD/S/R-VR +ECR	Partial	Yes (E^2OI-2 and EOI-2, Rev. 2)	Partial
9	SSR-SDC SSR-SD/S/R-VR +ECI	Partial	Yes (E^2OI-1 and EOI-2, Rev. 2)	Full
10	SSR-SDC +[SSR-SD/S/R-VO]	Partial	Yes (E^2OI-1)	Partial
11	SSR-SDC +[SSR-SD/S/R-VO] +ECR	Partial	Yes (E^2OI-1)	Partial

SMALL LOCA EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage
12	SSR-SDC +[SSR-SD/S/R-VO] +ECI	Partial	Yes (E^2OI-1)	Full
13	SSR-SDC +[SSR-SD/S/R-VO] +PPC-S/R-VR	Partial	Yes (E^2OI-1)	Full
14	SSR-SDC +[SSR-SD/S/R-VO] +PPC-S/R-VR +ECR	Partial	Yes (E^2OI-1)	Partial
15	SSR-SDC +[SSR-SD/S/R-VO] +PPC-S/R-VR +ECI	Partial	Yes (E^2OI-1)	Full
16	SSR-SDC +[SSR-SD/S/R-VO] +[PPC-SR-VO]	None	No	None
17	AFWS	Partial	Yes (E^2OI-2)	Full
18	AFWS +ECR	Partial	Yes (E^2OI-2)	Partial
19	AFWS +ECI	Partial	Yes (E^2OI-1 and E^2OI-2)	Partial
20	AFWS +PPC-S/R-VR	Partial	Yes (E^2OI-2)	Full
21	AFWS +PPC-S/R-VR +ECR	Partial	Yes (E^2OI-2)	Partial

SMALL LOCA EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage
22	AFWS +PPC-S/R-VR +ECI	Partial	Yes ($E^2$01-1 and $E^2$01-2)	Partial
23	AFWS +[PPC-S/R-VO]	Partial	No	Partial
24	RPS	Partial	No	Partial
25	EP	Partial	No	Partial

SECONDARY BREAK EVENT TREE
COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage
1	Design Basis	Full	No	Full
2	ECI	Partial	Yes (E^2OI-1)	Partial
3	PPC-S/R-VR	Partial	No	Partial
4	PPC-S/R-VR +ECR	Partial	No	Partial
5	PPC-S/R-VR +ECI	Partial	Yes (E^2OI-1)	Partial
6	PPC-S/R-VO	None	(1)	Full
7	SSR-SD/S/R-VR	Partial	No	Partial
8	SSR-SD/S/R-VR +ECI	Partial	Yes (E^2OI-1)	Partial
9	SSR-SD/S/R-VR +PPC-S/R-VR	Partial	No	Partial
10	SSR-SD/S/R-VR +PPC-SR-VR +ECR		No	Partial

SECONDARY BREAK EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage
11	SSR-SD/S/R-VR +PPC-SR-VR +ECI	Partial	Yes (E^2OI-1)	Partial
12	SSR-SD/S/R-VO	None	Yes (E^2OI-1)	Partial
13	[SSR-SD/S/R-VO +ECR]	Partial	No	Partial
14	[SSR-SD/S/R-VO +ECI]		Yes (E^2OI-1)	Partial
15	[SSR-SD/S/R-VO +PPC-S/R-VO]	None	No	None
16	AFWS	Partial	Yes (E^2OI-2)	Full
17	AFWS +ECR	Partial	Yes (E^2OI-2)	Partial
18	AFWS +ECI	Partial	Yes (E^2OI-1 and E^2OI-2)	Partial
19	AFWS +PPC-S/R-VR	Partial	Yes (E^2OI-2)	Full
20	AFWS +PPC-S/R-VR +ECR	Partial	Yes (E^2OI-2)	Partial
21	AFWS +PPC-S/R-VR +ECI	Partial	Yes (E^2OI-1 and E^2OI-2)	Partial

SECONDARY BREAK EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage
22	AFWS +PPC-S/R-VO	Partial	Yes (E^2OI-2)	Full
23	AFWS +SSR-SD/S/R-VR	Partial	Yes (E^2OI-2)	Full
24	[AFWS +SSR-SD/S/R-VO]	Partial	Yes (E^2OI-2)	Partial
25	MSI	Partial	No	Partial
26	MSI +ECI	Partial	Yes (E^2OI-1)	Partial
27	MSI +PPC-S/R-VR	Partial	No	Partial
28	MSI +PPC-S/R-VR +ECR	Partial	No	Partial
29	MSI +PPC-S/R-VR +ECI	Partial	Yes (E^2OI-1)	Full
30	MSI +PPC-S/R-VO	Partial	(2)	Partial
31	MSI +AFWS	Partial	Yes (E^2OI-2)	Partial

SECONDARY BREAK EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage
32	[MSI +AFWS +ECR]	Partial	Yes (E^2OI-2)	Partial
33	[MSI +AFWS +ECI]	Partial	Yes (E^2OI-1 and E^2OI-2)	Partial
34	MSI +AFWS -PPC-S/R-VR	Partial	Yes (E^2OI-2)	Full
35	[MSI +AFWS +PPC-S/R-VR +ECR]	Partial	Yes (E^2OI-2)	Partial
36	[MSI +AFWS +PPC-S/R-VR +ECI]	Partial	Yes (E^2OI-1 and E^2OI-2)	Partial
37	[MSI +AFWS +PPC-S/R-VO]	Partial	Yes (E^2OI-2)	Partial
38	RPS	Partial	No	Partial
39	EP	Partial	No	Partial

STEAM GENERATOR TUBE RUPTURE EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage
1	Design Basis	Full	No	Full
2	ECI Term	Partial	No	Partial
3	PPC Spray	Full	No	Full
4	ECI Term +PPC Spray	Partial	No	Partial
5	PPC-S/R-VR +PPC Spray	Partial	No	Partial
6	ECI Term* +PPC-S/R-VR +PPC Spray	Partial	Yes (E^2OI-1)	Partial
7	PPC-S/R-VO +PPC Spray	None	No	None
8	ECI Term +PPC-S/R-VO +PPC Spray	None	No	None
9	SSR-SD/S/R-VR	Partial	No	Partial
10	ECI-Term* +SSR-SD/S/R-VR	Partial	Yes (E^2OI-1)	Partial

STEAM GENERATOR TUBE RUPTURE EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage
11	SSR-SD/S/R-VO	Partial	Yes (E^2OI-1)	Partial
12	ECI Term +SSR-SD/S/R-VO	Partial	Yes (E^2OI-1)	Partial
13	SSR-SD/S/R-VO +PPC Spray	Partial	Yes (E^2OI-1)	Partial
14	ECI Term +SSR-SD/S/R-VO +PPC Spray	Partial	Yes (E^2OI-1)	Partial
15	PPC-S/R-VR +PPC Spray +SSR-SD/S/R-VO	Partial	Yes (E^2OI-1)	Partial
16	ECI Term * +PPC-S/R-VR +PPC Spray +SSR-SD/S/R-VO	Partial	Yes (E^2OI-1)	Partial
17	PPC-S/R-VO +PPC Spray +SSR-SD/S/R-VO	Partial	Yes (E^2OI-1)	Partial

STEAM GENERATOR TUBE RUPTURE EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage
18	MSI Faulted SG	Partial	Yes (EOI's, Rev. 2)	Partial
19	MSI Faulted SG +ECI Term	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial
20	PPC Spray +MSI Faulted SG	Partial	Yes (EOI's, Rev. 2)	Partial
21	ECI Term +PPC Spray +MSI Faulted SG	Partial	Yes (EOI's, Rev. 2)	Partial
22	PPC-S/R-VR +PPC Spray +MSI Faulted SG	Partial	Yes (EOI's, Rev. 2)	Partial
23	ECI Term* +PPC-S/R-VR +PPC Spray +MSI Faulted SG	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial
24	PPC-S/R-VO +PPC Spray +MSI Faulted SG	None	Yes (EOI's, Rev. 2)	Partial
25	ECI Term +PPC-S/R-VO +PPC Spray +MSI Faulted SG	None	Yes (EOI's, Rev. 2)	Partial

STEAM GENERATOR TUBE RUPTURE EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage
26	SSR-SD/S/R-VR +MSI Faulted SG	Partial	Yes (EOI's, Rev. 2)	Partial
27	ECI Term* +SSR-SD/S/R-VR +MSI Faulted SG	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial
28	SSR-SD/S/R-VO +MSI Faulted SG	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial
29	ECI Term +SSR-SD/S/R-VO +MSI Faulted SG	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial
30	PPC Spray + SSR-SD/S/R-VO +MSI Faulted SG	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial
31	ECI Term +PPC Spray +SSR-SD/S/R-VO + MSI Faulted SG	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial

STEAM GENERATOR TUBE RUPTURE EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage
32	PPC-S/R-VR +PPC Spray +SSR-SD/S/R-VO +MSI Faulted SG	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial
33	ECI Term* +PPC-S/R-VR +PPC Spray +SSR-SD/S/R-VO +MSI Faulted SG	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial
34	PPC-S/R-VO +PPC Spray +SSR-SD/S/R-VO +MSI Faulted SG	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial
35	AFWS	Partial	Yes (E^2OI-2)	Full
36	ECI Term* +AFWS	Partial	Yes (E^2OI-1 and E^2OI-2)	Partial
37	PPC-S/R-VR +AFWS	Partial	Yes (E^2OI-2)	Full
38	ECI Term* +PPC-S/R-VR +AFWS	Partial	Yes (E^2OI-1 and E^2OI-2)	Partial
39	PPC-S/R-VO +AFWS	None	Yes (E^2OI-2)	Partial
40	MSI Faulted SG +AFWS	Partial	Yes (E^2OI-2 and	Partial

STEAM GENERATOR TUBE RUPTURE EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage
41	ECI Term* +MSI Faulted SG +AFWS	Partial	Yes (E^2OI-1, E^2OI-2, and EOI's, Rev. 2)	Partial
42	PPC-S/R-VR +MSI Faulted SG +AFWS	Partial	Yes (E^2OI-2 and EOI's, Rev. 2)	Partial
43	ECI Term* +PPC-S/R-VR +MSI Faulted SG +AFWS	Partial	Yes (E^2OI-1, E^2OI-2, and EOI's, Rev. 2)	Partial
44	PPC-S/R-VO +MSI Faulted SG +AFWS	None	Yes (E^2OI-2 and EOI's, Rev. 2)	Partial
45	ECI	Partial	Yes (E^2OI-1)	Partial
46	RPS	Partial	No	Partial
47	EP	Partial	No	Partial

ATTACHMENT 3

I.C.I.

CONCERN: AT WHAT LEVEL SHOULD PROCEDURES ADDRESS RISK

DEFINITION:

$RISK = P_i \times C_j$

P_i = PROBABILITY/FREQUENCY OF OCCURRENCE (i)

C_j = MAGNITUDE OF CONSEQUENCE (j)

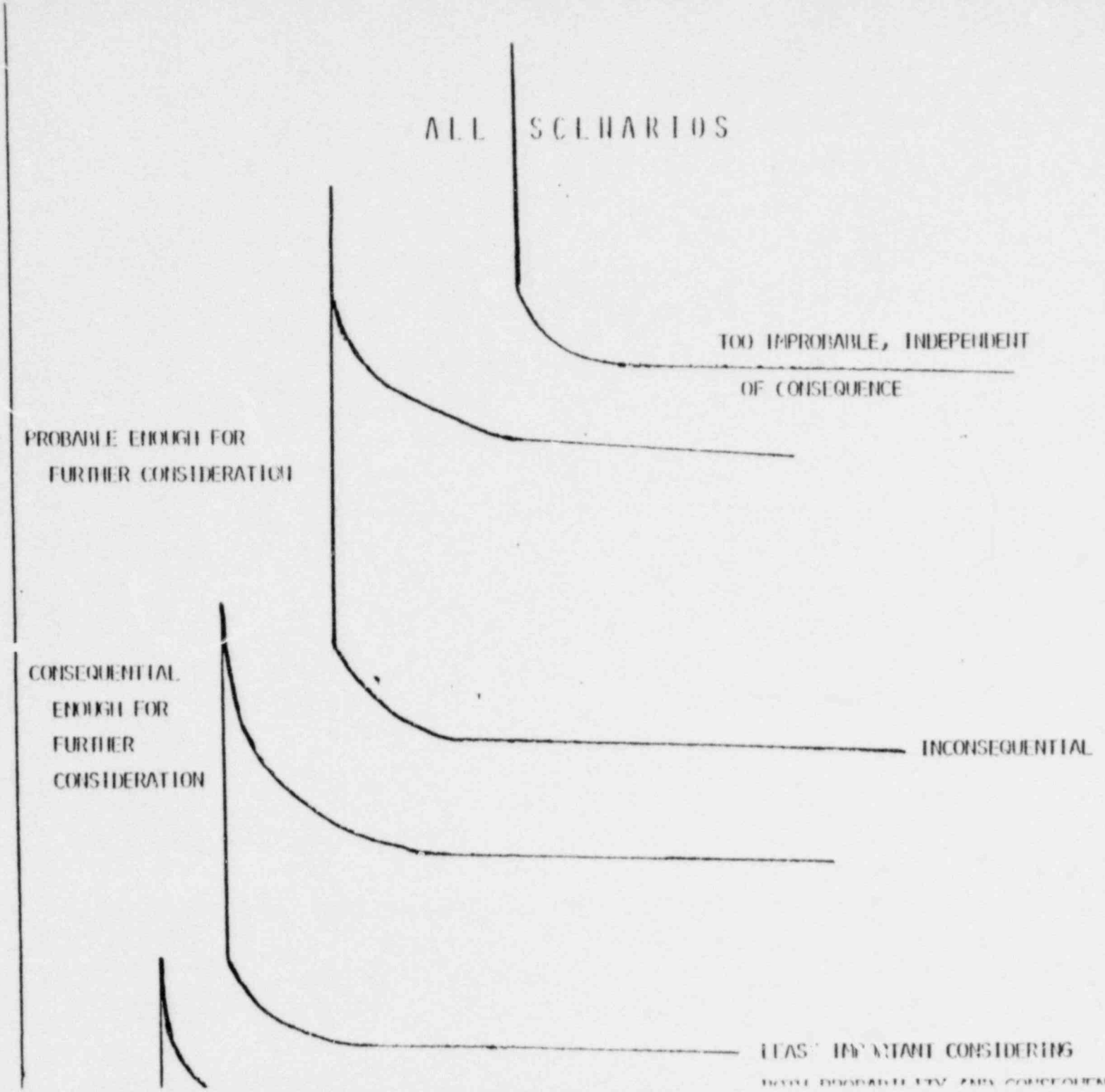
CONSEQUENCE

- HEALTH—SAFETY ISSUE
- PLANT DAMAGE—FINANCIAL ISSUE

MUST DEFINE INTERFACE

PROGRAM - RESPONSE TO NUREG-0737 I.C.I. PHASE 2

OBJECTIVE : TO PROVIDE A QUANTITATIVE BASIS FOR ASSESSING THE NEED AND PRIORITY FOR PRODUCING ADDITIONAL PROCEDURES TO COVER WCAP-9691 SCENARIOS


ALL SCENARIOS
TOO IMPROBABLE, INDEPENDENT OF CONSEQUENCE
PROBABLE ENOUGH FOR FURTHER CONSIDERATION
CONSEQUENTIAL ENOUGH FOR FURTHER CONSIDERATION
INCONSEQUENTIAL
LEAST IMPORTANT CONSIDERING

IMPROBABLE

- PROBABILITY CUT-OFF POINT

- EVENT TREE QUANTIFICATION

  FAILURE PROBABILITY SOURCES

  CONDITIONAL PROBABILITY

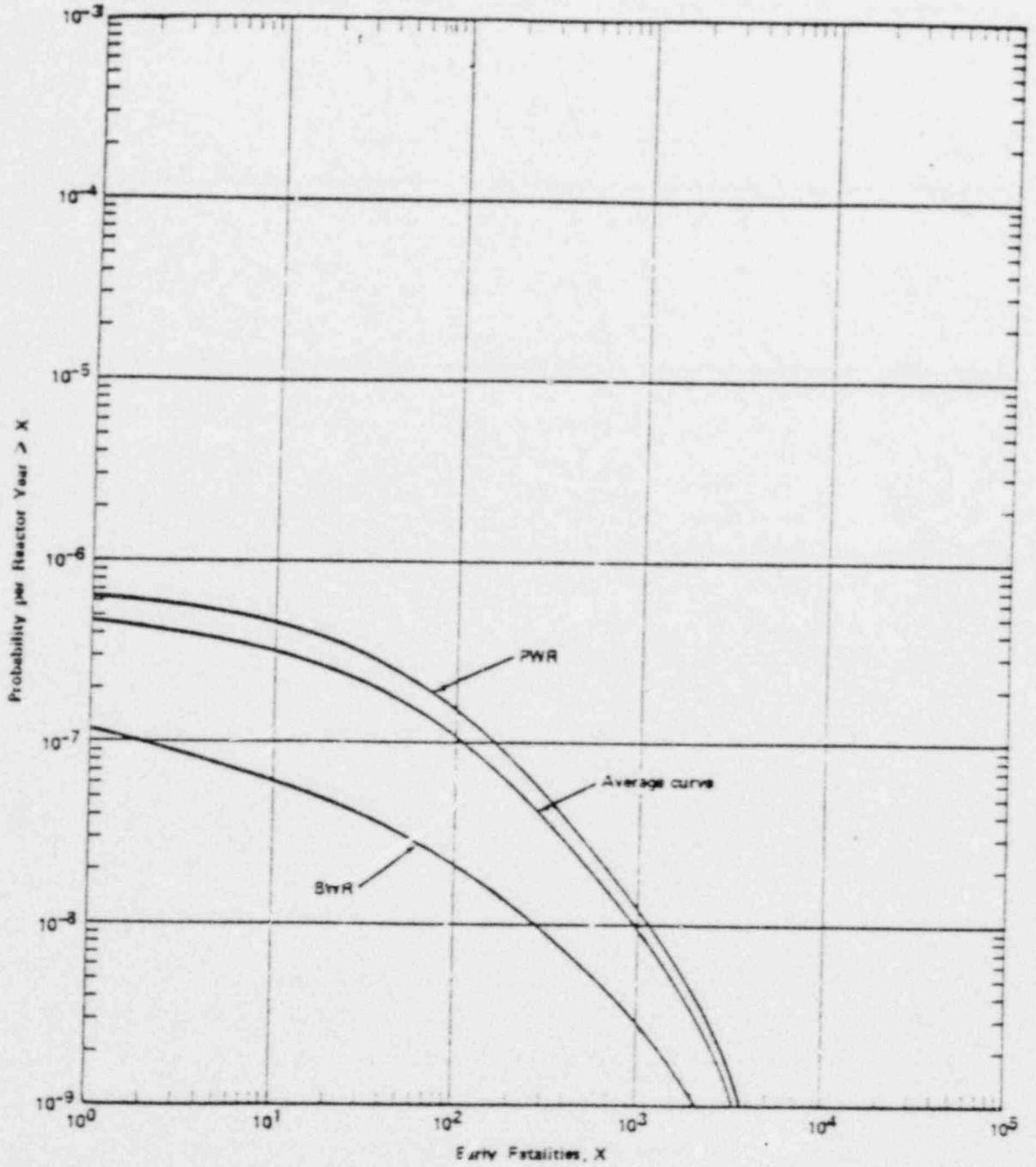


FIGURE 5-3 Probability Distribution for Early Fatalities per Reactor Year

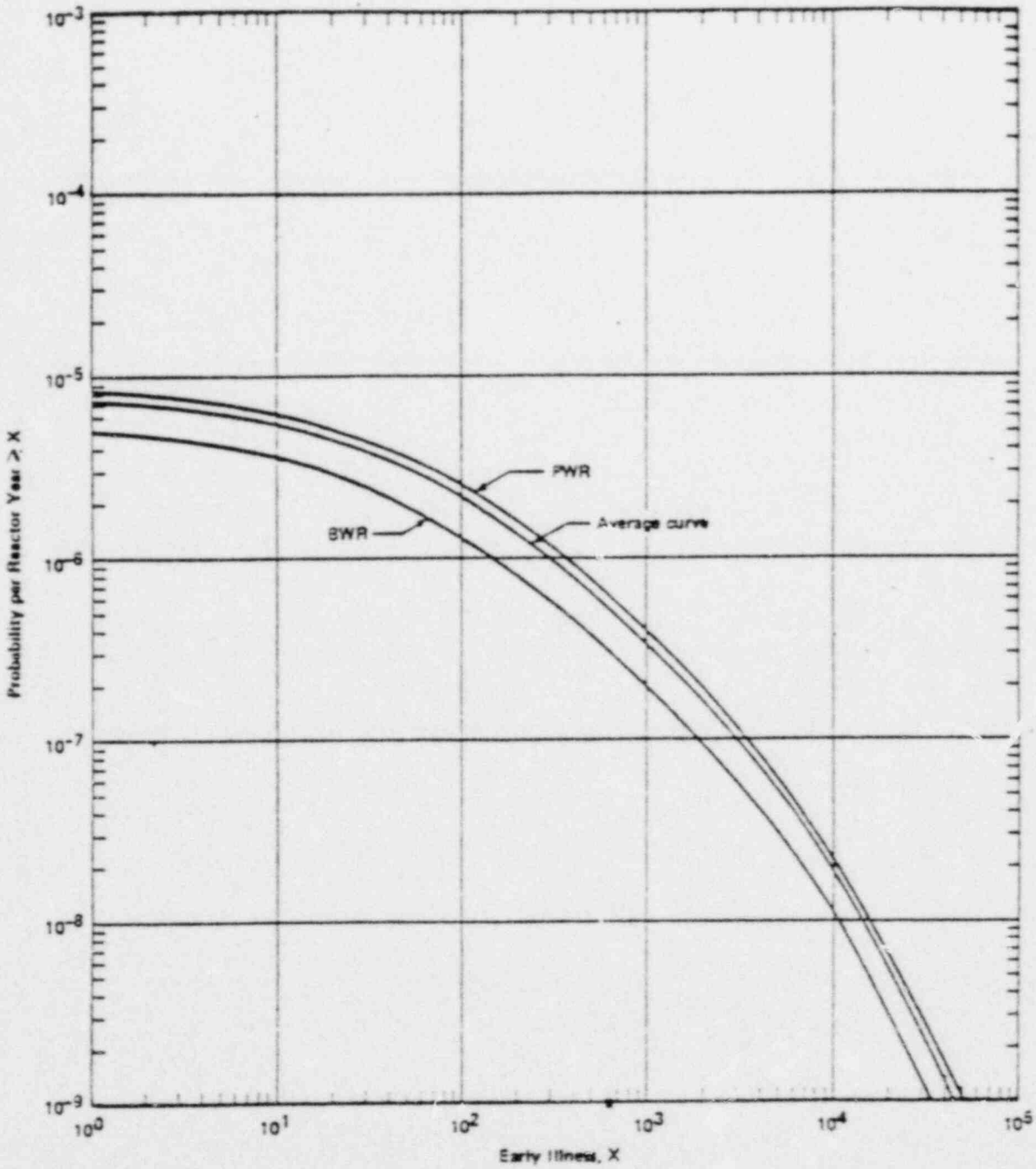


FIGURE 5-4 Probability Distribution for Early Illness per Reactor Year

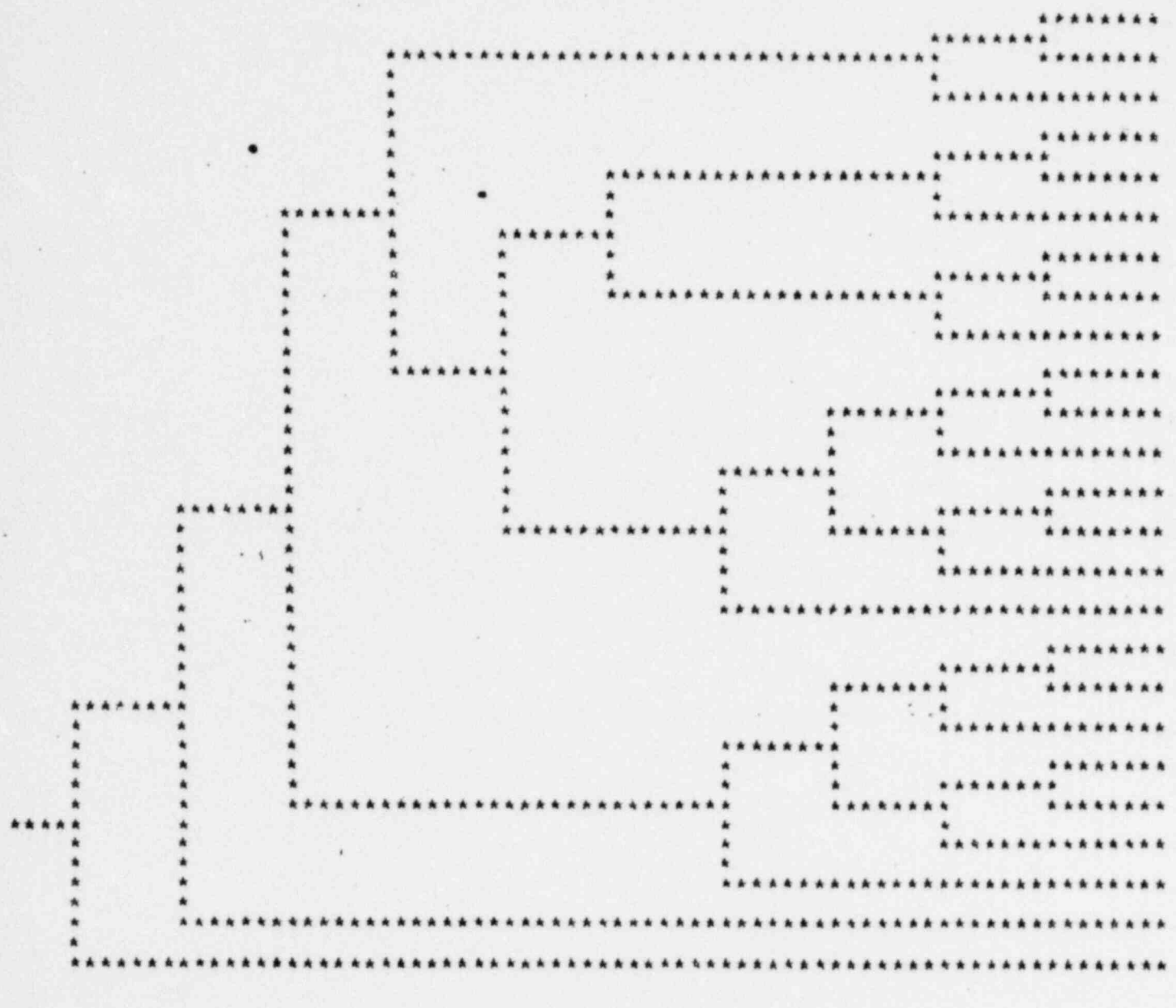
SOME PROPOSED NUMERICAL VALUES FOR INDIVIDUAL RISK CRITERION

NRC – RES	10^{-5}/YR UNACCEPTABLE
	10^{-6} – 10^{-5}/YR WARNING RANGE (CASE BY CASE EVALUATION)
WILSON	10^{-5}/YR NEAR SITE
	10^{-6}/YR NEXT TOWNSHIP
OKRENT	2 X 10^{-4}/YR ESSENTIAL ACTIVITY
	2 X 10^{-5}/YR BENEFICIAL ACTIVITY
	2 X 10^{-6}/YR PERIPHERAL ACTIVITY
	ASSESS RISK AT 90% C.L.
CORKERTON ET AL (CEGB)	10^{-5}/YR PUBLIC
	10^{-4}/YR WORKER
WASH 1400	8 X 10^{-7}/YR
GERMAN RISK STUDY	1 X 10^{-6}/YR
AIF	10^{-5}/YR

FAILURE PROBABILITY SOURCES

- WASH-1400
- NUREG-0611 (AUX. FEED. SYSTEM)
- Z/IP MINI WASH-1400
- NRC DISCUSSIONS (PRA)
- ENGINEERING JUDGEMENT (SDC)
- NUREG-0737 2.K.2. (PORV RELIABILITY)

```
3CDEFGHIJKLM SMALL LOCA EVENT TREE FOR WOG SUBMITTAL                    11:12:53 19-Feb-81
11 Pathname of File for Nodal Probabilities is :UDD:PXMJH:S2TREE.DP
11 Pathname of File for Tree Pathnames is :UDD:PXMJH:S2TREE
11 Pathname of File for Consequence Category Input is :UDD:PXMJH:S2TREE.RC
S2      EP      RPS     AFW     SGC     SVO     SVR     PVO     PVR     ECI     ECR
```



1	A B C D E J K	
2	A B C D E J K	
3	A B C D E J	
4	A B C D E F G J K	
5	A B C D E F G J K	
6	A B C D E F G J	
7	A B C D E F G J K	
8	A B C D E F G J K	
9	A B C D E F G J	
10	A B C D E F H I J K	
11	A B C D E F H I J K	
12	A B C D E F H I J	
13	A B C D E F H I J K	
14	A B C D E F H I J K	
15	A B C D E F H I J	
16	A B C D E F H	
17	A B C D H I J K	
18	A B C D H I J K	
19	A B C D H I J	
20	A B C D H I J K	
21	A B C D H I J K	
22	A B C D H I J	
23	A B C D H	
24	A B C	
25	A B	

BCDEFGHIJKLM SMALL LOCA EVENT TREE FOR WOG SUBMITTAL 11:12:20 19-Feb-81
ll pathname for input file is :UDD:P[illegible]H:S2TREE.DP
ent Input
ference document is S2 INPUT DEFAULT PROBABILITIES(e=1.0E-6) A IS MOD

EVENT	EVENT NAME	FAILURE PROBABILITY	EPSILON
S2	SMALL LOCA	.1000E+01	R
EP	ELECT.POWER	.1000E-04	R
RPS	R TRIP SYS	.3000E-04	R
AFW	AUX FEED SYS	.5000E-04	R
SDC	STM DMP RLF	.5000E-01	R
SVO	SEC VLV OPN	.1000E-05	R
SVR	SEC VLV RCLS	.1500E+00	R
PVO	PRMY VLV OPN	.1000E-05	R
PVR	PRMY VLV RCLS	.2000E-02	R
ECI	EM COOL INJ	.5000E-03	R
ECR	EM COOL RCIR	.5000E-02	R

:EEDLINE/STEAMLINE BREAK TREE"
/ll pathnama for input file is :UDD:PXMJH:SSBTREE.DP
/ent Input
:ference document is S3 INPUT DEFAULT PROBABILITIES(e=1.0E-6) A IS MOD

11:18:21 19-Feb-81

EVENT	EVENT NAME	FAILURE PROBABILITY	EPSILON
S3	STEAM/FEEDLINE BREAK	.1000E+01	R
EP	ELECT.POWER	.1000E-04	R
RPS	R TRIP SYS	.3000E-04	R
MSI	MSIV CLS	.4000E-03	R
AFW	AUX FEED SYS	.5000E-04	R
SVO	SEC VLV OPN	.1000E-05	R
SVR	SEC VLV RCLS	.1500E+00	R
PVO	PRMY VLV OPN	.1000E-05	R
PVR	PRMY VLV RCLS	.2000E-02	R
ECI	EM COOL INJ	.5000E-03	R
ECR	EM COOL RCIR	.5000E-02	R

ABCDEFGHIJKLM SMALL LOCA EVENT TREE FOR WOG SUBMITTAL 14:56:31 19-Feb-81

Frequency Value is .1000E-02

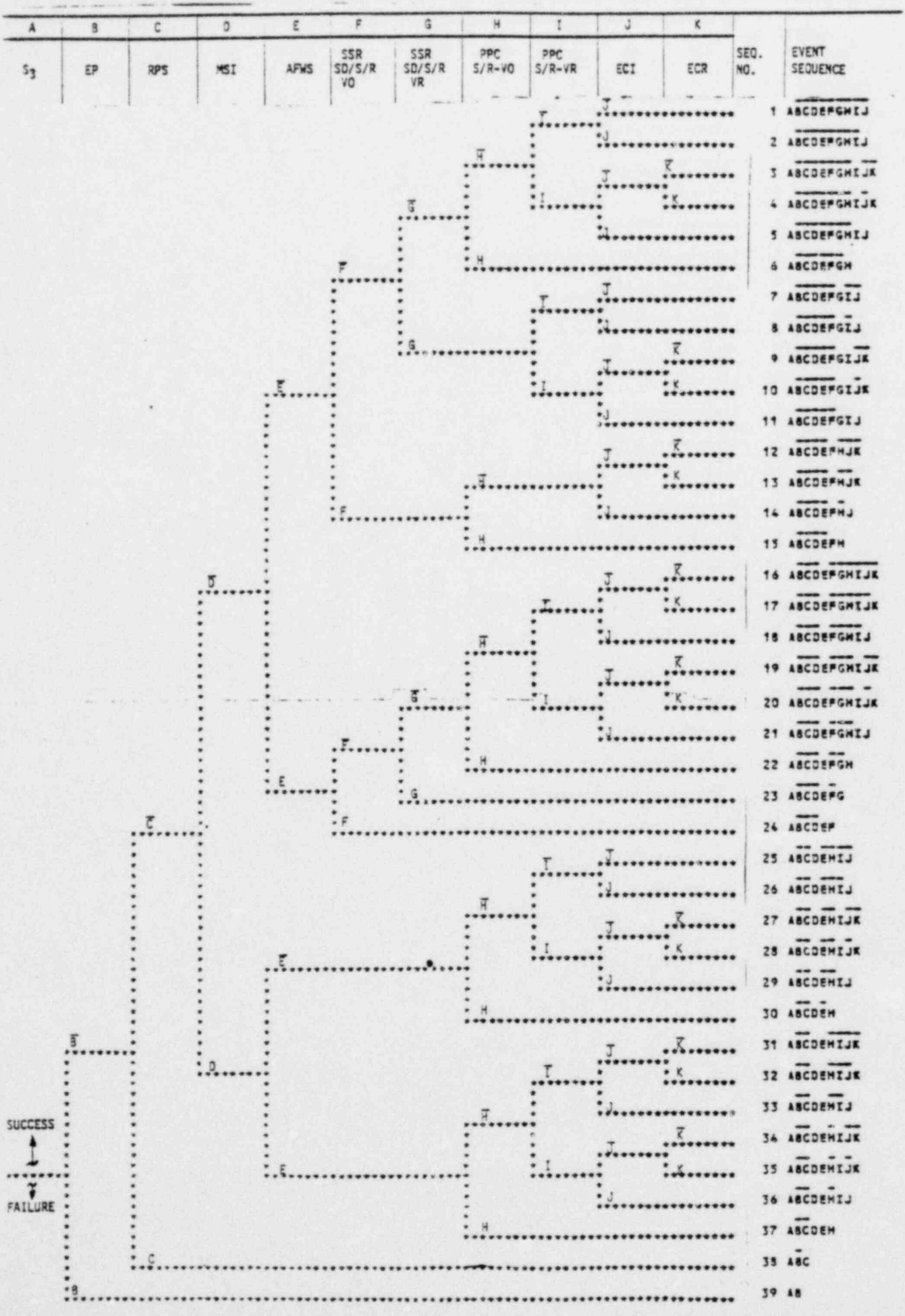
Full pathname for input file is :UDD:PXMJH:S2TREE

All Paths, Ordered by Decreasing Probability

PATH	NUMBER OF FAILURES	S2 EP RPS	AFW SDC SVO	SVR PVO PVR	ECI ECR	FREQUENCY
1	1	011	112	222	11	.9447E-03*EPS**
4	2	011	101	122	11	.4226E-04*EPS**
7	3	011	101	022	11	.7453E-05*EPS**
2	2	011	112	222	10	.4747E-05*EPS**
3	2	011	112	222	02	.4750E-06*EPS**
5	3	011	101	122	10	.2124E-06*EPS**
17	2	011	022	211	11	.4962E-07*EPS**
8	4	011	101	022	10	.3748E-07*EPS**
24	2	010	222	222	22	.3000E-07*EPS**
6	3	011	101	122	02	.2125E-07*EPS**
25	2	002	222	222	22	.1000E-07*EPS**
9	4	011	101	022	02	.3750E-08*EPS**
18	3	011	022	211	10	.2494E-09*EPS**
20	3	011	022	210	11	.9945E-10*EPS**
10	3	011	100	211	11	.4962E-10*EPS**
19	3	011	022	211	02	.2495E-10*EPS**
21	4	011	022	210	10	.4997E-12*EPS**
11	4	011	100	211	10	.2494E-12*EPS**
13	4	011	100	210	11	.9944E-13*EPS**
23	3	011	022	202	22	.5000E-13*EPS**
22	4	011	022	210	02	.5000E-13*EPS**
12	4	011	100	211	02	.2495E-13*EPS**
14	5	011	100	210	10	.4997E-15*EPS**
16	4	011	100	202	22	.5000E-16*EPS**
15	5	011	100	210	02	.5000E-16*EPS**

Sum of Probabilities is .1000E+01

Sum of Frequencies is .1000E-02



SECONDARY HIGH ENERGY LINE

INCONSEQUENTIAL

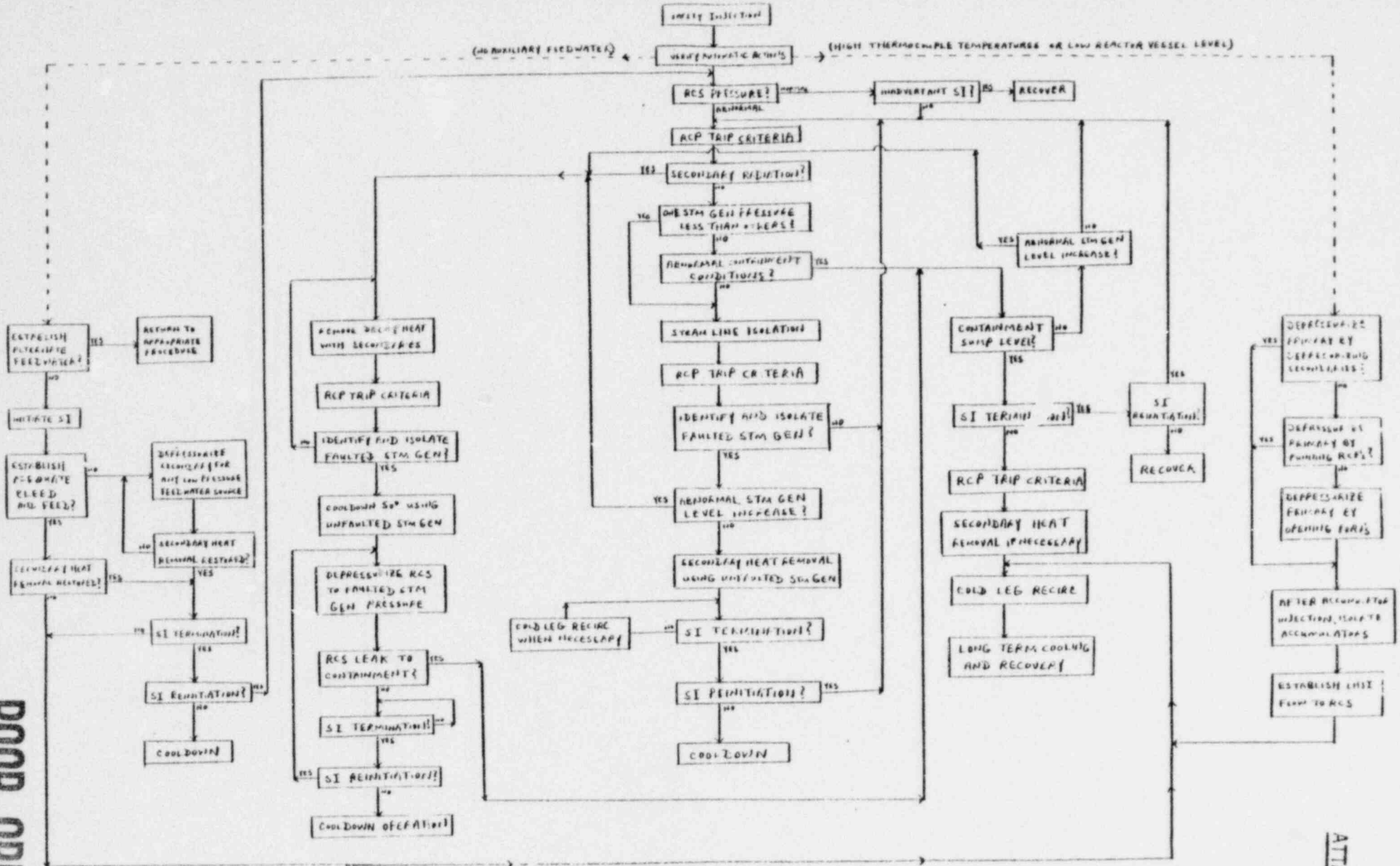
DEFINITION OF HAZARD STATES

- NO DAMAGE
- DAMAGE
- MELT

LOGIC DEVELOPMENT

MINIMAL RISK CONTRIBUTOR

- QUANTIFY RISK CONTRIBUTION OF SYSTEMS IN WASH-1400
- CORRELATE W-9691 AND WASH-1400 SYSTEMS
- QUANTIFY W-9691 RISK CONTRIBUTION
- DEVELOP MINIMAL CONTRIDUTION CRITERIA (AS REQUIRED)



TASK-LEVEL BLOCK DIAGRAM OF WESTINGHOUSE EOIs AND E^2OIs (PRELIMINARY)

ATTACHMENT 4

POOR ORIGINAL

ATTACHMENT 5

LARGE LOCA EVENT TREE
COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage	Anticipated Method(s) of Resolution	Anticipated Final Coverage
1	None	Full	No	Full	Completed	Full
2	ECR	Partial	No	Partial	Address Loss of ECR Function	Full
3	ECI	Partial	Yes (E^2OI-1)	Partial	Address Loss of ECI during large LOCA	Full
4	EP	Partial	No	Partial	Address Loss of EP Function	Full

SMALL LOCA EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage	Anticipated Method(s) of Resolution	Anticipated Final Coverage
1	None	Full	No	Full	Completed	Full
2	ECR	Partial	No	Partial	Address Loss of ECR Function	Full
3	ECI	Partial	Yes (E^2OI-1)	Full	Completed	Full
4	SSR-SDC	Full	No	Full	Completed	Full
5	SSR-SDC +ECR	Partial	No	Partial	Address Loss of ECR Function	Full
6	SSR-SDC +ECI	Partial	Yes (E^2OI-1)	Full	Completed	Full
7	SSR-SDC +SSR-SD/S/R-VR	Partial	Yes (EOI-2, Rev. 2)	Partial	Modifications to EOI's	Full
8	SSR-SDC +SSR-SD/S/R-VR +ECR	Partial	Yes (E^2OI-2 and EOI-2, Rev. 2)	Partial	Address Loss of ECR Function	Full
9	SSR-SDC SSR-SD/S/R-VR +ECI	Partial	Yes (E^2OI-1 and EOI-2, Rev. 2)	Full	Completed	Full
10	SSR-SDC +[SSR-SD/S/R-VO]	Partial	Yes (E^2OI-1)	Partial	PRA Evaluation	Not Required † (4)
11	SSR-SDC +[SSR-SD/S/R-VO] +ECR	Partial	Yes (E^2OI-1)	Partial	PRA Evaluation	Not Required † (5)

† Reverts to Sequence ( ) following PRA evaluation, based upon combined functional failure probability.

SMALL LOCA EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage	Anticipated Method(s) of Resolution	Anticipated Final Coverage
12	SSR-SDC +[SSR-SD/S/R-VO] +ECI	Partial	Yes (E^2OI-1)	Full	PRA Evaluation	Not Required † (6)
13	SSR-SDC +[SSR-SD/S/R-VO] +PPC-S/R-VR	Partial	Yes (E^2OI-1)	Full	PRA Evaluation	Not Required † (4)
14	SSR-SDC +[SSR-SD/S/R-VO] +PPC-S/R-VR +ECR	Partial	Yes (E^2OI-1)	Partial	PRA Evaluation	Not Required † (5)
15	SSR-SDC +[SSR-SD/S/R-VO] +PPC-S/R-VR +ECI	Partial	Yes (E^2OI-1)	Full	PRA Evaluation	Not Required † (6)
16	SSR-SDC +[SSR-SD/S/R-VO] +[PPC-SR-VO]	None	No	None	PRA Evaluation	Not Required † (4)
17	AFWS	Partial	Yes (E^2OI-2)	Full	Completed	Full
18	AFWS +ECR	Partial	Yes (E^2OI-2)	Partial	Address Loss of ECR Function	Full
19	AFWS +ECI	Partial	Yes (E^2OI-1 and E^2OI-2)	Partial	Modifications to E^2OI's	Full
20	AFWS +PPC-S/R-VR	Partial	Yes (E^2OI-2)	Full	Completed	Full
21	AFWS +PPC-S/R-VR +ECR	Partial	Yes (E^2OI-2)	Partial	Address Loss of ECR Function	Full

† Reverts to Sequence ( ) following PRA Evaluation, based upon combined functional failure probability.

SMALL LOCA EVENT TREE
COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage	Anticipated Method(s) of Resolution	Anticipated Final Coverage
22	AFWS +PPC-S/R-VR +ECI	Partial	Yes (E^2OI-1 and E^2OI-2)	Partial	Modifications to E^2OI's	Full
23	AFWS +[PPC-S/R-VO]	Partial	No	Partial	PRA Evaluation	Not Required † (17)
24	RPS	Partial	No	Partial	Address Loss of RPS Function	Full
25	EP	Partial	No	Partial	Address Loss of EP Function	Full

† Reverts to Sequence ( ) following PRA Evaluation, based upon combined functional failure probability.

SECONDARY BREAK EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage	Anticipated Method(s) of Resolution	Anticipated Final Coverage
1	Design Basis	Full	No	Full	Completed	Full
2	ECI	Partial	Yes (E^2OI-1)	Partial	Address Loss of ECI Function During Secondary Break	Full
3	PPC-S/R-VR	Partial	No	Partial	Modification to EOI's	Full
4	PPC-S/R-VR +ECR	Partial	No	Partial	Address Loss of ECR Function	Full
5	PPC-S/R-VR +ECI	Partial	Yes (E^2OI-1)	Partial	Address Loss of ECI Function During Secondary Break	Full
6	PPC-S/R-VO	None	(1)	Full	Completed	Full
7	SSR-SD/S/R-VR	Partial	No	Partial	Address Multiple Steam Generator Blowdown	Full
8	SSR-SD/S/R-VR +ECI	Partial	Yes (E^2OI-1)	Partial	Address Loss of ECI Function During Secondary Break	Full
9	SSR-SD/S/R-VR +PPC-S/R-VR	Partial	No	Partial	Modification to EOI's	Full
10	SSR-SD/S/R-VR +PPC-SR-VR +ECR		No	Partial	Address Loss of ECR Function	Full

(1) Re-evaluation of this sequence for a secondary break identifies this sequence as being fully covered.

SECONDARY BREAK EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage	Anticipated Method(s) of Resolution	Anticipated Final Coverage
11	SSR-SD/S/R-VR +PPC-SR-VR +ECI	Partial	Yes (E^2OI-1)	Partial	Address Loss of ECI Function During Secondary Break	Full
12	SSR-SD/S/R-VO	None	Yes (E^2OI-1)	Partial	Address Loss of SSR-SD/S/R-VO Function	Full
13	[SSR-SD/S/R-VO +ECR]	Partial	No	Partial	PRA Evaluation	Not Required † (12)
14	[SSR-SD/S/R-VO +ECI]		Yes (E^2OI-1)	Partial	PRA Evaluation	Not Required † (12 or 2)
15	[SSR-SD/S/R-VO +PPC-S/R-VO]	None	No	None	PRA Evaluation	Not Required † (12 or 6)
16	AFWS	Partial	Yes (E^2OI-2)	Full	Completed	Full
17	AFWS +ECR	Partial	Yes (E^2OI-2)	Partial	Address Loss of ECR Function	Full
18	AFWS +ECI	Partial	Yes (E^2OI-1 and E^2OI-2)	Partial	Modifications to E^2OI's	Full
19	AFWS +PPC-S/R-VR	Partial	Yes (E^2OI-2)	Full	Completed	Full
20	AFWS +PPC-S/R-VR +ECR	Partial	Yes (E^2OI-2)	Partial	Address Loss of ECR Function	Full
21	AFWS +PPC-S/R-VR +ECI	Partial	Yes (E^2OI-1 and E^2OI-2)	Partial	Modifications to E^2OI's	Full

† Reverts to sequence ( ) following PRA Evaluation, based upon combined functional failure probability.

SECONDARY BREAK EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage	Anticipated Method(s) of Resolution	Anticipated Final Coverage
22	AFWS +PPC-S/R-VO	Partial	Yes (E^2OI-2)	Full	Completed	Full
23	AFWS +SSR-SD/S/R-VR	Partial	Yes (E^2OI-2)	Full	Completed	Full
24	[AFWS +SSR-SD/S/R-VO]	Partial	Yes (E^2OI-2)	Partial	PRA Evaluation	Not Required † (16 or 12)
25	MSI	Partial	No	Partial	Address Multiple Steam Generator Blowdown	Full
26	MSI +ECI	Partial	Yes (E^2OI-1)	Partial	Address Multiple Steam Generator Blowdown	Full
27	MSI +PPC-S/R-VR	Partial	No	Partial	Address Multiple Steam Generator Blowdown	Full
28	MSI +PPC-S/R-VR +ECR	Partial	No	Partial	Address Loss of ECR	Full
29	MSI +PPC-S/R-VR +ECI	Partial	Yes (E^2OI-1)	Full	Completed	Full
30	MSI +PPC-S/R-VO	Partial	(2)	Partial	Address Multiple Steam Generator Blowdown	Full
31	MSI +AFWS	Partial	Yes (E^2OI-2)	Partial	Address Multiple Steam Generator Blowdown	Full

† Reverts to sequence ( ) following PRA Evaluation, based upon combined functional failure probability.

(2) This sequence is the same as sequence 25, refer also to first footnote

SECONDARY BREAK EVENT TREE
COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage	Anticipated Method(s) of Resolution	Anticipated Final Coverage
32	[MSI +AFWS +ECR]	Partial	Yes (E^2OI-2)	Partial	PRA Evaluation	Not Required † (17 or 25)
33	[MSI +AFWS +ECI]	Partial	Yes (E^2OI-1 and E^2OI-2)	Partial	PRA Evaluation	Not Required † (18 or 25)
34	MSI +AFWS -PPC-S/R-VR	Partial	Yes (E^2OI-2)	Full	Completed	Full
35	[MSI +AFWS +PPC-S/R-VR +ECR]	Partial	Yes (E^2OI-2)	Partial	PRA Evaluation	Not Required † (20 or 25)
36	[MSI +AFWS +PPC-S/R-VR +ECI]	Partial	Yes (E^2OI-1 and E^2OI-2)	Partial	PRA Evaluation	Not Required † (21 or 25)
37	[MSI +AFWS +PPC-S/R-VO]	Partial	Yes (E^2OI-2)	Partial	PRA Evaluation	Not Required † (31)
38	RPS	Partial	No	Partial	Address Loss of RPS Function	Full
39	EP	Partial	No	Partial	Address Loss of EP Function	Full

† Reverts to sequence ( ) following PRA Evaluation, based upon combined functional failure probability.

STEAM GENERATOR TUBE RUPTURE EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage	Anticipated Method(s) of Resolution	Anticipated + Final Coverage
1	Design Basis	Full	No	Full	Completed	Full
2	ECI Term	Partial	No	Partial	Address Loss of ECI Term Function	Full
3	PPC Spray	Full	No	Full	Completed	Full
4	ECI Term +PPC Spray	Partial	No	Partial	Address Loss of ECI Term Function	Full
5	PPC-S/R-VR +PPC Spray	Partial	No	Partial	Modifications to EOI's	Full
6	ECI Term* +PPC-S/R-VR +PPC Spray	Partial	Yes (E^2OI-1)	Partial	Address Loss of ECI Term* Function	Full
7	PPC-S/R-VO +PPC Spray	None	No	None	Address Loss of RCS Depressurization Function	Full
8	ECI Term +PPC-S/R-VO +PPC Spray	None	No	None	Address ECI Effects in Loss of RCS Depressurization Function	Full
9	SSR-SD/S/R-VR	Partial	No	Partial	Address SGTR with Secondary Depressurization	Full
10	ECI-Term* +SSR-SD/S/R-VR	Partial	Yes (E^2OI-1)	Partial	Address ECI effects in SGTR with secondary depressurization	Full

+ PRA impact not presently identified.

STEAM GENERATOR TUBE RUPTURE EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage	Anticipated Method(s) of Resolution	Anticipated + Final Coverage
11	SSR-SD/S/R-VO	Partial	Yes (E^2OI-1)	Partial	Address Loss of Secondary Depressurization Function	Full
12	ECI Term +SSR-SD/S/R-VO	Partial	Yes (E^2OI-1)	Partial	Address ECI effects on loss of Secondary Depressurization Function	Full
13	SSR-SD/S/R-VO +PPC Spray	Partial	Yes (E^2OI-1)	Partial	Address loss of Secondary Depressurization Function	Full
14	ECI Term +SSR-SD/S/R-VO +PPC Spray	Partial	Yes (E^2OI-1)	Partial	Address ECI effects on loss of Secondary Depressurization Function	Full
15	PPC-S/R-VR +PPC Spray +SSR-SD/S/R-VO	Partial	Yes (E^2OI-1)	Partial	Address loss of Secondary Depressurization Function	Full
16	ECI Term * +PPC-S/R-VR +PPC Spray +SSR-SD/S/R-VO	Partial	Yes (E^2OI-1)	Partial	Address ECI effects on loss of Secondary Depressurization Function	Full
17	PPC-S/R-VO +PPC Spray +SSR-SD/S/R-VO	Partial	Yes (E^2OI-1)	Partial	Address loss of RCS and/or Secondary Depressurization Functions	Full

+ PRA impact not presently identified.

STEAM GENERATOR TUBE RUPTURE EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage	Anticipated Method(s) of Resolution	Anticipated + Final Coverage
18	MSI Faulted SG	Partial	Yes (EOI's, Rev. 2)	Partial	Address Loss of MSI Function	Full
19	MSI Faulted SG +ECI Term	Partial	Yes (E^2OI-1 and (EOI's, Rev. 2)	Partial	Address ECI effects on Loss of MSI Function	Full
20	PPC Spray +MSI Faulted SG	Partial	Yes (EOI's, Rev. 2)	Partial	Address Loss of MSI Function	Full
21	ECI Term +PPC Spray +MSI Faulted SG	Partial	Yes (EOI's, Rev. 2)	Partial	Address ECI effects on Loss of MSI Function	Full
22	PPC-S/R-VR +PPC Spray +MSI Faulted SG	Partial	Yes (EOI's, Rev. 2)	Partial	Address Loss of MSI Function	Full
23	ECI Term* +PPC-S/R-VR +PPC Spray +MSI Faulted SG	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial	Address ECI effects on Loss of MSI Function	Full
24	PPC-S/R-VO +PPC Spray +MSI Faulted SG	None	Yes (EOI's, Rev. 2)	Partial	Address Loss of MSI Function and Loss of RCS Depressurization Function	Full
25	ECI Term +PPC-S/R-VO +PPC Spray +MSI Faulted SG	None	Yes (EOI's, Rev. 2)	Partial	Address ECI effects on Loss of MSI Function and Loss of RCS Depressurization Function	Full

+ PRA impact not presently identified.

STEAM GENERATOR TUBE RUPTURE EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage	Anticipated Method(s) of Resolution	Anticipated + Final Coverage
26	SSR-SD/S/R-VR +MSI Faulted SG	Partial	Yes (EOI's, Rev. 2)	Partial	Address Loss of MSI Function and Secondary Depressurization	Full
27	ECI Term* +SSR-SD/S/R-VR +MSI Faulted SG	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial	Address ECI effects on Loss of MSI Function and Secondary Depressurization	Full
28	SSR-SD/S/R-VO +MSI Faulted SG	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial	Address Loss of Secondary Depressurization and Loss of MSI Functions	Full
29	ECI Term +SSR-SD/S/R-VO +MSI Faulted SG	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial	Address ECI effects on Loss of Secondary Depressurization and Loss of MSI Functions	Full
30	PPC Spray + SSR-SD/S/R-VO +MSI Faulted SG	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial	Address Loss of Secondary Depressurization and Loss of MSI Function	Full
31	ECI Term +PPC Spray +SSR-SD/S/R-VO + MSI Faulted SG	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial	Address ECI effects on Loss of Secondary Depressurization and Loss of MSI Functions	Full

+ PRA impact not presently identified

STEAM GENERATOR TUBE RUPTURE EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage	Anticipated Method(s) of Resolution	Anticipated + Final Coverage
32	PPC-S/R-VR +PPC Spray +SSR-SD/S/R-VO +MSI Faulted SG	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial	Address Loss of Secondary Depressurization and Loss of MSI Function	Full
33	ECI Term* +PPC-S/R-VR +PPC Spray +SSR-SD/S/R-VO +MSI Faulted SG	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial	Address ECI effects on Loss of Secondary Depressurization and Loss of MSI Functions	Full
34	PPC-S/R-VO +PPC Spray +SSR-SD/S/R-VO +MSI Faulted SG	Partial	Yes (E^2OI-1 and EOI's, Rev. 2)	Partial	Address Loss of RCS and/or Secondary Depressurization Functions	Full
35	AFWS	Partial	Yes (E^2OI-2)	Full	Completed	Full
36	ECI Term* +AFWS	Partial	Yes (E^2OI-1 and E^2OI-2)	Partial	Address Loss of ECI Term* Function	Full
37	PPC-S/R-VR +AFWS	Partial	Yes (E^2OI-2)	Full	Completed	Full
38	ECI Term* +PPC-S/R-VR +AFWS	Partial	Yes (E^2OI-1 and E^2OI-2)	Partial	Address Loss of ECI Term* Function	Full
39	PPC-S/R-VO +AFWS	None	Yes (E^2OI-2)	Partial	Address Loss of RCS Depressurization Function	Full
40	MSI Faulted SG +AFWS	Partial	Yes (E^2OI-2 and EOI's, Rev. 2)	Partial	Address AFWS effects on Loss of MSI Function	Full

+ PRA impact not presently identified

STEAM GENERATOR TUBE RUPTURE EVENT TREE COVERAGE ANALYSIS

Sequence Number	Failed Functions	WCAP-9691 Coverage	Additional Coverage Since WCAP-9691 (Procedure)	Present Coverage	Anticipated Method(s) of Resolution	Anticipated Final Coverage +
41	ECI Term* +MSI Faulted SG +AFWS	Partial	Yes (E^2OI-1, E^2OI-2, and EOI's, Rev. 2)	Partial	Address ECI and AFWS effects on Loss of MSI Function	Full
42	PPC-S/R-VR +MSI Faulted SG +AFWS	Partial	Yes (E^2OI-2 and EOI's, Rev. 2)	Partial	Address AFWS effects on Loss of MSI Function	Full
43	ECI Term* +PPC-S/R-VR +MSI Faulted SG +AFWS	Partial	Yes (E^2OI-1, E^2OI-2, and EOI's, Rev. 2)	Partial	Address ECI and AFWS effects on Loss of MSI Function	Full
44	PPC-S/R-VO +MSI Faulted SG +AFWS	None	Yes (E^2OI-2 and EOI's, Rev. 2)	Partial	Address AFWS effects on Loss of RCS Depressurization and Loss of MSI Functions	Full
45	ECI	Partial	Yes (E^2OI-1)	Partial	Address Loss of ECI Function During SGTR	Full
46	RPS	Partial	No	Partial	Address Loss of RPS Function	Full
47	EP	Partial	No	Partial	Address Loss of EP Function	Full

+ PRA impact not presently identified

SUMMARY OF PROCEDURAL COVERAGE

		PRIOR TO WCAP-9691 SUBMITTAL	PRESENT COVERAGE* (2/20/81)	ANTICIPATED FINAL COVERAGE
LARGE LOCA	FULL	1	1	4
	NOT REQUIRED	-	-	0
	PARTIAL	3	3	0
	NONE	0	0	0
SMALL LOCA	FULL	2	10	17
	NOT REQUIRED	-	-	8
	PARTIAL	22	14	0
	NONE	1	1	0
SECONDARY BREAK	FULL	1	8	30
	NOT REQUIRED	-	-	9
	PARTIAL	35	30	0
	NONE	3	1	0
SGTR	FULL	2	4	UNKNOWN +
	NOT REQUIRED	-	-	UNKNOWN +
	PARTIAL	39	41	0
	NONE	6	2	0

* 79 OUT OF 115 SEQUENCES HAVE AUGMENTED COVERAGE

+ FINAL DIVISION OF SEQUENCES BETWEEN CATEGORIES DEPENDENT UPON RESULTS OF PRA EVALUATIONS

TREATMENT OF
CONTAINMENT INTERACTIONS

- PROCEDURES ARE BEING REVIEWED TO ASSURE THAT CRITICAL SAFETY FUNCTIONS RELATED TO CONTAINMENT INTEGRITY HAVE BEEN ADDRESSED

- NUMEROUS INSTANCES OF REQUIRED ACTION OR SURVEILLANCE STEPS RELATING TO CONTAINMENT EXIST IN EOIs

- INTERACTIONS BETWEEN PROCEDURES AND CONTAINMENT CONDITIONS WILL BE REVIEWED AND EVALUATED. PROCEDURE MODIFICATIONS WILL BE MADE WHERE REQUIRED

- CERTAIN PROPOSED CONTINGENCY PROCEDURES WILL CONTAIN ACTION STEPS WITH CONTAINMENT SIGNIFICANCE

- NO SPECIFIC INSTRUCTIONS RELATED TO DEGRADED CORE INTERACTIONS WILL BE DEVELOPED. REQUIREMENTS FOR THESE SITUATIONS WILL BE DEFINED THROUGH RULEMAKING IN THE FUTURE.

PROPOSED W OWNER'S GROUP ACTION PLAN

- A THREE PHASE APPROACH TO GUIDELINE DEVELOPMENT IS PROPOSED

- JULY 1, 1981
  - COMPLETE EVENT TREE PRA
  - MULTIPLE STEAM GENERATOR TUBE RUPTURE CONSIDERATIONS
  - SG TUBE RUPTURE WITH SECONDARY SIDE DEPRESSURIZATION
  - EOI AND E^2OI UPGRADE
  - LOSS OF ECR
  - ATWS

- JANUARY 1982
  - MULTIPLE STEAM GENERATOR BLOWDOWN
  - LOSS OF ALL AC POWER
  - SG TUBE RUPTURE WITH MSI CAPABILITY FAILURE

- MID-1982
  - SECONDARY SIDE RUPTURE WITHOUT HIGH HEAD SAFETY INJ.
  - SG TUBE RUPTURE WITHOUT PRIMARY PRESSURE CONTROL
  - SG TUBE RUPTURE ECI CONSIDERATIONS
  - SG TUBE RUPTURE WITHOUT SECONDARY PRESSURE CONTROL