

FARLEY NUCLEAR PLANT UNITS 1 AND 2
CONTAINMENT ISOLATION SYSTEM NOTEBOOK FOR
INDIVIDUAL PLANT EXAMINATION

Revision 0

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APPROVALS

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1.0 INTRODUCTION

The design of the Farley Nuclear Plant includes four barriers to prevent the release of significant fission products to the environment. These barriers are the ceramic fuel matrix, the fuel cladding, the reactor coolant system pressure boundary, and the containment structure. However, many postulated severe accident sequences result in the loss or degradation of the first three of these fission product barriers, leaving the containment structure as the only remaining barrier precluding the release of fission products to the environment. Furthermore, the Industry Degraded Core Program (IDCOR) has identified in Reference 1 that the offsite risks, expressed in terms of fission product releases to the atmosphere, may be dominated by those severe accident sequences in which the containment integrity cannot be established or maintained. Therefore, the purpose of this notebook is to determine the probability that containment isolation cannot be established or maintained during a severe accident.

2.0 SYSTEM DESCRIPTION

References 2a and 3 describe the containment isolation system. The properties of this system relevant to this notebook are summarized below.

2.1 Reactor Containment Structure

The reactor containment structure consists of a prestressed, reinforced concrete shield building with a $\frac{1}{2}$ inch thick, carbon steel liner attached to its inner surface. The containment structure is designed to withstand a maximum internal pressure of 54 psig and a temperature of 280 °F. An integrated leak rate test is performed at 40 ± 10 month intervals to verify the total leak rate from the containment structure is either not greater than 0.15% of total contained atmosphere by weight per day at 48.0 psig or not greater than 0.016% of total contained atmosphere by weight per day at 24 psig.

2.2 Reactor Containment Penetrations

There are 185 penetrations through the reactor containment structure. In order to minimize the release of radionuclides to the environment following an accident, the outboard side of all containment penetrations is contained within the penetration room except those listed below.

- o Containment Leak Rate Test Connections
- o Refueling Tube
- o Equipment Hatch
- o Personnel Access Lock
- o Auxiliary Access Lock
- o Main Steam and Feedwater Penetrations
- o Pressurizer Dead-weight Pressure Tester

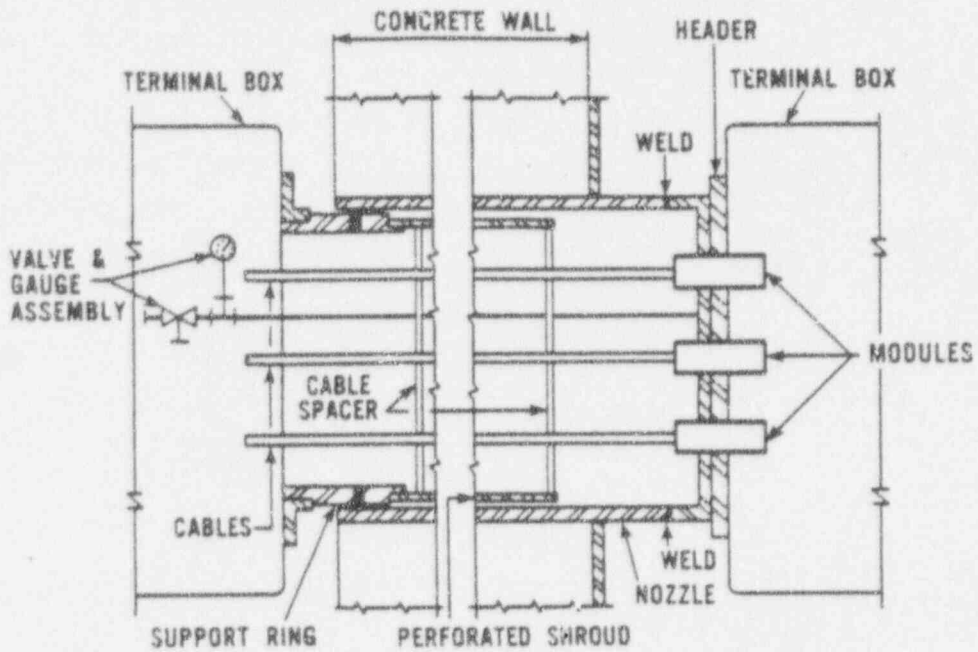
The penetration room is designed to limit the release of radionuclides to the environment following an accident through the use of a filtration system. Any airborne radioactivity which passes from containment into the penetration room through the penetration seals is forced through particulate and charcoal filters before it is released to the environment. The penetration room is also maintained at a slightly negative gauge pressure to preclude exfiltration of airborne radioactivity to the environment.

Electrical Penetrations

Electrical penetration assemblies consist of a header plate, cable supports, a cable cover shroud, and support ring, as shown in Figure 1. The header plate is welded to the liner penetrations and forms part of the containment pressure boundary, and the interfaces between individual cable modules and the header plate is sealed either with a weld or redundant epoxy barriers and metallic O-rings. The cables are supported throughout the shield building penetration nozzle by cable supports or spacers, and cable motion during short circuits is minimized. Finally, the support rings act as the transition piece for the penetration from containment into the penetration room.

ELECTRICAL PENETRATIONS

TYPICAL LOW VOLTAGE POWER, CONTROL, & INSTRUMENTATION PENETRATION



TYPICAL 4160 VOLT POWER PENETRATION

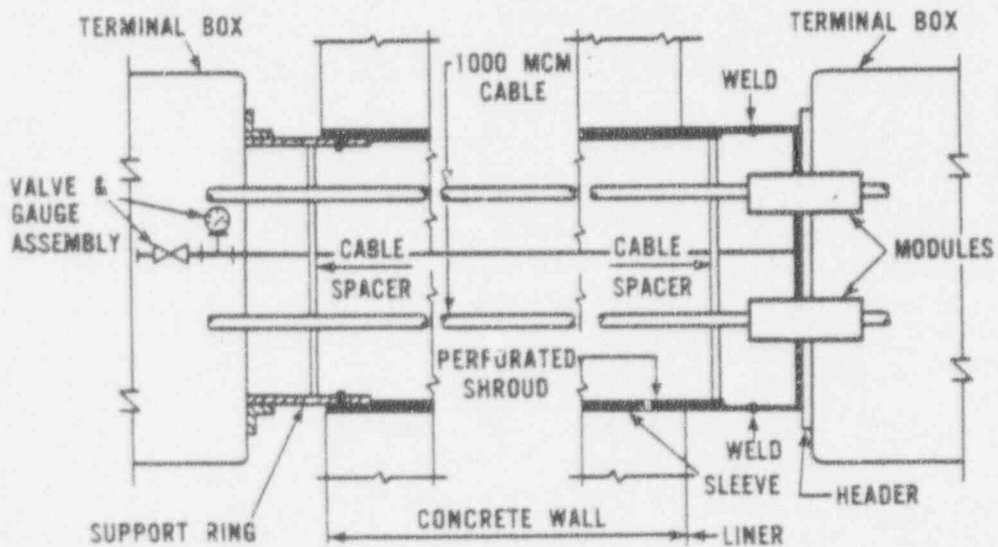


FIGURE 1

Piping Penetrations

A typical piping penetration assembly consists of a flanged head and integral pipe as shown in Figure 2. The head is welded to the penetration nozzle. The main steam and feedwater penetrations are of similar design and construction; the major difference being size and increased penetrations support. An instrument penetration is made up of a pipe cap with a socket weld coupling. The instrumentation or process pipe is welded to the coupling where it penetrates the cap. This type of penetration arrangement may have one or more pipes penetrating the same cap.

Fuel Transfer Tube

A fuel transfer penetration is provided for fuel movements between the refueling transfer canal in the reactor containment and the spent fuel pit and is shown in Figure 3. The penetration consists of a 20-inch pipe inside a 28-inch sleeve. The inner pipe acts as a transfer tube and is fitted with a double gasketed blind flange in the refueling canal and a gate valve in the spent fuel pool transfer canal. The outer tube is welded to the containment liner and spent fuel pool liner. Bellows expansion joints are welded to the inner tube and outer tube for normal and seismic differential building movements.

Hatches

An equipment hatch is provided which is fabricated from welded steel and furnished with a double-ended flange and bolted dished door (19 ft 6 in inside diameter). Equipment up to and including the size of the reactor vessel O-ring seal can be transferred into and out of containment via this hatch. The hatch barrel is welded to the liner.

CONTAINMENT PIPING PENETRATIONS

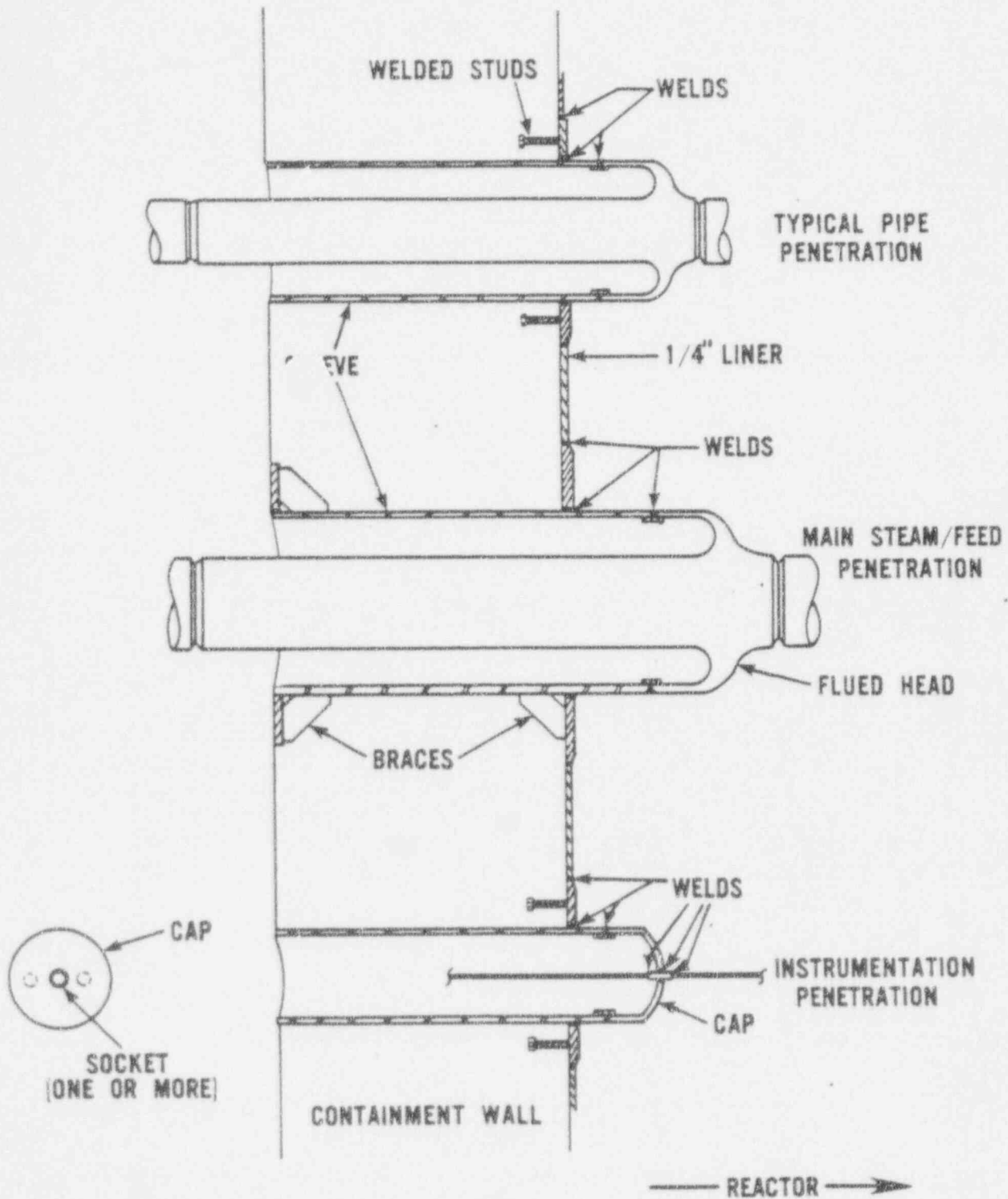


FIGURE 2

FUEL TRANSFER TUBE

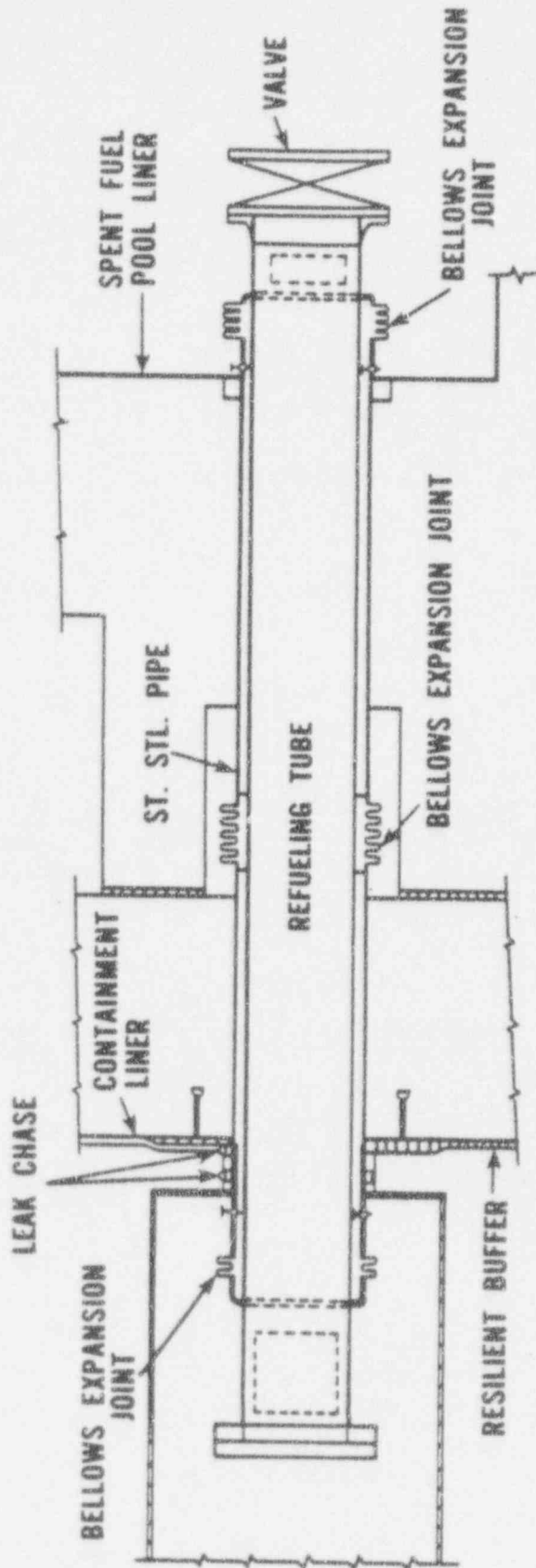


FIGURE 3

Two personnel locks are provided. One of these is for normal access. The other is an emergency escape hatch. Each personnel lock is a double door welded steel assembly. The two doors in each personnel lock are interlocked to prevent both being opened simultaneously and to ensure that one door is completely closed before the opposite door can be opened. A quick-acting type, equalizing valve connects the personnel lock with the interior of the containment structure for the purpose of equalizing pressure in the two systems when entering or leaving the containment.

2.3 Containment Isolation Valves

The general design basis governing containment isolation valve requirements is given in Reference 2a, and it is repeated here for completeness:

"Leakage through all fluid penetrations not serving accident consequence limiting systems is minimized by a double barrier so that no single credible failure or malfunction of an active component results in loss of isolation or intolerable leakage. The installed double barriers take the form of closed piping systems, both inside and outside of containment, and various types of isolation valves."

Isolation valve arrangements have been established to conform with General Design Criteria 55, 56, and 57. Simple check valves are not used as isolation valves outside containment.

2.4 Containment Isolation Valve Actuation

Containment isolation following an accident is accomplished in six stages, safety injection system actuation, automatic containment isolation phases A and B, steam line isolation, auxiliary feedwater pump start, and manual isolation, although the isolation stages need not necessarily follow this order.

Five containment isolation valves are closed upon receipt of a safety injection system actuation signal ("S" signal), and Table 1 lists these five

valves as well as the containment penetrations isolated by their closure. Any one of the five following conditions results in generation of an "S" signal:

- o Two out of three (2/3) Pressurizer Low Pressure (1850 psig)
- o Two out of four (2/4) High-1 Containment Building Pressure (4.0 psig)
- o Two out of three (2/3) High Steam Line Differential Pressure (100 psig)
- o Two out of three (2/3) Low Steam Line Pressure (585psig)
- o Manual actuation by operators

TABLE 1

CONTAINMENT ISOLATION VALVES AND PENETRATIONS ISOLATED ON SAFETY INJECTION ACTUATION ('S') SIGNAL

Index No.	Valve Identification No.	Penetration Number	Penetration Description
1	CCW-MOV-8107	24	Charging Line
2	CVC-MOV-8108		
3	SW-MOV-3135	60	Service water supply to reactor coolant pump motor air coolers
4	SW-MOV-3131	32	Service water return from reactor coolant pump motor air coolers
5	SW-MOV-3134		

Fifty containment and steam generator isolation valves are closed as part of the Automatic Containment Isolation Phase A. The closure of these fifty valves isolates all non-essential process lines. Table 2 lists these isolation valves and the containment penetrations isolated by their closure.

TABLE 2

CONTAINMENT/STEAM GENERATOR ISOLATION VALVES AND PENETRATIONS ISOLATED ON
CONTAINMENT ISOLATION PHASE A ('T') SIGNAL*

Index No.	Valve Identification No.	Penetration Number (from Ref. 2b)	Penetration Description
1	CVC-HV-8871	29	Accumulators test line
2	CVC-HV-8961		
3	CVC-HV-8880	63	Nitrogen Supply to Accumulators
4	RC-HV-8047	64a	Nitrogen supply to pressurizer relief tank
5	RC-HV-8033		
6	RC-HV-8028	30	Pressurizer relief tank make-up
7	LWP-LCV-1003	31	Reactor coolant drain tank drain
8	LWP-HV-7136		
9	CBV-MOV-3318A	70	Containment differential pressure instrument
10	CBV-MOV-3318B		
11	CVC-HV-8152	23	Normal letdown line
12	CVC-HV-8149A		
13	CVC-HV-8149B		
14	CVC-HV-8149C		
15	CVC-MOV-8100	28	Reactor coolant pump seal water return and excess letdown line
16	CVC-MOV-8112		
17	SS-HV-3104	56	Pressurizer steam sample line
18	SS-HV-3331		
19	SS-HV-3103	57	Pressurizer liquid sample line
20	SS-HV-3332		
21	SS-HV-3765	58	RCS hot leg sample line
22	SS-HV-3333		
23	CBV-HV-3657	53	Containment air sample-in
24	CEV-MOV-3660	54	Containment air sample-out
25	CBV-HV-3658		
26	CBV-HV-3198A	13	Containment main purge exhaust
27	CBV-HV-3196		

TABLE 2

CONTAINMENT ISOLATION VALVES AND PENETRATIONS ISOLATED ON
CONTAINMENT ISOLATION PHASE A ('T') SIGNAL, (cont.)

Index No.	Valve Identification No.	Penetration Number (from Ref. 2b)	Penetration Description
28	CBV-HV-3198D	12	Containment main purge supply
29	CBV-HV-3197		
30	LWP-HV-3376	78	Containment sump pumps discharge
31	LWP-HV-3377		
32	CCW-HV-3095	45	CCW supply to excess letdown HX and RCDT HX
33	CCW-HV-3443	46	CCW return from excess letdown HX and RCDT HX
34	CCW-HV-3067		
35	CVC-HV-8860	49	Accumulator make-up line
36	SS-HV-3766	50	Accumulator sample line
37	SS-HV-3334		
38	LWP-HV-7126	62	Hydrogen supply and vent header reactor coolant drain tank
39	LWP-HV-7150		
40	LWP-HV-3380	33	Containment sump pump sample recirculation
41	CTS-HV-3659	82	Demineralized water
42	CBV-HV-2867C	13a	Containment mini purge exhaust
43	CBV-HV-2867D		
44	CBV-HV-2866C	12a	Containment mini purge supply
45	CBV-HV-2866D		
46	QnN12HV3234A	2 (partial)	Steam from Steam Generator B to Auxiliary Feedwater Pump Drive Warming Line
47	QnN12HV3234B	3 - Unit 1 (partial) 1 - Unit 2 (partial)	Steam from Steam Generator C to Auxiliary Feedwater Pump Drive Warming Line
48	QnN25V001A	4 - Unit 1 (partial) 6 - Unit 2 (partial)	Chemical Injection to Steam Generator A
49	QnN25V001B	5 (partial)	Chemical Injection to Steam Generator B

TABLE 2

CONTAINMENT ISOLATION VALVES AND PENETRATIONS ISOLATED ON
CONTAINMENT ISOLATION PHASE A ('T') SIGNAL, (cont.)

Index No.	Valve Identification No.	Penetration Number (from Ref. 2b)	Penetration Description
50	QnN25V001C	6 - Unit 1 (partial) 4 - Unit 2 (partial)	Chemical Injection to Steam Generator C

- Notes:
1. Valve Identification numbers containing an "n" represent two Valve TPNS Numbers, one with a "1" in place of the "n" (for unit 1) and one with a "2" in place of the "n" (for unit 2).
 2. The note "(partial)" in column 3 indicates that the tabulated valve is one of several, parallel isolation valves on the process line. For this reason, the containment penetration is not completely isolated by the closure of the tabulated valve. Please see Table 8 for a complete list of the isolation valves associated with each containment penetration.

The signal which accomplishes phase A isolation is referred to as a "T" signal. A "T" signal is generated automatically with a safety injection actuation signal ("S" signal), or a "T" signal can be generated manually.

Seven containment isolation valves are closed as part of Automatic Containment Isolation Phase B. The closure of these seven valves isolate the containment penetrations serving all essential process lines except those required for safe shutdown of the reactor. Table 3 lists these isolation valves and the containment penetrations isolated by their closure.

The signal which accomplishes phase B isolation is referred to as a "P" signal. A "P" signal is generated automatically with containment spray actuation, or a "P" signal can be generated manually. Containment spray actuation, in turn, is activated by one of the two following conditions:

- o Two out of four (2/4) High-3 Containment Building Pressure (27 psig)
- o Manual actuation by operators

TABLE 3

CONTAINMENT ISOLATION VALVES AND PENETRATIONS ISOLATED ON
CONTAINMENT ISOLATION PHASE B ('P') SIGNAL

Index No.	Valve Identification No.	Penetration Number (from Ref. 2b)	Penetration Description
1	CCW-MOV-3052	42	CCW supply to RCP thermal barriers and oil coolers
2	CCW-MOV-3046	44	CCW return from RCP oil coolers
3	CCW-MOV-3182		
4	CCW-HV-3184	43	CCW return from RCP thermal barriers
5	CCW-HV-3045		
6	IA-HV-3611	48	Instrument Air
7	Q1P19HV2228 (Unit 1) Q2P19V006 (Unit 2)	97B	Backup Air Supply to Pressurizer PORVs

Twelve steam generator isolation valves are closed on a steam line isolation actuation signal. The closure of these twelve valves isolates the main steam lines from the steam generators. Table 4 lists these twelve valves and the containment penetration isolated by their closure. A steam line isolation actuation signal is activated by any one of the following three conditions:

- o High steam line flow (2/3) in coincidence with low-low Tave (2/3)
- o Low steam line pressure (2/3 steam lines)
- o High-high (2/3) containment pressure
- o Manual activation of individual valves

TABLE 4

STEAM GENERATOR ISOLATION VALVES AND PENETRATIONS ISOLATED ON
STEAM LINE ISOLATION ACTUATION SIGNAL

Index No.	Valve Identification No.	Penetration Number (from Ref. 2b)	Penetration Description
1	QnN11V001A	1 - Unit 1 (partial) 3 - Unit 2 (partial)	Main Steam Line from Steam Generator A
2	QnN11V002A		
3	QnN11V003A		
4	QnN11V003D		
5	QnN11V001B	2 (partial)	Main Steam Line from Steam Generator B
6	QnN11V002B		
7	QnN11V003B		
8	QnN11V003E		
9	QnN11V001C	3 - Unit 1 (partial) 1 - Unit 2 (partial)	Main Steam Line from Steam Generator C
10	QnN11V002C		
11	QnN11V003C		
12	QnN11V003F		

- Notes:
1. Valve Identification numbers containing an "n" represent two Valve TPNS Numbers, one with a "1" in place of the "n" (for unit 1) and one with a "2" in place of the "n" (for unit 2).
 2. The note "(partial)" in column 3 indicates that the tabulated valve is one of several, parallel isolation valves on the process line. For this reason, the containment penetration is not completely isolated by the closure of the tabulated valve. Please see Table 8 for a complete list of the isolation valves associated with each containment penetration.

Nine generator isolation valves are closed on an auxiliary feedwater pump start signal. The start signal only senses start of the motor-driven AFW pumps; start of the turbine-driven pump does not cause isolation. The closure of these nine valves isolates the blowdown lines and blowdown sample lines from the steam generators. Table 5 lists these valves and the containment penetration isolated by their closure. An auxiliary feedwater pump start signal is activated by any one of the following four conditions:

- o Tripping of both steam generator feed pumps
- o Low-low water level signals from two out of three level transmitters on any one steam generator
- o A safety injection signal
- o Loss of offsite power

Forty-five containment and steam generator isolation valves are controlled manually through the course of a severe accident. Table 6 lists these isolation valves and the containment penetrations isolated by their closure.

2.5 Containment Isolation Support Systems

The support systems required to isolate the containment penetrations critical to this analysis are shown in Table 9.

TABLE 5

STEAM GENERATOR ISOLATION VALVES AND PENETRATIONS ISOLATED ON
AUXILIARY FEEDWATER PUMP START SIGNAL

Index No.	Valve Identification No.	Penetration Number (from Ref. 2b)	Penetration Description
1	QnG24V003A	9 - Unit 1 7 - Unit 2	Steam Generator Blowdown from Steam Generator A
2	QnG24V003B	8	Steam Generator Blowdown from Steam Generator B
3	QnG24V003C	7 - Unit 1 9 - Unit 2	Steam Generator Blowdown from Steam Generator C
4	QnP15HV3179A	51	Blowdown Sample from Steam Generator A
5	QnP15HV3179B		
6	QnP15HV3180A	52	Blowdown Sample from Steam Generator B
7	QnP15HV3180B		
8	QnP15HV3181A	53	Blowdown Sample from Steam Generator C
9	QnP15HV3181B		

Note: Valve Identification numbers containing an "n" represent two Valve TPNS Numbers, one with a "1" in place of the "n" (for unit 1) and one with a "2" in place of the "n" (for unit 2).

TABLE 6

CONTAINMENT/STEAM GENERATOR ISOLATION VALVES AND PENETRATIONS
ISOLATED MANUALLY DURING A SEVERE ACCIDENT*

Index No.	Valve Identification No.	Penetration Number (from Ref. 2b)	Penetration Description
1	QnG31V012	95	Refueling cavity supply
2	QnG21V005	31	Reactor coolant drain tank drain
3	RHR-MOV-8701A	16	Residual heat removal A loop pump suction
4	RHR-MOV-8702A	18	Residual heat removal B loop pump suction
5	QnP18V001	47	Service air and breathing air
6	QnP18V002		
7	CBV-MOV-3238	71	Leak rate test connection
8	CBV-MOV-3239	72	Leak rate test connection
9	RHR-MOV-8811A	11	Containment sump recirculation line to low-head injection pump A
10	RHR-MOV-8812A		
11	RHR-MOV-8811B	10	Containment sump recirculation line to low-head injection pump B
12	RHR-MOV-8812B		
13	CS-MOV-8826A	94	Containment sump-recirculating line to containment spray pump A
14	CS-MOV-8827A		
15	CS-MOV-8826B	93	Containment sump-recirculating line to containment spray pump B
16	CS-MOV-8827B		
17	QnB13V026B	64b	Pressurizer dead-weight pressure tester
18	CBV-MOV-3745B	61b	Post-accident containment sample-in
19	CBV-MOV-3835B		
20	CBV-MOV-3528C	61a	Post-accident containment sample-out
21	CBV-MOV-3528D		
22	CBV-MOV-3739B		
23	CBV-MOV-3745A	66	Post-accident containment sample-in
24	CBV-MOV-3835A		

TABLE 6

CONTAINMENT ISOLATION VALVES AND PENETRATIONS
CONTROLLED MANUALLY DURING A SEVERE ACCIDENT, (cont.)

Index No.	Valve Identification No.	Penetration Number (from Ref. 2b)	Penetration Description
25	CBV-MOV-3528A	67	Post-accident containment sample-cut
26	CBV-MOV-3528B		
27	CBV-MOV-3739A		
28	CBV-MOV-3740	103	Post-accident containment venting
29	CBV-MOV-3530		
30	Q2P18V004	79	Breathing air (Unit 2 only)
31	Q2P18V005		
32	QnN12V001A-A	2 (partial)	Steam to Auxiliary Feedwater Pump Turbine Drive from Steam Generator B
33	QnN12V001B-B	3 - Unit 1 (partial) 1 - Unit 2 (partial)	Steam to Auxiliary Feedwater Pump Turbine Drive from Steam Generator C
34	QnN11PV3371A	1 - Unit 1 (partial) 3 - Unit 2 (partial)	Steam to Atmospheric Relief from Steam Generator A
35	QnN11PV3371B	2 (partial)	Steam to Atmospheric Relief from Steam Generator B
36	QnN11PV3371C	3 - Unit 1 (partial) 1 - Unit 1 (partial)	Steam to Atmospheric Relief from Steam Generator C
37	QnN21V001A-B	4 - Unit 1 (partial) 6 - Unit 2 (partial)	Feedwater to Steam Generator A
38	QnN23V011A		
39	QnN21V001B-B	5 (partial)	Feedwater to Steam Generator B
40	QnN23V011B		
41	QnN21V001C-B	6 - Unit 1 (partial) 4 - Unit 2 (partial)	Feedwater to Steam Generator C
42	QnN23V011C		
43	QnN15HV3328	51	Steam Generator A Sample
44	QnN15HV3329	52	Steam Generator B Sample

TABLE 6

CONTAINMENT ISOLATION VALVES AND PENETRATIONS
CONTROLLED MANUALLY DURING A SEVERE ACCIDENT, (cont.)

Index No.	Valve Identification No.	Penetration Number (from Ref. 2b)	Penetration Description
45	QnP15HV3330	53	Steam Generator C Sample

- Notes:
1. Valve Identification numbers containing an "n" represent two Valve TPNS Numbers, one with a "1" in place of the "n" (for unit 1) and one with a "2" in place of the "n" (for unit 2).
 2. The note "(partial)" in column 3 indicates that the tabulated valve is one of several, parallel isolation valves on the process line. For this reason, the containment penetration is not completely isolated by the closure of the tabulated valve. Please see Table 8 for a complete list of the isolation valves associated with each containment penetration.

3.0 EVALUATION

3.1 Summary of Evaluation Methodology

The evaluation of containment isolation was performed using the methodology provided in the Westinghouse Containment Isolation Guidelines (Reference 4). These guidelines categorize all containment penetrations into three groups, electrical penetrations, mechanical penetrations, and fluid penetrations. The fluid penetrations are further classified as administratively controlled penetrations and non-administratively controlled penetrations.

Electrical Penetrations

Electrical penetrations are not explicitly modeled in this notebook for the following four reasons:

- o Electrical penetrations do not have "open/closed" positions; they are permanently sealed.
- o Electrical penetrations do not have the capability to carry radioactive fluids except under gross failure conditions.
- o Electrical penetrations are periodically leak tested.
- o The failure of electrical penetrations as a result of the accident conditions are considered in the evaluation of containment failure during an accident.

Mechanical Penetrations

The evaluation of potential failures of the mechanical and sealant materials for mechanical and fluid system penetrations is limited to only the personnel access penetration. This is the only mechanical penetration which may be "sealed" and "unsealed" during plant operations. All other mechanical and fluid system penetration mechanical and sealant materials do not have to be explicitly modeled in this evaluation of containment isolation for the following two reasons:

- o The mechanical and fluid system penetration mechanical and sealant materials are tested as part of the containment leakage surveillance to ensure compliance with the plant technical specifications. This provides a degree of assurance that the performance of the penetration is acceptable at the initiation of the accident.
- o The failure of sealant materials for mechanical and fluid system penetrations as a result of accident conditions are considered in the evaluation of containment failure during the accident.

Personnel Access and Administratively controlled Fluid System Penetrations

For the purposes of this analysis, administratively-controlled fluid system penetrations are defined as those systems which are not required to support normal operation of the plant. For these and the personnel access penetrations, the containment isolation failure probability can be entirely attributed to human error which results in a technical specification violation during plant operation. Reference 8 presents a review of all commercial power reactor unisolated containment events and gives an unisolated containment frequency of $1.2E-04$ per year for all administratively-controlled penetrations taken collectively. The value of $1.2E-04$ per year is believed to realistically reflect the conditions applicable to large dry PWR containments for administratively-controlled penetrations. For these reasons, $1.2E-04$ per year is the value used in this analysis as the isolation failure probability of the personnel access and administratively controlled fluid system penetrations. Beyond this probability of isolation failure, administratively controlled fluid system penetrations are not explicitly modeled in this notebook.

Non-Administratively-Controlled Fluid System Penetrations

Non-administratively-controlled fluid system penetrations are those fluid system penetrations needed to support normal operation and post-accident shutdown of the plant. Reference 4, Westinghouse Containment Isolation Guidelines, provides two further criteria for determining whether non-administratively controlled fluid system penetrations should be explicitly modeled in a containment isolation model. First, containment penetrations

less than 2 inches in diameter are considered too small to release a significant amount of fission products to the environment. This criterion is the direct adoption of a recommendation made in Reference 1 and further justified in Reference 21. Second, containment penetrations which are a part of a closed system either inside or outside containment pose no significant threat to containment isolation. This criterion is based on the small probability of two independent, low probability events occurring simultaneously, one event being the failure of a penetration's isolation valves to close and the other event being a pipe break in the closed system associated with that penetration. Please note that the consequences of pipe breaks resulting from an accident are examined as part of that accident.

Containment penetrations serving secondary system fluid pipes are excluded from explicit containment isolation consideration since the steam generator secondary side is a closed system inside containment for all accident sequences except a steam generator tube rupture (STGR) and steam/feedwater line breaks inside containment. In all steam generator tube rupture event sequences resulting in core damage, the containment is assumed to be bypassed through the ruptured U-tube and some secondary system containment penetration. However, since all other containment penetrations must be isolated during a SGTR in order to minimize the release of fission products following core damage, containment isolation is still modeled in the SGTR plant response tree (Reference 9). In steam/feedwater line breaks inside containment, isolation of the broken steam generator's containment penetrations is modeled directly in the plant response tree. Containment isolation is assumed to fail if the broken steam generator's secondary side is not isolated.

As discussed above, Reference 4 provides five screening criteria for identifying penetrations which do not require explicit modeling to determine their impact on containment isolation. These criteria are summarized in Table 7.

Criterion 6 in Table 7 is not from Reference 4, so it is discussed here. Criterion 6 applies to penetrations whose only containment leakage pathways are from containment sump suction lines to the RWST. During accident sequences in which the RWST does not empty, any leakage of containment gases

through these penetrations would enter the bottom of the full RWST and be scrubbed by the water in the RWST before escaping to the environment. During accident sequences in which the RWST is emptied into containment, the sump suction lines would be submerged. In this case any leakage from containment through these penetrations would consist of water being forced back to the RWST. In either case, any fission products passing through these penetrations would be scrubbed by several feet of water and would not present a significant release hazard. Therefore, penetrations whose only containment leakage pathways are from containment sump suction lines to the RWST do not have to be explicitly modeled in this containment isolation analysis.

TABLE 7

SCREENING CRITERIA TO IDENTIFY CONTAINMENT PENETRATIONS
NOT EXPLICITLY MODELED IN THIS CONTAINMENT ISOLATION ANALYSIS

<u>Criterion Number</u>	<u>Description</u>
1	Containment penetrations less than two inches in diameter are not considered significant sources of leakage, unless the penetration serves a containment sump line. (See also criterion 5)
2	Electrical Containment Penetrations are not considered significant sources of leakage.
3	Administratively-Controlled Mechanical and Fluid System containment penetrations are considered separately in this analysis.
4	Penetrations of Systems closed to both the RCS and Containment atmosphere are not considered significant sources of leakage.
5	Penetrations of Systems closed to the environment outside of containment are not considered significant sources of leakage.
6	Penetrations whose only containment leakage pathways are from containment sump suction lines to the RWST are not considered significant sources of fission product leakage to the environment.

3.2 Identification of Containment Penetrations Critical to Containment Isolation

Reference 2b provides the comprehensive list of containment penetrations used in this analysis. All containment penetrations were examined relative to the criteria presented in Table 7. Table 8 summarizes the results of these examinations. If a fluid system penetration met any of the criteria in Table 7, it was eliminated from further consideration in this analysis. Table 9 presents all containment penetrations which, per the screening criteria, require explicit modeling in this containment isolation analysis. Finally, Figures 4 through 10 present the containment-leakage flow paths of all critical (explicitly modeled) containment penetrations.

3.3 Identification of Isolation Requirements

Figures 4 through 10 show the component alignments needed for containment isolation failure through all critical penetrations identified in section 3.2 above. Table 9 provides the support system dependencies of all critical penetrations.

TABLE 8

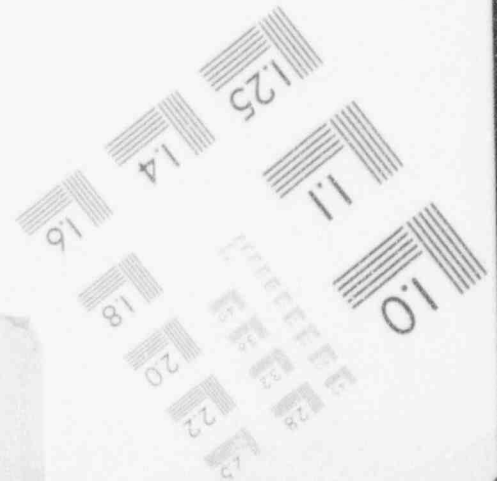
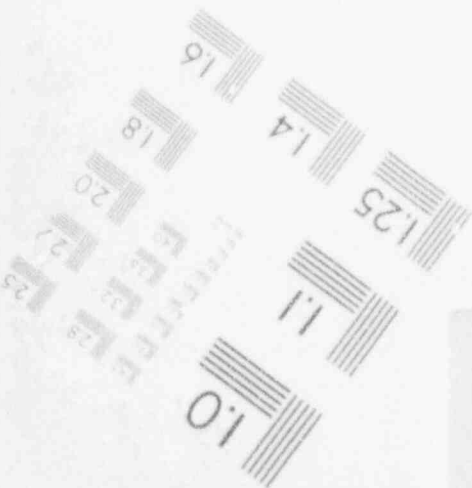
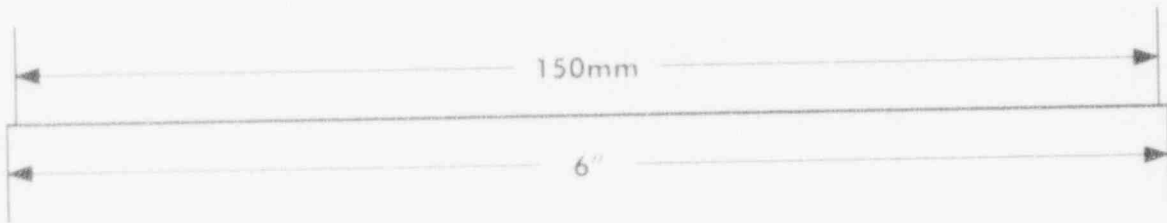
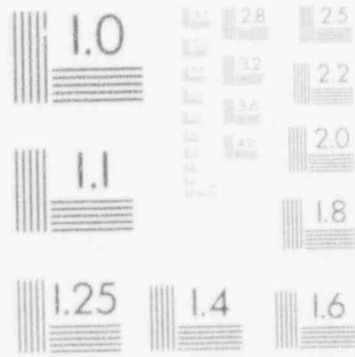
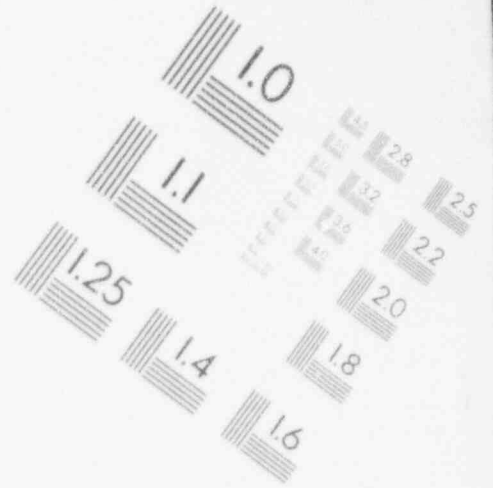
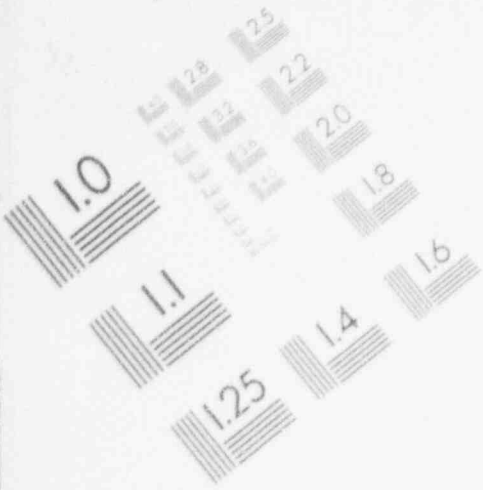
SCREENING OF CONTAINMENT PENETRATIONS
FOR SIGNIFICANCE TO CONTAINMENT ISOLATION ANALYSIS*

Ref. 2b Pene- tration Number	Description and Drawing Reference	Barrier and its Location (IC or OC)	Line Size (in.)	Valve Type	Isola- tion Signal	System Exposed		Applicable Screening Criterion Number
						IC	OC	
1-Unit 1 3-Unit 2	Main steam from SG A, D-(17/20)5033 Sh. 1	QnN11V001A, OC QnN11V002A, OC QnN11V003A, OC QnN11V003D, OC QnN11PV3371A, OC	32 32 3 3 6	AOV AOV AOV AOV AOV	SLIAS SLIAS SLIAS SLIAS Manual	SG -- SG -- SG	-- Turb -- Turb Atm	4, See Note 15
2	Main steam from SG B, D-(17/20)5033 Sh. 1	QnN11V001B, OC QnN11V002B, OC QnN11V003B, OC QnN11V003E, OC QnN11PV3371B, OC QnN12V001A-A, OC QnN12HV3234A, OC	32 32 3 3 6 3 1	AOV AOV AOV AOV AOV AOV AOV	SLIAS SLIAS SLIAS SLIAS Manual Manual T	SG -- SG -- SG SG SG	-- Turb -- Turb Atm FW FW	4, See Note 15
3-Unit 1 1-Unit 2	Main Steam from SG C, D-(17/20)5033 Sh. 1	QnN11V001C, OC QnN11V002C, OC QnN11V003C, OC QnN11V003F, OC QnN11PV3371C, OC QnN12V001B-B, OC QnN12HV3234B, OC	32 32 3 3 6 3 1	AOV AOV AOV AOV AOV AOV AOV	SLIAS SLIAS SLIAS SLIAS Manual Manual T	SG -- SG -- SG SG SG	-- Turb -- Turb Atm FW FW	4, See Note 15
4-Unit 1 6-Unit 2	Feedwater to SG A, D-(17/20)5073	QnN21V001A-B, OC QnN23V011A, OC QnN25V001A, OC	14 4 0.5	MOSCV MOSCV AOV	Manual Manual T	SG SG SG	FW AFW CIS	4, See Note 15
5	Feedwater to SG B, D-(17/20)5073	QnN21V001B-B, OC QnN23V011B, OC QnN25V001B, OC	14 4 0.5	MOSCV MOSCV AOV	Manual Manual T	SG SG SG	FW AFW CIS	4, See Note 15
6-Unit 1 4-Unit 2	Feedwater to SG C, D-(17/20)5073	QnN21V001C-B, OC QnN23V011C, OC QnN25V001C, OC	14 4 0.5	MOSCV MOSCV AOV	Manual Manual T	SG SG SG	FW AFW CIS	4, See Note 15

* See notes at end of table for abbreviations key

1

IMAGE EVALUATION TEST TARGET (MT-3)



1

IMAGE EVALUATION TEST TARGET (MT-3)

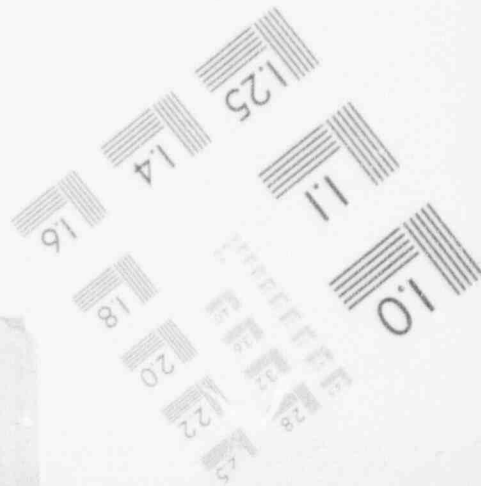
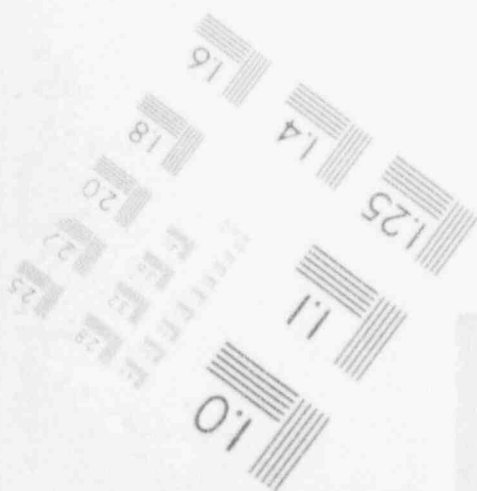
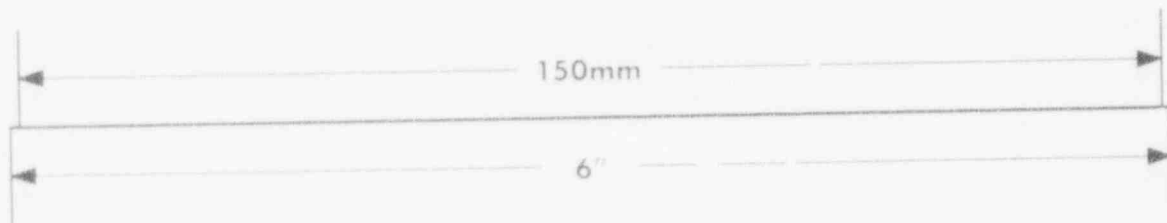
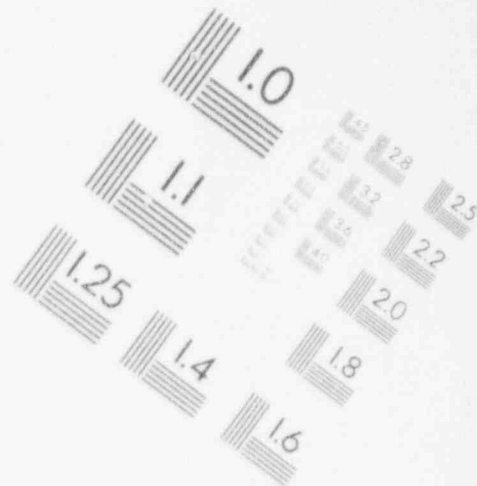
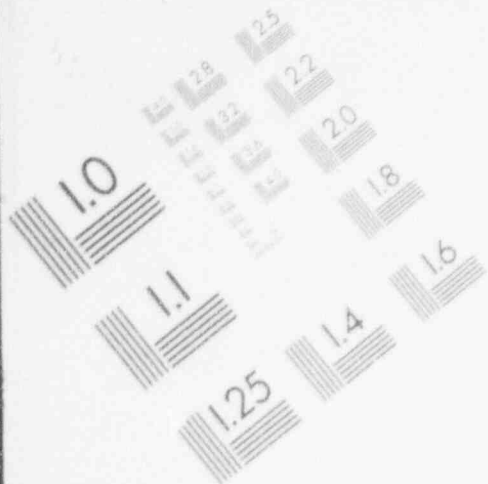


TABLE 8
 SCREENING OF CONTAINMENT PENETRATIONS
 FOR SIGNIFICANCE TO CONTAINMENT ISOLATION ANALYSIS (cont.)

Ref. 2b Pene- tration Number	Description and Drawing Reference	Barrier and its Location (IC or OC)	Line Size (in.)	Valve Type	Isola- tion Signal	System Exposed		Applicable Screening Criterion Number
						IC	OC	
7-Unit 1 9-Unit 2	Steam generator blowdown from SG C, D-(17/20)5071	QnG24V003C, OC	2	AOV	AFPSS	SG	Atm	4, See Note 15
8	Steam generator blowdown from SG B, D-(17/20)5071	QnG24V003B, OC	2	AOV	AFPSS	SG	Atm	4, See Note 15
9-Unit 1 7-Unit 2	Steam generator blowdown from SG A, D-(17/20)5071	QnG24V003A, OC	2	AOV	AFPSS	SG	Atm	4, See Note 15
10	Containment sump recirc. line to low-head SI pump B, D-(17/20)5038 Sh. 2	QnE11V025B, OC QnE11V026B, OC	14 14	MOV MOV	Manual Manual	Cont --	-- SIS	6
11	Containment sump recirc. line to low-head SI pump A, D-(17/20)5038 Sh. 2	QnE11V025A, OC QnE11V026A, OC	14 14	MOV MOV	Manual Manual	Cont --	-- SIS	6
12	Containment main purge supply, D-(17/20)5010 Sh. 1 & 2	QnP13V282, IC QnP13V281, OC	48 48	AOV AOV	T T	Cont --	-- Atm	3, See Note 12
12a	Containment mini purge supply, D-(17/20)5010 Sh. 1 & 2	QnP13V302, IC QnP13V301, OC	8 8	AOV AOV	T T	Cont --	-- Atm	Retained for Analysis
13	Containment main purge exhaust, D-(17/20)5010 Sh. 1 & 2	QnP13V283, IC QnP13V284, OC	48 48	AOV AOV	T T	Cont --	-- Atm	3, See Note 12
13a	Containment mini purge exhaust, D-(17/20)5010 Sh. 1 & 2	QnP13V304, IC QnP13V303, OC	8 8	AOV AOV	T T	Cont --	-- Atm	Retained for Analysis

TABLE 8
 SCREENING OF CONTAINMENT PENETRATIONS
 FOR SIGNIFICANCE TO CONTAINMENT ISOLATION ANALYSIS (cont.)

Ref. 2b Penetration Number	Description and Drawing Reference	Barrier and its Location (IC or OC)	Line Size (in.)	Valve Type	Isolation Signal	System Exposed		Applicable Screening Criterion Number
						IC	OC	
14	Fuel transfer tube, D-(17/20)5067	Blind Flange, IC	36	--	N/A	Cont	Atm	3
15	Residual heat removal A loop pump disc, D-(17/20)5041	QnE11V042B, IC QnE11V023B, OC	10 10	Check MOV	N/A Manual	Cont --	-- RHR	Retained for Analysis
16	Residual heat removal A loop pump suction, D-(17/20)5041	QnE11V001A, IC	12	MOV	Manual	Cont	RHR	Retained for Analysis
17	Residual heat removal B loop pump disc, D-(17/20)5041	QnE11V042A, IC QnE11V023A, OC	10 10	Check MOV	N/A Manual	Cont --	-- RHR	Retained for Analysis
18	Residual heat removal B loop pump suction, D-(17/20)5041	QnE11V001B, IC	12	MOV	Manual	Cont	RHR	Retained for Analysis
19	High-head injection to RCS cold legs, D-(17/20)5038 Sh. 1	QnE21V062A, IC QnE21V062B, IC QnE21V062C, IC QnE21V064A, OC QnE21V004B, OC	2 2 2 3 3	Check Check Check MOV MOV	N/A N/A N/A Manual Manual	RCS RCS RCS -- --	-- -- -- SIS SIS	Retained for Analysis
20	High-head injection to RCS cold legs, D-(17/20)5038 Sh. 1	QnE21V066A, IC QnE21V066B, IC QnE21V066C, IC QnE21V063, OC	2 2 2 3	Check Check Check MOV	N/A N/A N/A Manual	RCS RCS RCS --	-- -- -- SIS	Retained for Analysis
21	Containment spray A, D-(17/20)5038 Sh. 3	QnE13V002A, IC QnE13V005A, OC	8 8	Check MOV	N/A Manual	Cont --	-- Atm	Retained for Analysis
22	Containment spray B, D-(17/20)5038 Sh. 3	QnE13V002B, IC QnE13V005B, OC	8 8	Check MOV	N/A Manual	Cont --	-- Atm	Retained for Analysis

TABLE 8
SCREENING OF CONTAINMENT PENETRATIONS
FOR SIGNIFICANCE TO CONTAINMENT ISOLATION ANALYSIS (cont.)

Ref. 2b Pene- tration Number	Description and Drawing Reference	Barrier and its Location (IC or OC)		Line Size (in.)	Valve Type	Isola- tion Signal	System Exposed		Applicable Screening Criterion Number
							IC	OC	
23	Letdown line, D-(17/20)5039 Sh. 1	QnE21V253A,	IC	2	AOV	T	RCS	--	1, See Note 13
		QnE21V253B,	IC	2	AOV	T	RCS	--	
		QnE21V253C,	IC	2	AOV	T	RCS	--	
		QnE21V254,	OC	3	AOV	T	--	CVCS	
24	Charging line, D-(17/20)5039 Sh. 1 & 6	QnE21V119,	IC	3	Check	N/A	RCS	--	Retained for Analysis
		QnE21V257,	OC	3	MOV	S	--	CVCS	
		QnE21V258,	OC	3	MOV	S	--	CVCS	
25	Reactor coolant pump seal water-in RCP B, D-(17/20)5039 Sh. 1	QnE21V115B,	IC	2	Check	N/A	RCS	CVCS	1, See Note 1
26	Reactor coolant pump seal water-in RCP C, D-(17/20)5039 Sh. 1	QnE21V115C,	IC	2	Check	N/A	RCS	CVCS	1, See Note 1
27	Reactor coolant pump seal water-in RCP A, D-(17/20)5039 Sh. 1	QnE21V115A,	IC	2	Check	N/A	RCS	CVCS	1, See Note 1
28	Reactor coolant pump seal water return and excess letdown line, D-(17/20)5039 Sh. 1	QnE21V249A,	IC	3	MOV	T	RCS	--	1, See Note 10
		QnE21V213,	IC	3/4	Check	N/A	RCS	--	
		QnE21V249B,	OC	3	MOV	T	--	CVCS	
29	Accumulators test line, D-(17/20)5038 Sh. 2,	QnE21V049,	IC	3/4	AOV	T	SIS	--	1
		QnE21V050,	OC	3/4	AOV	T	--	SS	
30	Pressurizer relief tank make-up, D-(17/20)5037 Sh. 2,	QnB13V038,	IC	3	Check	N/A	PRT	--	Retained for Analysis
		QnB13V040,	OC	3	AOV	T	--	RMWST	
31	Reactor coolant drain tank drain D-(17/20)5042 Sh. 1,	QnG21V064,	IC	3	AOV	T	RCDT	--	1 & 4 See Note 2
		QnG21V005,	IC	3	Diaph	LC	RCDT	--	
		QnG21V006,	OC	3	AOV	T	--	WPS	

TABLE 8
 SCREENING OF CONTAINMENT PENETRATIONS
 FOR SIGNIFICANCE TO CONTAINMENT ISOLATION ANALYSIS (cont.)

Ref. 2b Pene- tration Number	Description and Drawing Reference	Barrier and its Location (IC or OC)		Line Size (in.)	Valve Type	Isola- tion Signal	System Exposed		Applicable Screening Criterion Number	
							IC	OC		
32	Service water return from reactor coolant pump motor air coolers, D-(17/20)5003 Sh. 2	QnP16V081, IC	6	MOV	S	S	SWS	--	4, See Note 3	
		QnP16V072, OC	6				--	SWS		
33	Containment sump pump sample recirculation, D-(17/20)5004 Sh. 1	QnG21V204, IC	2	Check AOV	N/A T	Cont	--	--	WPS	Retained for Analysis
QnG21HV3380, OC	2									
34	Service water supply to containment cooler A, D-(17/20)5003 Sh. 1	QnP16V206A, IC	12	Check MOV	N/A Manual	SWS	--	--	SWS	4
		QnP16V010A, OC	12							
35	Service water supply to containment cooler B, D-(17/20)5003 Sh. 1	QnP16V206B, IC	12	Check MOV	N/A Manual	SWS	--	--	SWS	4
		QnP16V010B, OC	12							
36	Service water supply to containment cooler C D-(17/20)5003 Sh. 1	QnP16V206C, IC	12	Check MOV	N/A Manual	SWS	--	--	SWS	4
		QnP16V010C, OC	12							
37	Service water supply to containment cooler D D-(17/20)5003 Sh. 1	QnP16V206D, IC	12	Check MOV	N/A Manual	SWS	--	--	SWS	4
		QnP16V010D, OC	12							
38	Service water return from containment cooler A D-(17/20)5003 Sh. 1	QnP16V207A, IC	10	MOV	Manual	SWS	--	--	SWS	4
		QnP16V043A, OC	10							
		QnP16V044A, OC	6							
39	Service water return from containment cooler B D-(17/20)5003 Sh. 1	QnP16V207B, IC	10	MOV	Manual	SWS	--	--	SWS	4
		QnP16V043B, OC	10							
		QnP16V044B, OC	6							
40	Service water return from containment cooler D D-(17/20)5003 Sh. 1	QnP16V207D, IC	10	MOV	Manual	SWS	--	--	SWS	4
		QnP16V043D, OC	10							
		QnP16V044D, OC	6							

TABLE 8
 SCREENING OF CONTAINMENT PENETRATIONS
 FOR SIGNIFICANCE TO CONTAINMENT ISOLATION ANALYSIS (cont.)

Ref. 2b Penetration Number	Description and Drawing Reference	Barrier and its Location (IC or OC)	Line Size (in.)	Valve Type	Isolation Signal	System Exposed		Applicable Screening Criterion Number
						IC	OC	
41	Service water return from containment cooler C D-(17/20)5003 Sh. 1	QnP16V207C, IC QnP16V043C, OC QnP16V044C, OC	10 10 6	MOV MOV MOV	Manual Manual Manual	SWS -- --	-- SWS SWS	4
42	CCW supply to RCP thermal barriers and oil coolers D-(17/20)5002 Sh. 2	QnP17V083, IC QnP17V082, OC	6 6	Check MOV	N/A P	CCW --	-- CCW	5, See Note 4
43	CCW return from RCP thermal barriers, D-(17/20)5002 Sh. 2	QnP17HV3184, IC QnP17HV3045, OC	3 3	AOV AOV	P P	CCW --	-- CCW	5, See Note 4
44	CCW return from RCP oil coolers, D-(17/20)5002 Sh. 2	QnP17V097, IC QnP17V099, OC	6 6	MOV MOV	P P	CCW --	-- CCW	5, See Note 4
45	CCW supply to excess letdown HX and RCDT HX, D-(17/20)5002, Sh. 2	QnP17V159, IC QnP17HV3095, OC	6 6	Check AOV	N/A T	CCW --	-- CCW	5, See Note 4
46	CCW return from excess letdown HX and RCDT HX, D-(17/20)5002, Sh. 2	QnP17HV3443, IC QnP17HV3067, OC	6 6	AOV AOV	T T	CCW --	-- CCW	5, See Note 4
47	Service air and breathing air, D-(17/20)5035 Sh. 1	QnP18V002, IC QnP18V001, OC	2 2	Globe Globe	LC LC	Cont --	-- SA	3, See Note 9
48	Instrument air, D-175034, Sh. 3 D-205034, Sh. 4 D-(17/20)5034, Sh. 2	QnP19V002, IC QnP19HV3611, OC	2 2	Check AOV	N/A P	IA --	-- IA	3, See Note 14
49	Accumulator make-up line, D-(17/20)5038 Sh. 2	QnE21V052, IC QnE21V091, OC	1 1	Check AOV	N/A T	Accm --	-- RWST	1
50	Accumulator sample line, D-(17/20)5009 Sh. 1	QnP15HV3766, IC QnP15HV3334, OC	3/8 3/8	AOV AOV	T T	Accm --	-- SS	1

TABLE 8
SCREENING OF CONTAINMENT PENETRATIONS
FOR SIGNIFICANCE TO CONTAINMENT ISOLATION ANALYSIS (cont.)

Ref. 2b Penetration Number	Description and Drawing Reference	Barrier and its Location (IC or OC)	Line Size (in.)	Valve Type	Isolation Signal	System Exposed		Applicable Screening Criterion Number
						IC	OC	
51	Steam generator A sample, D-(17/20)5009 Sh. 2	QnP15HV3179A, IC	3/8	AOV	AFPSS	SG	--	1
		QnP15HV3179B, IC	3/8	AOV	AFPSS	SG	--	
		QnP15HV3328, OC	3/8	AOV	Manual	--	SS	
52	Steam generator B sample, D-(17/20)5009 Sh. 2	QnP15HV3180A, IC	3/8	AOV	AFPSS	SG	--	1
		QnP15HV3180B, IC	3/8	AOV	AFPSS	SG	--	
		QnP15HV3329, OC	3/8	AOV	Manual	--	SS	
53	Steam generator C sample, D-(17/20)5009 Sh. 2	QnP15HV3181A, IC	3/8	AOV	AFPSS	SG	--	1
		QnP15HV3181B, IC	3/8	AOV	AFPSS	SG	--	
		QnP15HV3330, OC	3/8	AOV	Manual	--	SS	
54	Containment air sample out, D-(17/20)5010 Sh. 2	QnE14V002, IC	1	MOV	T	Cont	--	1
		QnE14HV3658, OC	1	AOV	T	--	SS	
55	Containment air sample in, D-(17/20)5010 Sh. 2	QnE14V001, IC	1	Check	N/A	Cont	--	1
		QnE14HV3657, OC	1	AOV	T	--	SS	
56	Pressurizer steam sample, D-(17/20)5009 Sh. 2	QnP15HV3104, IC	3/8	AOV	T	RCS	--	1
		QnP15HV3331, OC	3/8	AOV	T	--	SS	
57	Pressurizer liquid sample line, D-(17/20)5009 Sh. 1	QnP15HV3103, IC	3/8	AOV	T	RCS	--	1
		QnP15HV3332, OC	3/8	AOV	T	--	SS	
58	RCS hot leg sample line, D-(17/20)5009 Sh. 1	QnP15HV3765, OC	3/8	AOV	T	RCS	--	1
		QnP15HV3333, OC	3/8	AOV	T	--	SS	
59	Relief valve discharge to pressurizer relief tank, D-(17/20)5037, Sh. 2, D-(17/20)5038, Sh. 2, D-(17/30)5039, Sh. 2,	QnB13V054, IC	2	Check	N/A	PRT	--	1, See Note 11
		QnE21V263A, OC	1	SRV	N/A	--	CVCS	
		QnE21V263B, OC	1	SRV	N/A	--	CVCS	
		QnE11V039A, OC	1	SRV	N/A	--	RHR	
		QnE11V039B, OC	1	SRV	N/A	--	RHR	
		QnE11V040, OC	1	SRV	N/A	--	RHR	

TABLE 8
 SCREENING OF CONTAINMENT PENETRATIONS
 FOR SIGNIFICANCE TO CONTAINMENT ISOLATION ANALYSIS (cont.)

Ref. 2b Penetration Number	Description and Drawing Reference	Barrier and its Location (IC or OC)		Line Size (in.)	Valve Type	Isolation Signal	System Exposed		Applicable Screening Criterion Number
							IC	OC	
60	Service water supply to reactor coolant pump motor air coolers, D-(17/20)5003 Sh. 2	QnP16V075, IC	QnP16V071, OC	6 6	Check MOV	N/A S	SWS --	-- SWS	4, See Note 3
61A	Post-accident containment sample-out, D-(17/20)5019	QnE23V022C, IC	QnE23V022D, IC	3/4 3/4	MOV MOV	LC LC	Cont Cont	-- --	1
		QnE23V023B, OC		3/4	MOV	LC	--	Atm	
61B	Post-accident containment sample-in, D-(17/20)5019	QnE23V025B, IC	QnE23V024B, OC	3/4 3/4	MOV MOV	LC LC	Cont --	-- Atm	1
62	Hydrogen supply and vent header reactor coolant drain tank, D-(17/20)5042 Sh. 1	QnG21V082, IC	QnG21V001, OC	3/4 3/4	AOV AOV	T T	RCDT --	-- WPS	1
63	Nitrogen supply to accumulator tanks, D-(17/20)5038, Sh. 2,	QnE21V058, IC	QnE21V059, OC	1	Check AOV	N/A T	Accm --	-- N ₂	1
64A	Nitrogen supply to pressurizer relief tank, D-(17/20)5037	QnB13V037, IC	QnB13V039, OC	1 1	AOV AOV	T T	PRT --	-- N ₂	1
64B	Pressurizer dead-weight pressure tester, D-(17/20)5037	Pressure Sensor Diaphragm, IC	QnB13V026B, OC	3/8 3/8	-- Needle	N/A LC	RCS --	-- Atm	1 & 4
65	Containment pressure instrument	Containment Pressure Measuring Instrument		—	—	—	Cont	Atm	5, See Note 5
66	Post-accident containment sample in, D-(17/20)5019	QnE23V025A, IC	QnE23V024A, OC	3/4 3/4	MOV MOV	LC LC	Cont --	-- Atm	1

TABLE 8
 SCREENING OF CONTAINMENT PENETRATIONS
 FOR SIGNIFICANCE TO CONTAINMENT ISOLATION ANALYSIS (cont.)

Ref. 2b Pene- tration Number	Description and Drawing Reference	Barrier and its Location (IC or OC)	Line Size (in.)	Valve Type	Isola- tion Signal	System Exposed		Applicable Screening Criterion Number
						IC	OC	
67	Post-accident containment sample out, D- (17/20) 5019	QnE23V022A, IC QnE23V022B, IC QnE23V023A, OC	3/4 3/4 3/4	MOV MOV MOV	LC LC LC	Cont Cont --	-- -- Atm	1
68	Spare	Permanently Sealed	--	--	--	Cont	Atm	5
69	Spare	Permanently Sealed	--	--	--	Cont	Atm	5
70	Containment differential pressure inst., D- (17/20) 5010 Sh. 2	QnE14V004, IC QnE14V003, OC	1 1	MOV MOV	T T	Cont	-- Atm	1
71	Leak rate test, D- (17/20) 5010 Sh. 1	Blind Flange, IC QnP23V002A, OC	8 8	-- MOV	N/A Manual	Cont --	-- Atm	3, See Note 6
72	Leak rate test, D- (17/20) 5010 Sh. 1	Blind Flange, IC QnP23V002B, OC	8 8	-- MOV	N/A Manual	Cont --	-- Atm	3, See Note 6
73	Containment pressure instrument	Containment Pressure Measuring Instrument	--	--	--	Cont	Atm	5, See Note 5
74	Containment pressure instrument	Containment Pressure Measuring Instrument	--	--	--	Cont	Atm	5, See Note 5
75	Containment pressure instrument	Containment Pressure Measuring Instrument	--	--	--	Cont	Atm	5, See Note 5

TABLE 8
 SCREENING OF CONTAINMENT PENETRATIONS
 FOR SIGNIFICANCE TO CONTAINMENT ISOLATION ANALYSIS (cont.)

Ref. 2b Penetration Number	Description and Drawing Reference	Barrier and its Location (IC or OC)	Line Size (in.)	Valve Type	Isolation Signal	System Exposed		Applicable Screening Criterion Number
						IC	OC	
76	Containment pressure instrument	Containment Pressure Measuring Instrument	--	--	--	Cont	Atm	5, See Note 5
77	Spare	Permanently Sealed	--	--	--	Cont	Atm	5
78	Containment sump pump discharge, D-(17/20)5004 Sh. 1	QnG21V291, IC QnG21HV3376, IC QnG21HV3377, OC	3/4 3 3	Check AOV AOV	N/A T T	Cont Cont --	-- -- WPS	Retained for Analysis
79	Breathing Air (Unit 2 Only), D-205035 Sh. 1	Q2P18V005, IC Q2P18V004, OC	2 2	Globe Globe	LC LC	Cont --	-- SA	5
80	High-head injection to RCS hot legs, D-(17/20)5038 Sh. 1	QnE21V079A, IC QnE21V079B, IC QnE21V079C, IC QnE21V072, OC	2 2 2 3	Check Check Check MOV	N/A N/A N/A Manual	RCS RCS RCS --	-- -- -- SIS	Retained for Analysis
81	High-head injection to RCS hot legs, D-(17/20)5038 Sh. 1	QnE21V078A, IC QnE21V078B, IC QnE21V078C, IC QnE21V068, OC	2 2 2 3	Check Check Check MOV	N/A N/A N/A Manual	RCS RCS RCS --	-- -- -- SIS	Retained for Analysis
82	Demineralized water, D-(17/20)5047	QnP11V002, IC QnP11V001, OC	3 3	Check AOV	N/A T	DWS --	-- DWS	4, See Note 7
83	Spare	Permanently Sealed	--	--	--	Cont	Atm	5
84	Equipment hatch	Blind Flange	234	--	N/A	Cont	Atm	3
85	Electrical, This Table Entry Represents 81 Actual Containment Penetrations	Mechanically Sealed	--	--	--	Cont	Atm	5

TABLE 8
 SCREENING OF CONTAINMENT PENETRATIONS
 FOR SIGNIFICANCE TO CONTAINMENT ISOLATION ANALYSIS (cont.)

Ref. 2b Penetration Number	Description and Drawing Reference	Barrier and its Location (IC or OC)	Line Size (in.)	Valve Type	Isolation Signal	System Exposed		Applicable Screening Criterion Number
						IC	OC	
86	Personnel lock	Inner Door, IC Outer Door, OC	-- --	-- --	-- --	Cont --	-- Atm	3
87	Auxiliary access lock	Inner Door, IC Outer Door, OC	-- --	-- --	-- --	Cont --	-- Atm	3
88	Electrical ground	Mechanically Sealed	--	--	--	Cont	Atm	5
89	Spare	Permanently Sealed	--	--	--	Cont	Atm	5
90	Spare	Permanently Sealed	--	--	--	Cont	Atm	5
91	Spare	Permanently Sealed	--	--	--	Cont	Atm	5
92	Spare	Permanently Sealed	--	--	--	Cont	Atm	5
93	Containment sump recirc. line to cont. spray pump B, D-(17/20)5038 Sh. 3	QnE13V003B, OC QnE13V004B, OC	10 10	MOV MOV	Manual Manual	Cont --	-- SIS	6
94	Containment sump recirc. line to cont. spray pump A, D-(17/20)5038 Sh. 3	QnE13V003A, OC QnE13V004A, OC	10 10	MOV MOV	Manual Manual	Cont --	-- SIS	6
95	Refueling cavity supply, D-(17/20)5043	QnG31V013, IC QnG31V012, OC	2 2	Check Diaph	N/A LC	Cont --	-- Atm	1
96	Spare	Permanently Sealed	--	--	--	Cont	Atm	5

TABLE 8
 SCREENING OF CONTAINMENT PENETRATIONS
 FOR SIGNIFICANCE TO CONTAINMENT ISOLATION ANALYSIS (cont.)

Ref. 2b Pene- tration Number	Description and Drawing Reference	Barrier and its Location (IC or OC)	Line Size (in.)	Valve Type	Isola- tion Signal	System Exposed		Applicable Screening Criterion Number
						IC	OC	
97A	Containment pressure instrument	Containment Pressure Measuring Instrument	--	--	--	Cont	Atm	5, See Note 5
97B	Backup air supply to pressurizer PORV, D- (17/20) 5034	QnP19V004, IC (Unit 1)	1/2	Check	N/A	Cont	--	1
		Q1P19HV2228, OC (Unit 2)	3/4	AOV	P	--	IA	
		Q2P19V006, OC	3/4	AOV	P	--	IA	
98	Spare	Permanently Sealed	--	--	--	Cont	Atm	5
99	Spare	Permanently Sealed	--	--	--	Cont	Atm	5
100	Spare	Permanently Sealed	--	--	--	Cont	Atm	5
101	RHR injection to RCS hot legs, D- (17/20) 5038 Sh. 1 & 2	QnE21V076A, IC	6	Check	N/A	RCS	--	Retained for Analysis
		QnE21V076B, IC	6	Check	N/A	RCS	--	
		QnE11V044, OC	10	MOV	Manual	--	RHR	
102	Spare	Permanently Sealed	--	--	--	Cont	Atm	5
103	Post-accident containment venting, D- (17/20) 5019	QnE23V003, IC	6	MOV	LC	Cont	--	3, See Note 8
		QnE23V002, OC	6	MOV	LC	--	Atm	
104	Spare	Permanently Sealed	--	--	--	Cont	Atm	5

TABLE 8 (cont.)

TERMINOLOGY AND ABBREVIATIONS

1. P&ID drawing references containing "(17/20)" represent two drawings, one with a "17" in place of the "(17/20)" and one with a "20" in place of the "(17/20)". P&ID drawing numbers with a "17" after the "D-" correspond to Unit 1, and P&ID drawing numbers with a "20" after the "D-" correspond to Unit 2.
2. Barrier references containing an "n" represent two Valve TPNS Numbers, one with a "1" in place of the "n" (for unit 1) and one with a "2" in place of the "n" (for unit 2).
3. Valve type identifiers are used as follows:
 - AOV - Air Operated Valve
 - MOV - Motor Operated Valve
 - Diaph - Diaphragm valve
 - MOSCV - Motor Operated Stop Check Valve
 - SRV - Safety Relief Valve
4. Isolation signal identifiers are used as follows:
 - SLIAS - Steam Line Isolation Signal
 - Manual - Manually isolated from main control board
 - AFPSS - Auxiliary Feedwater Pump Start Signal
 - T - Containment Isolation Phase "A"
 - S - Safety injection actuation signal
 - P - Containment Isolation Phase "B"
 - LC - Locked Closed during operation
5. System identifiers are used as follows:
 - SG - Steam Generator secondary side
 - Turb - Main Turbine
 - FW - Feedwater system
 - AFW - Auxiliary Feedwater system
 - CIS - Chemical Injection system
 - Atm - Atmosphere Outside Containment
 - Cont - Containment atmosphere
 - SIS - Safety Injection system
 - RHR - Residual Heat Removal system
 - CVCS - Chemical and Volume Control System
 - RCS - Primary Reactor Coolant System
 - PRT - Pressurizer Relief Tank
 - RMWST - Reactor Makeup Water Storage Tank
 - WPS - Waste Processing System
 - SWS - Service Water System
 - CCW - Component Cooling Water system
 - SA - Service Air
 - IA - Instrument Air
 - Accm - Accumulators
 - N₂ - Compressed Nitrogen supply
 - RCDT - Reactor Coolant Drain Tank
 - DWS - Demineralized Water System

TABLE 8 (cont.)

NOTES

1. As seen on P&ID D-(17/20)5039 sh. 1, the seal water injection lines are reduced to 1.5 inch diameter lines near the reactor coolant pumps, and no other pipes connect to the seal water injection lines between the containment penetration and the reactor coolant pump. Therefore, the reactor coolant pump lines are essentially containment penetrations whose diameter is less than 2 inches.
2. From P&ID D-(17/20)5042 sh. 1 the reactor coolant drain tank drain can be considered a closed system inside of containment for the purposes of containment isolation analysis. The only connections with the reactor coolant drain tank are listed below:
 - o RCS cold leg, accumulator, and refueling canal drain lines
 - o Reactor vessel flange leakoff line
 - o RCP no. 2 seal leakoff lines
 - o RCDT Safety relief valve discharge lines to the containment sump
 - o PRT drain line to and fill line from the RCDT
 - o RCS excess letdown line
 - o Valve stem leakoff line

The RCS cold leg, accumulator, and refueling canal drain lines to the RCDT are isolated by normally closed, hand-operated valves. Also, the safety relief valves on the RCDT piping and the air operated valves on the PRT drain and fill lines are normally closed. Misalignment of these valves during operation would be detected by the RCS operational leakage detection system or by the inability to maintain accumulator, RCDT, or PRT level.

The combined flow area of the reactor vessel flange leakoff line (3/8"), RCP no. 2 seal leakoff lines (1/2" at the flow sensing element), and RCS excess letdown line (1") is only about 1.5 square inches. Also, the valve leakoff line only collects flow from the valve's stem packing (effective flow areas of only a fraction of a square inch). By criterion 1 of Table 5, these flowpaths do not present a significant pathway for fission product transport to the RCDT.

3. From P&ID D-(17/20)5003 sh. 2 and 3 the service water connections to the reactor coolant pump motor air coolers can be considered a closed system inside of containment for the purposes of containment isolation analysis.
4. Reference 2e states that the Component Cooling Water System is a closed system outside of containment.
5. Reference 2h indicates the containment pressure instruments form closed loops within the penetration room boundary.
6. Reference 2f indicates that the containment leak rate test penetrations are open only during scheduled plant shutdowns. Further, the monthly performance of STP-14.0, Reference 16, verifies the isolation of these penetrations.

TABLE 8 (cont.)

7. From P&ID D-175047 the demineralized water system can be considered a closed system inside of containment for the purposes of containment isolation analysis.
8. From P&ID D-175019 the post-accident containment venting penetration is locked closed. It can therefore be classified as an administratively-controlled penetration for the purposes of containment isolation.
9. From P&ID D-175035 the service air and breathing air penetration is locked closed inside of containment. It can therefore be classified as an administratively-controlled penetration for the purposes of containment isolation.
10. From P&ID D-175039 sh. 1 and Reference 5 the reactor coolant pump seal water return line is separated from the RCS by the number 1 RCP seals. Since the combined flow area through the number 1 RCP seals is much less than the flow area through a 2 inch pipe, this line can be eliminated from further containment isolation consideration per criterion number 1 of table 5.
11. From P&ID D-(17/20)5037 sh. 2 the piping of penetration 59 branches into 5 one-inch lines outside of containment. Two of these lines carry fluid from 3/4 inch pressure relief valves on the charging pump suction header, and the other three of these lines carry fluid from 3/4 inch pressure relief valves on the RHR pump discharge. Since the combined area of 5-3/4 inch lines is less than the area of one 2 inch line, penetration 59 can be eliminated from further containment isolation consideration.
12. Limiting Condition for Operation 3.6.1.7, References 10 and 11, states the 48 inch containment purge supply and exhaust lines must remain closed during operation. Therefore, these containment penetrations are isolated under administrative control. Further, the probability of their mispositioning is included in the 1.2E-4 per year probability that an administratively-controlled containment penetration is not isolated (see Section 3.1).
13. The normal letdown line passes through three, parallel letdown orifices. The combined flow area of the letdown orifices of Westinghouse Nuclear Steam Supply Systems is typically about 0.001 in.² per gpm of letdown capacity. Using the maximum letdown flowrate of 165 gpm from reference 12, the combined flow area of the FNP letdown orifices is about 0.165 in.². Therefore, the combined, effective flow area of the letdown lines is much less than the flow area of a 2 inch line.
14. The instrument air system is essentially a closed system inside containment since most air operated instruments and valves inside containment provide no significant, direct path out of containment. Air operated instruments and valves connected to the instrument air system usually confine the instrument air within a diaphragm, bellows, or piston and cylinder. Also, AOVs connected to the system usually employ a three way valve between itself and the instrument air supply. This three way valve acts to isolate the air supply line when the AOV is deactivated,

TABLE 8 (cont.)

allowing only the air trapped within the AOV to escape into containment. In addition, the instrument air supply penetration is only 2 inches in diameter. Therefore, the instrument air supply line does not present a significant pathway for the release of fission products to the environment.

15. The steam generator secondary side is a closed system inside containment for all accident sequences except a steam generator tube rupture. During a steam generator tube rupture, containment is assumed to be bypassed through the ruptured U-tube and some secondary system containment penetration.

TABLE 9

CONTAINMENT PENETRATIONS RETAINED FOR FURTHER
CONTAINMENT ISOLATION ANALYSIS*

Index No.	Penetration Number (Ref 2b)	Description	Fig. No.	Isol. Valve Inside Ctmt.	Line Size	Valve Type	Actuator Signal	Support System Dependency
				Isol. Valve Outside Ctmt.				
1	12a	Containment mini purge supply	5	QnP13V302	8	AOV	T	Fail closed on loss of power or loss of air
				QnP13V301	8	AOV	T	Fail closed on loss of power or loss of air
2	13a	Containment mini purge exhaust	5	QnP13V304	8	AOV	T	Fail closed on loss of power or loss of air
				QnP13V303	8	AOV	T	Fail closed on loss of power or loss of air
3	15	Residual heat removal A loop pump discharge	4	QnE11V042B	10	Check	N/A	none
				QnE11V023B	10	MOV	Manual	600V AC MCC U
4	16	Residual heat removal A loop pump suction	4	QnE11V001A	12	MOV	Manual	600V AC MCC U
				none		--	--	--
5	17	Residual heat removal B loop pump discharge	4	QnE11V042A	10	Check	N/A	none
				QnE11V023A	10	MOV	Manual	600V AC MCC V
6	18	Residual heat removal B loop pump suction	4	QnE11V001B	12	MOV	Manual	600V AC MCC U
				none		--	--	--

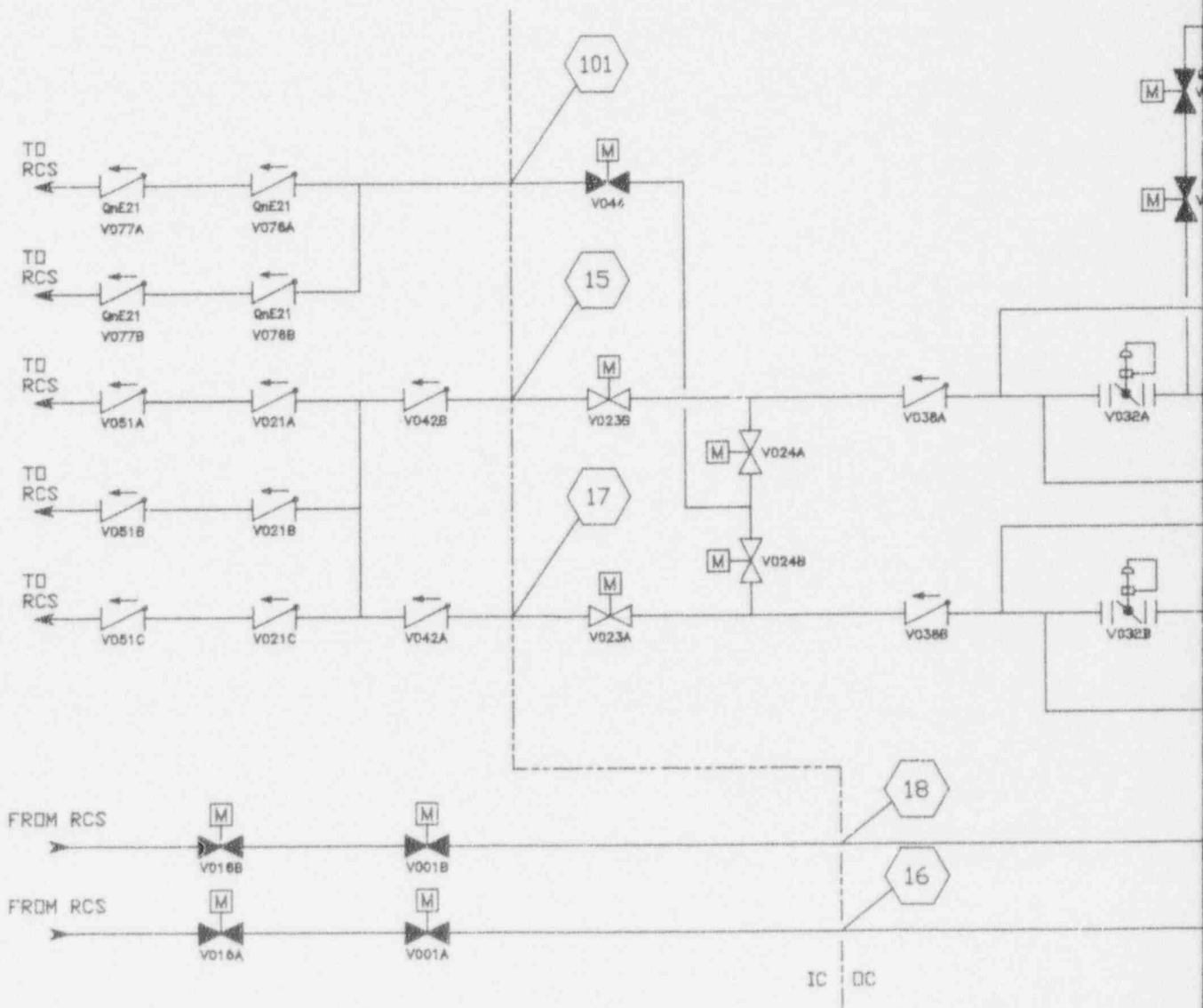
* See notes at end of Table 8 for abbreviations key

TABLE 9
CONTAINMENT PENETRATIONS RETAINED FOR FURTHER
CONTAINMENT ISOLATION ANALYSIS (cont.)

Index No.	Penetration Number (Ref 2b)	Description	Fig. No.	Isol. Valve Inside Ctmt.	Line Size	Valve Type	Actuator Signal	Support System Dependency
				Isol. Valve Outside Ctmt.				
7	19	High-head injection to RCS cold legs	6	QnE21V062A,B,C	2	Check	N/A	none
				QnE21V004A	3	MOV	S	600V AC MCC U
				QnE21V004B	3	MOV	S	600V AC MCC V
8	20	High-head injection to RCS cold legs	6	QnE21V066A,B,C	2	Check	N/A	none
				QnE21V063	3	MOV	Manual	600V AC MCC V
9	21	Containment spray A	7	QnE13V002A	8	Check	N/A	none
				QnE13V005A	8	MOV	CSAS	600V AC MCC U
10	22	Containment spray B	7	QnE13V002B	8	Check	N/A	none
				QnE13V005B	8	MOV	CSAS	600V AC MCC V
11	24	Charging line	8	QnE21V119	3	Check	N/A	none
				QnE21V257	3	MOV	S	600V AC MCC U
				QnE21V258	3	MOV	S	600V AC MCC V
12	30	Pressurizer relief tank make-up	9	QnB13V038	3	Check	N/A	none
				QnB13V040	3	AOV	T	Fail closed on loss of power or air
13	33	Containment sump pump sample recirculation	10	QnG21V204	2	Check	N/A	none
				QnG21HV3380	2	AOV	T	Fail closed on loss of power or loss of air

TABLE 9
CONTAINMENT PENETRATIONS RETAINED FOR FURTHER
CONTAINMENT ISOLATION ANALYSIS (cont.)

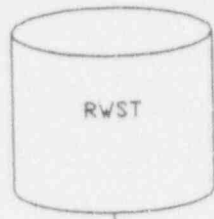
Index No.	Pene- tration Number (Ref 2b)	Description	Fig. No.	Isol. Valve Inside Ctmt.	Line Size	Valve Type	Actuator Signal	Support System Dependency
				Isol. Valve Outside Ctmt.				
14	78	Containment sump pumps discharge	10	QnG21V291	3/4 3	Check AOV	N/A T	none
				QnG21HV3376				Fail closed on loss of power or loss of air
				QnG21HV3377	3	AOV	T	Fail closed on loss of power or loss or air
15	80	High-head injection to RCS hot legs	6	QnE21V079A,B,C	2	Check	N/A	none
				QnE21V072	3	MOV	Manual	600V AC MCC U
16	81	High-head injection to RCS hot legs	6	QnE21V078A,B,C	2	Check	N/A	none
				QnE21V068	3	MOV	Manual	600V AC MCC V
17	101	RHR injection to RCS hot legs	4	QnE21V076A,B	6	Check	N/A	none
				QnE11V044	10	MOV	Manual	600V AC MCC V



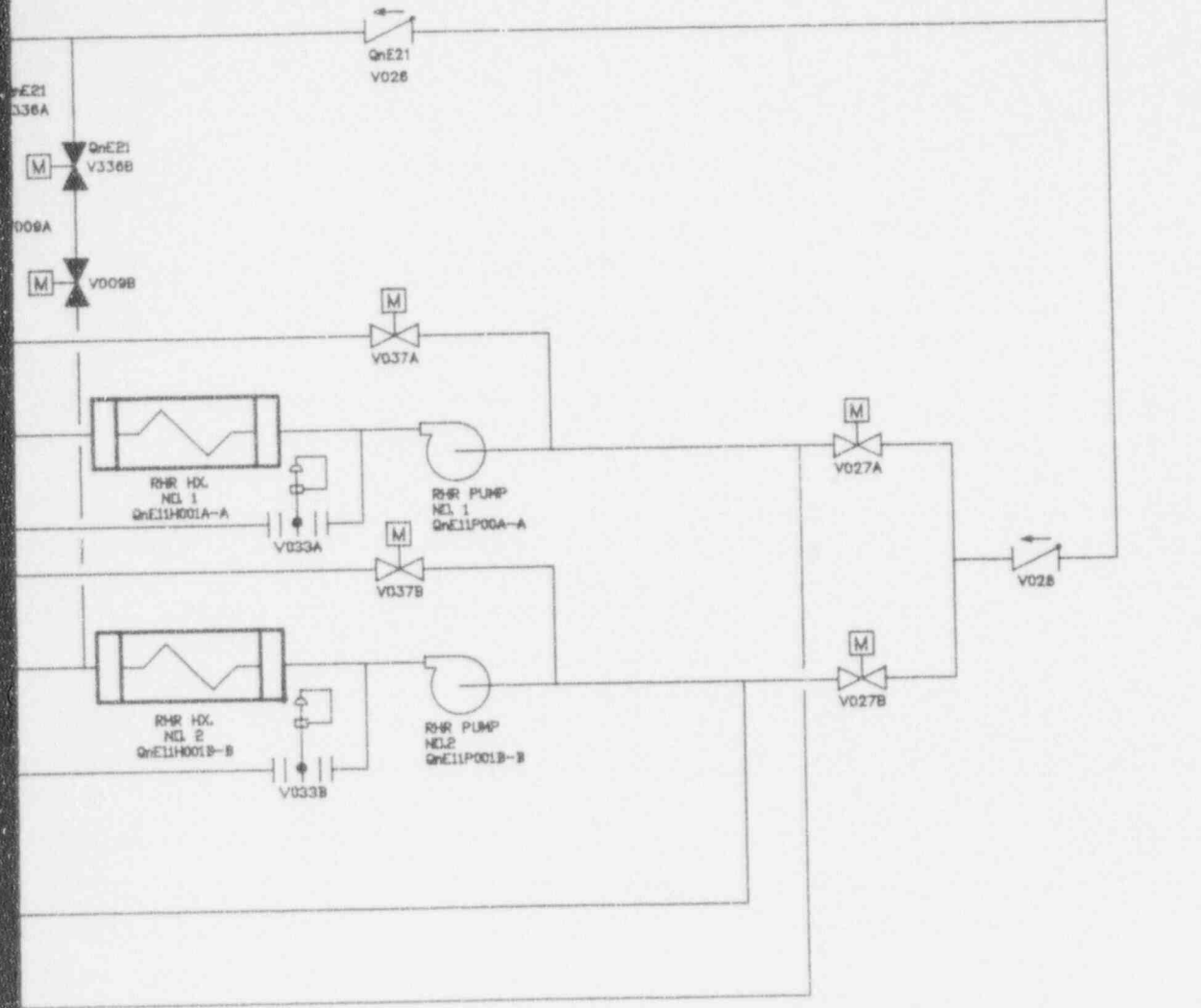
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NOTE: ALL VALVE NUMBERS ARE PREFIXED BY QnE11 UNLESS OTHERWISE NOTED

REF. DWG. D-(17/20)5038 SH.2
D-(17/20)5041

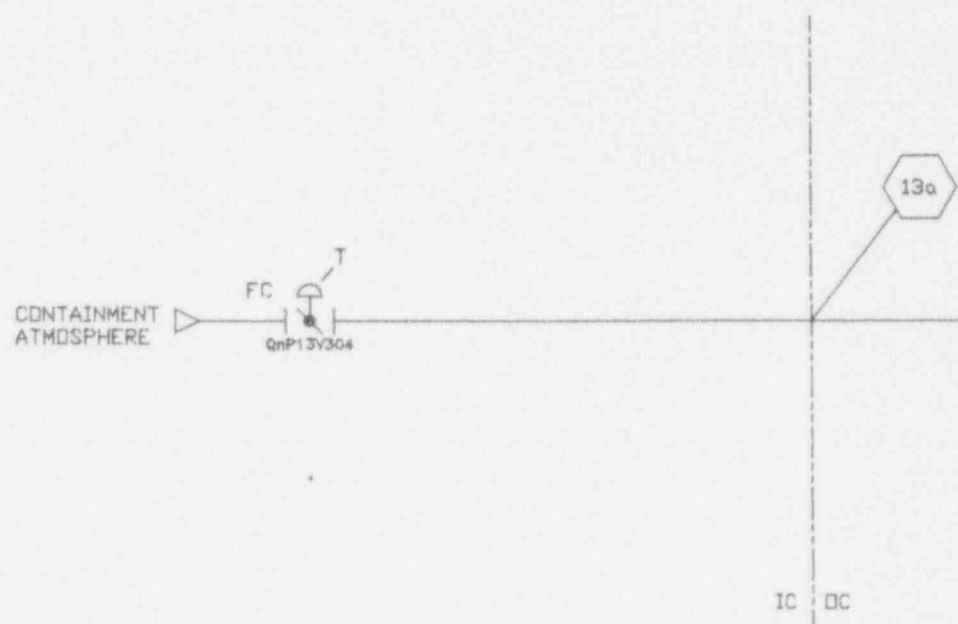
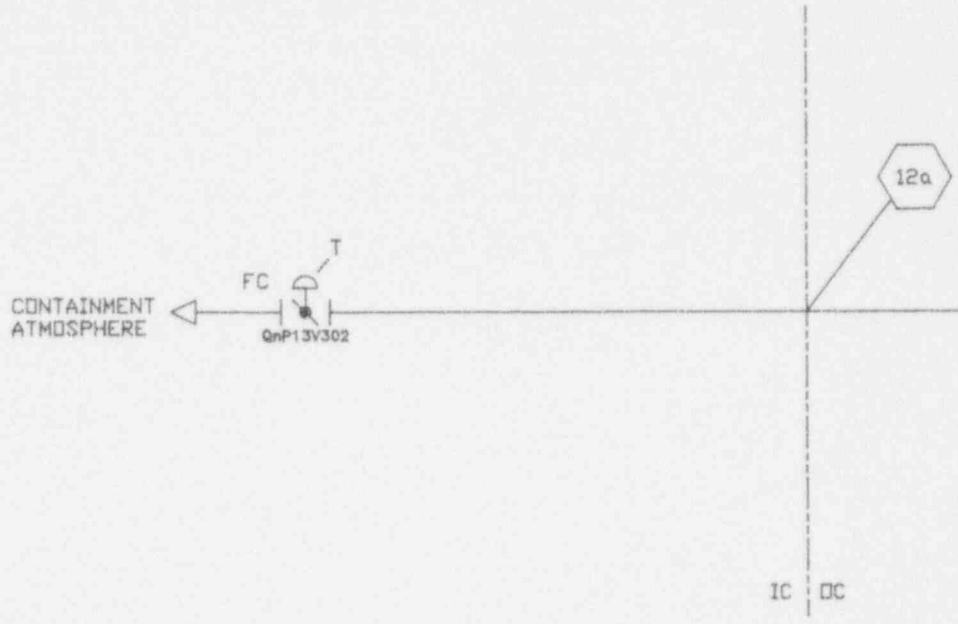


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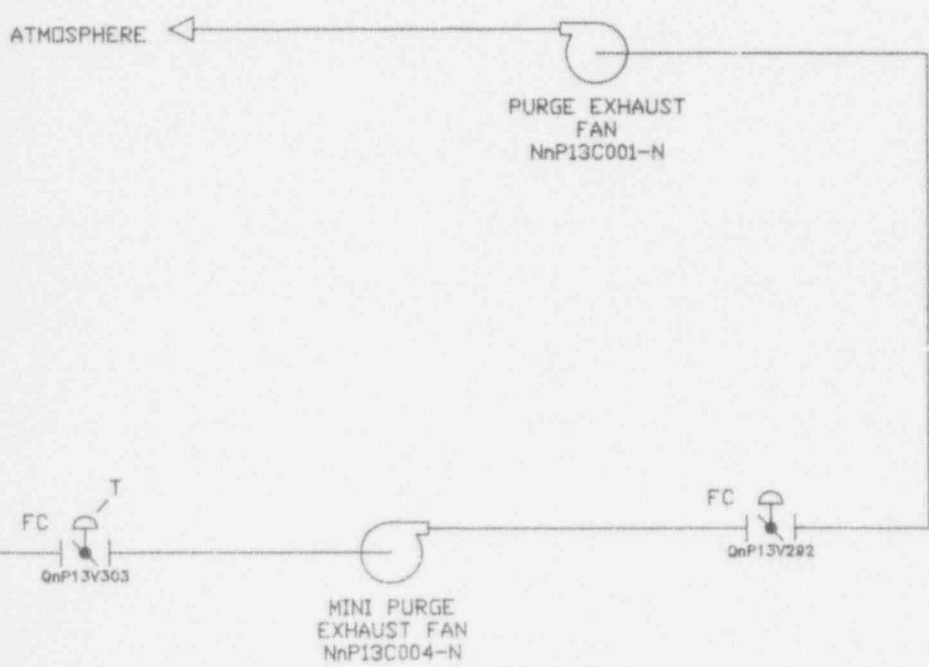
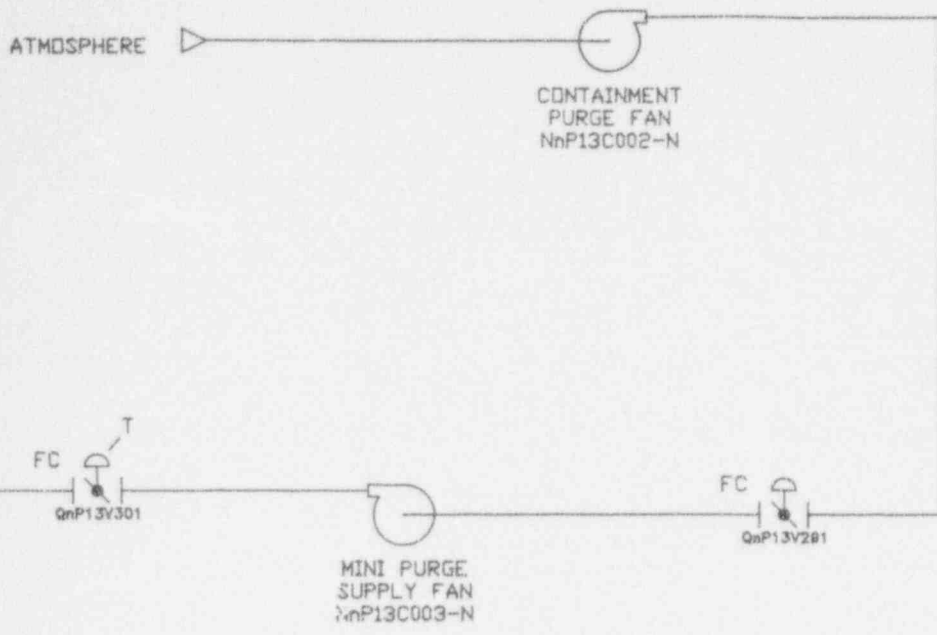
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FIGURE 4
FARLEY NUCLEAR PLANT
POTENTIAL CONTAINMENT BYPASS FLOWPATHS THROUGH
CONTAINMENT PENETRATIONS 15, 16, 17, 18 AND 101



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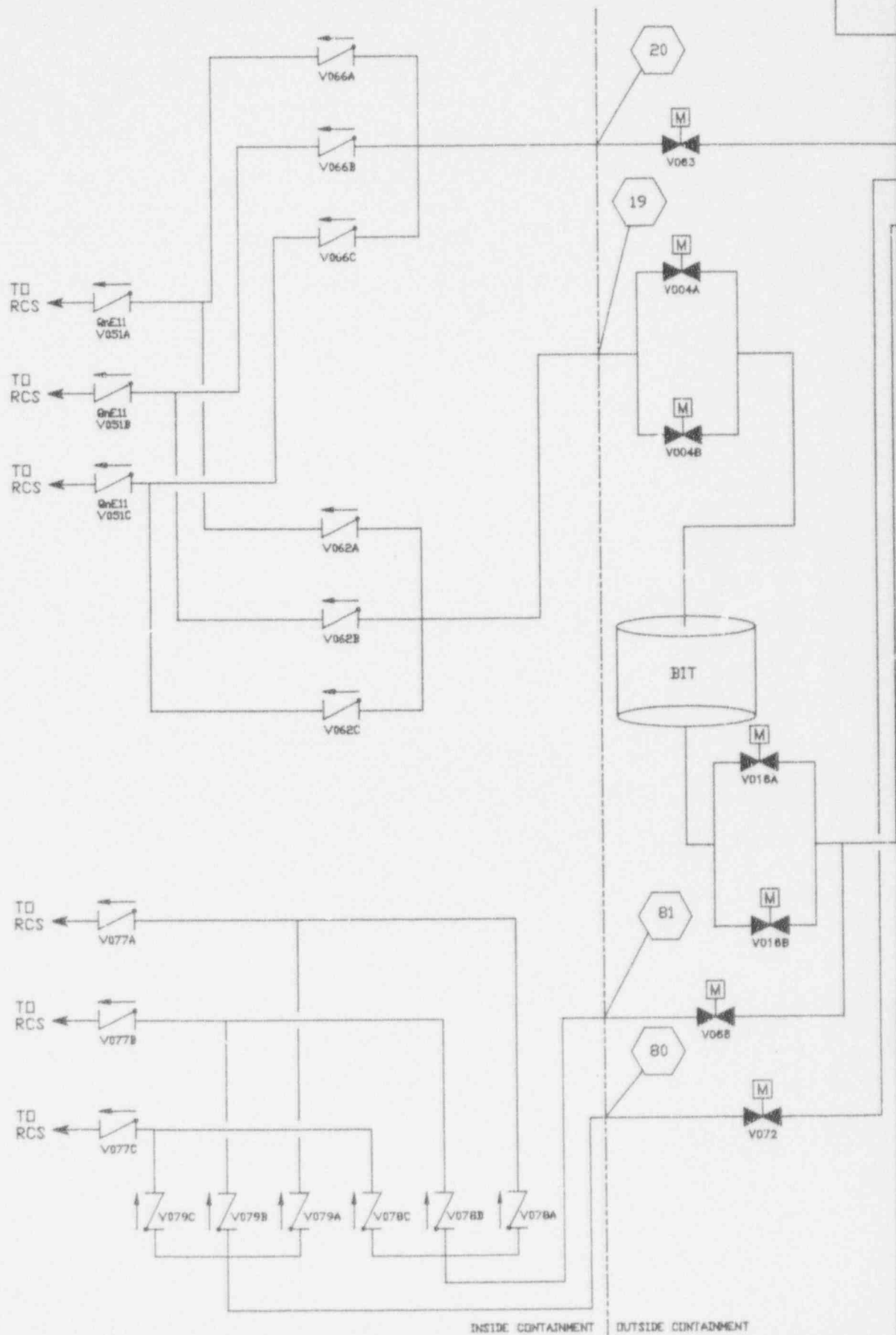
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REF. D-(17-20)5010 SH 1&2

FIGURE 5
FARLEY NUCLEAR PLANT
POTENTIAL CONTAINMENT BYPASS FLOWPATHS
THROUGH CONTAINMENT PENETRATIONS 12a AND 13a

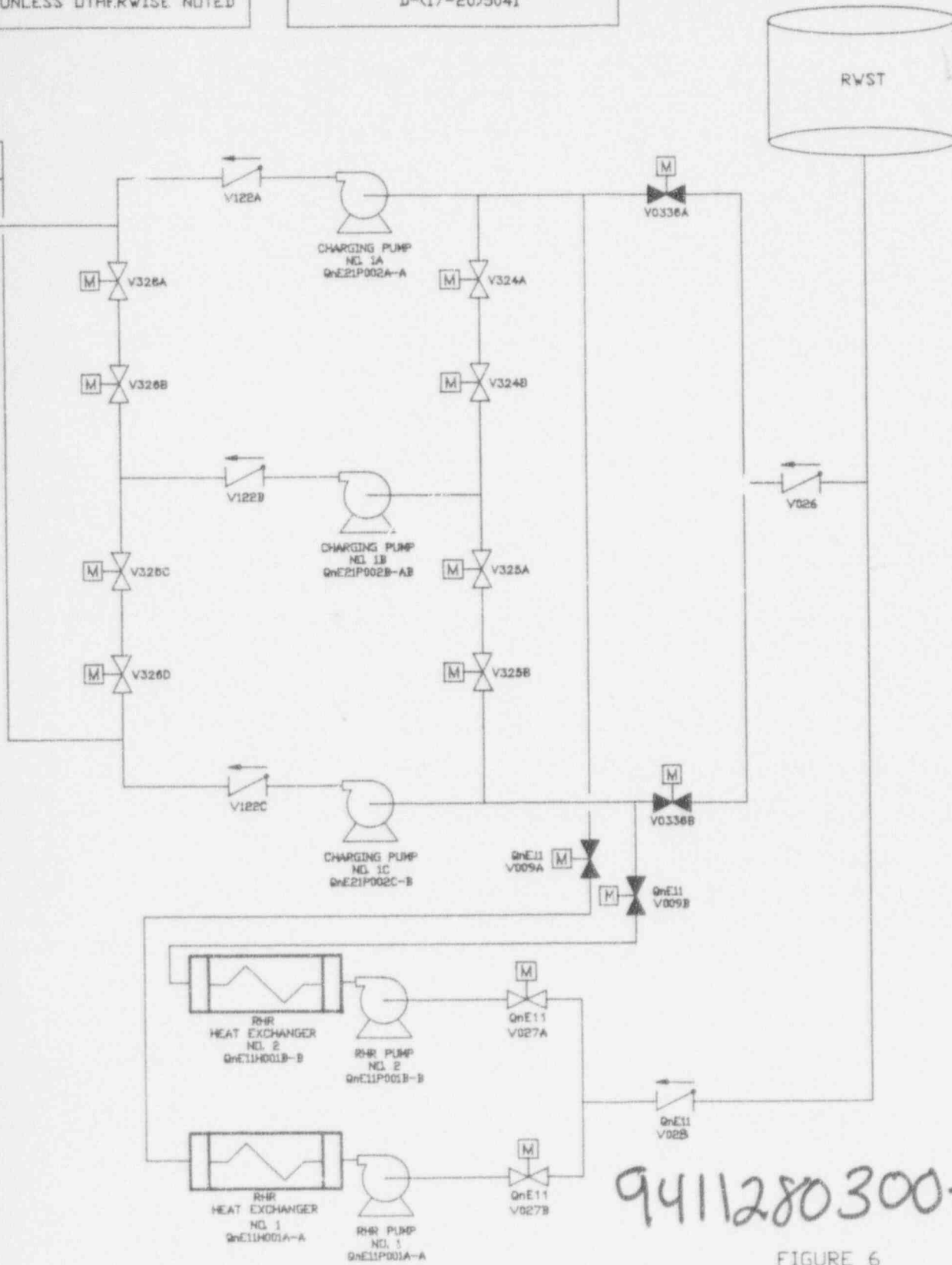


ALL VALVE NUMBERS
ARE PREFIXED WITH QnE21
UNLESS OTHERWISE NOTED

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D-(17-20)5039 SH 6
D-(17-20)5041

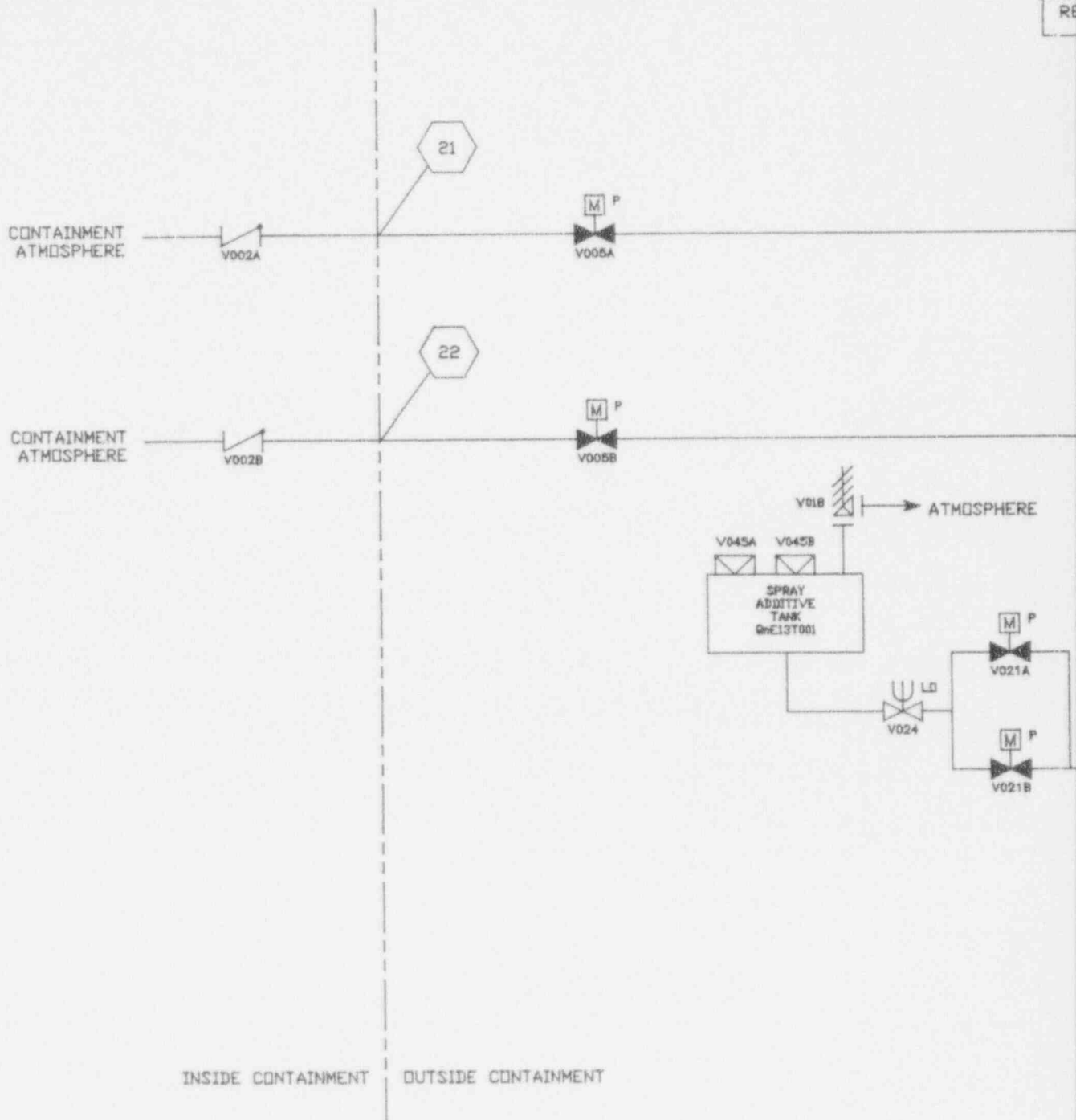
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FIGURE 6
FARLEY NUCLEAR PLANT
POTENTIAL CONTAINMENT BYPASS FLOWPATHS
THROUGH CONTAINMENT PENETRATIONS 19, 20, 80, AND 81

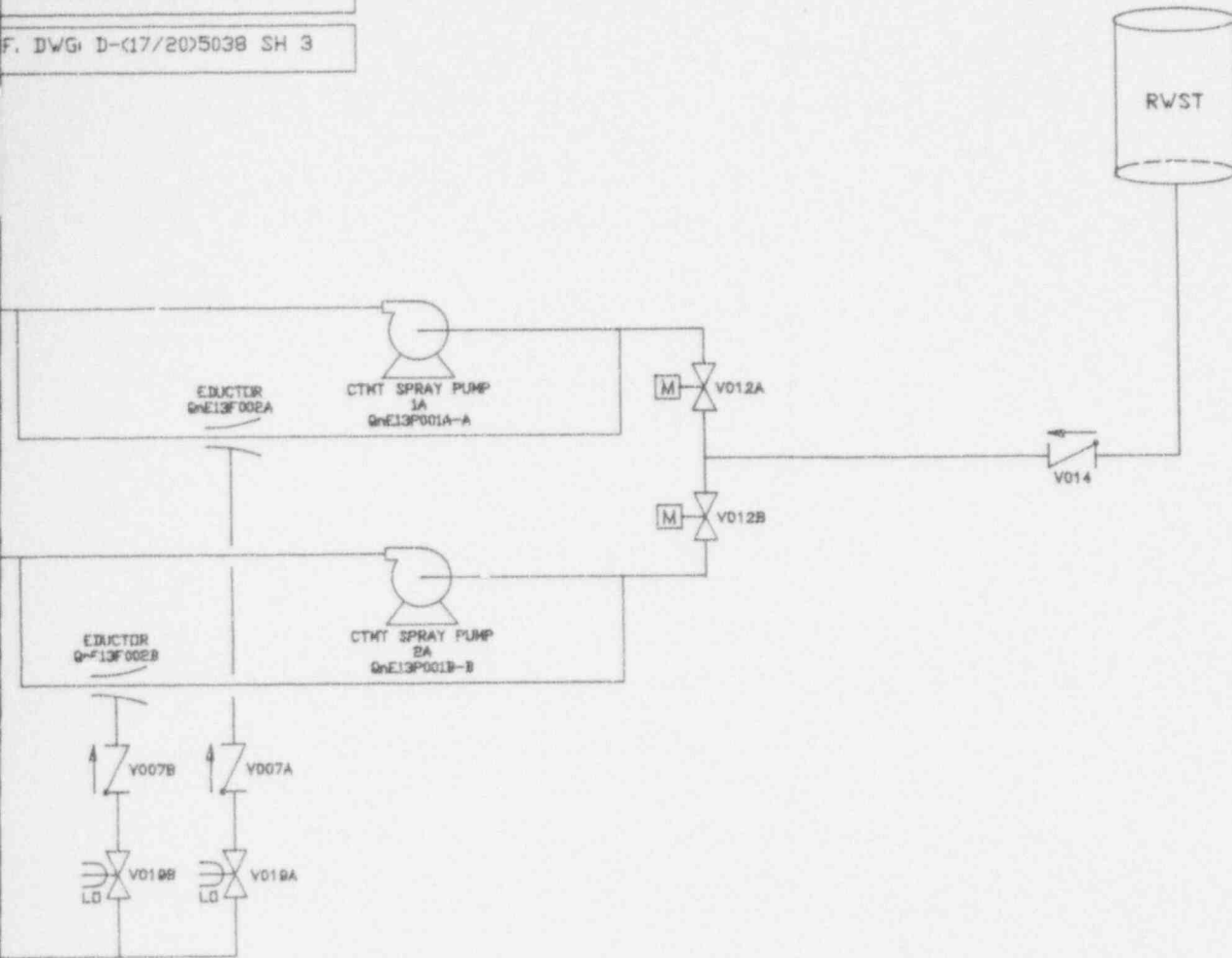


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IE: ALL VALVE NUMBERS ARE
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UNLESS OTHERWISE NOTED

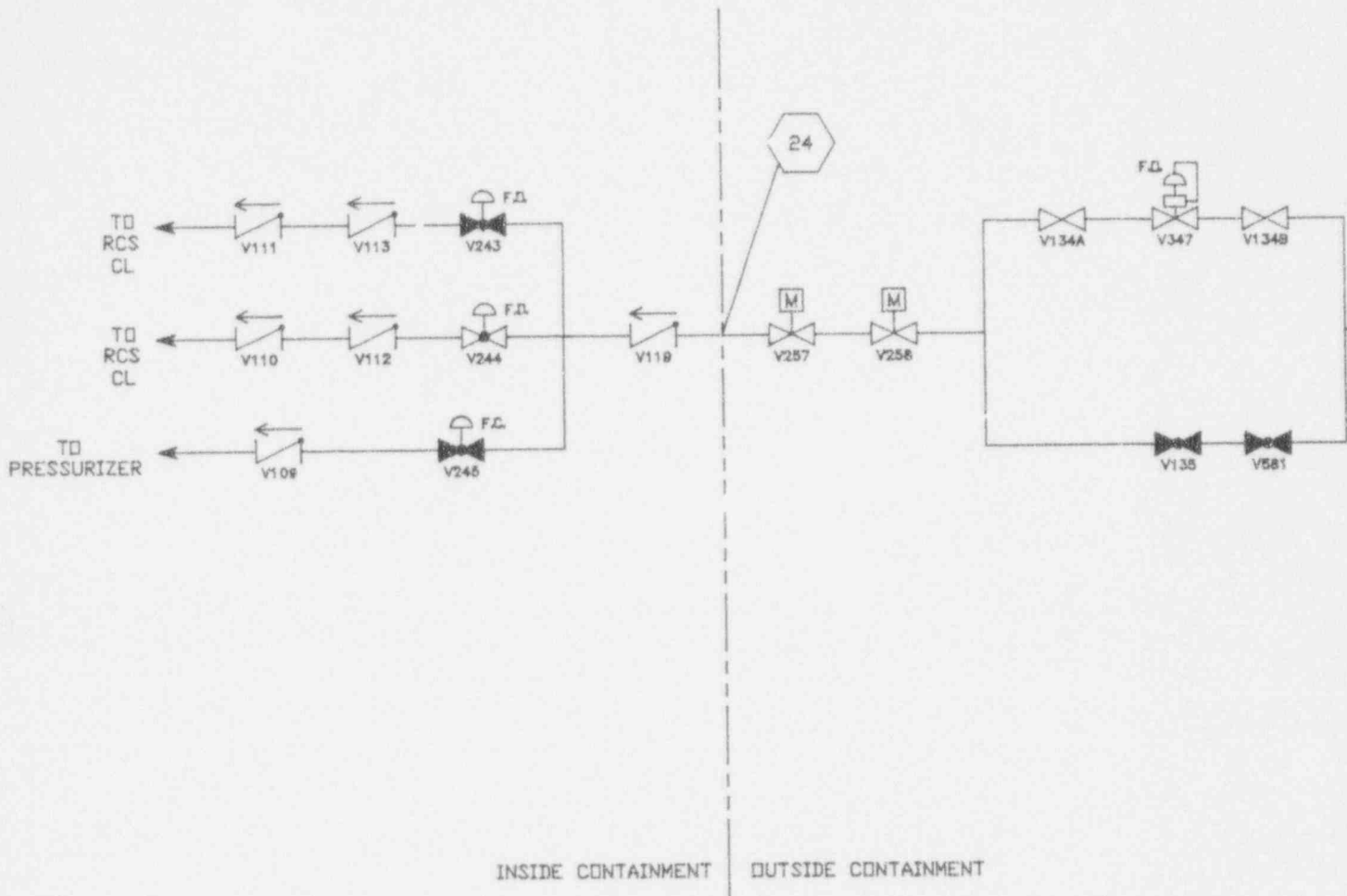
F. DWG: D-(17/20)5038 SH 3

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FIGURE 7
FARLEY NUCLEAR PLANT
POTENTIAL CONTAINMENT BYPASS FLOWPATHS
THROUGH CONTAINMENT PENETRATIONS 21 AND 22



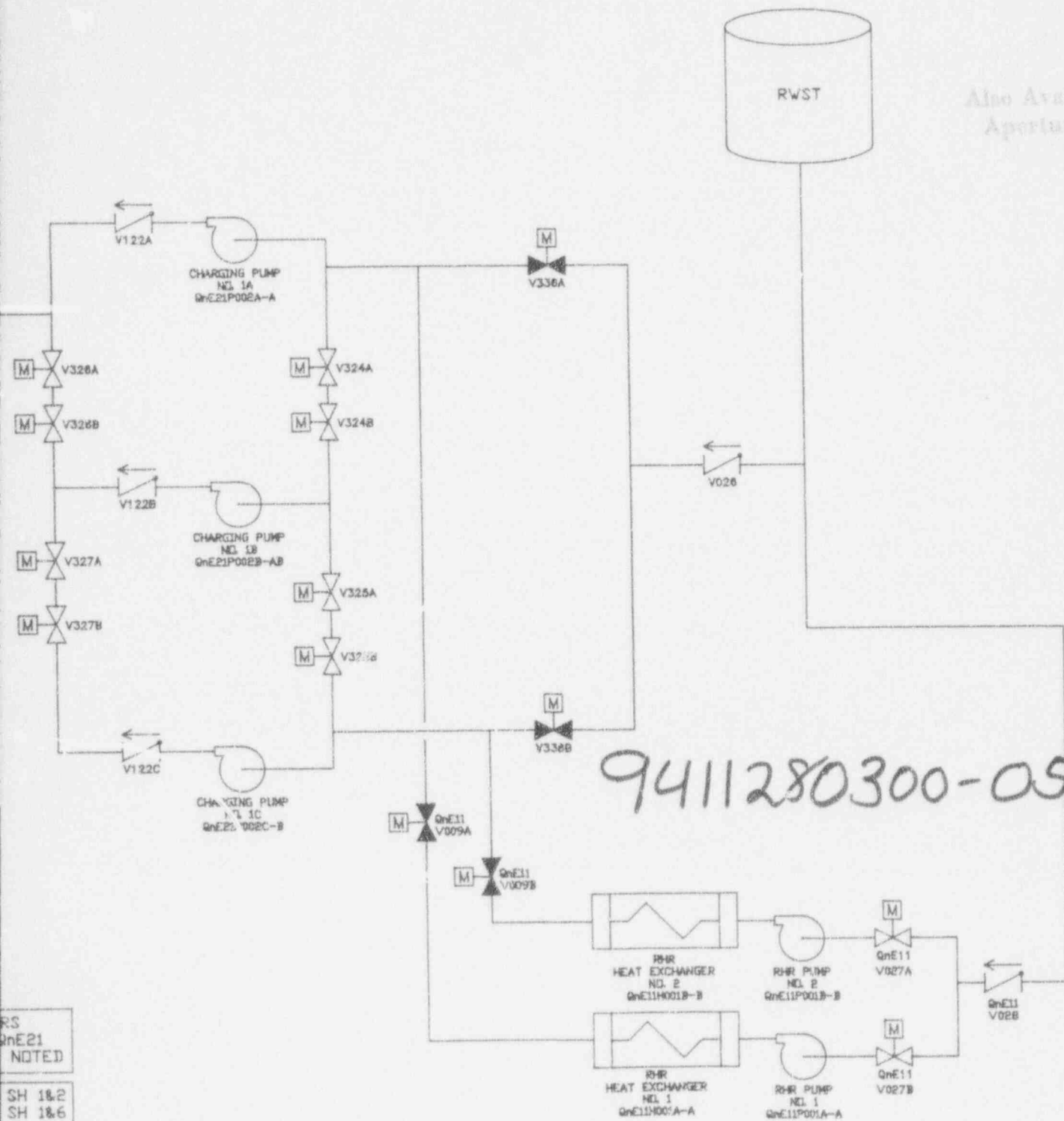
INSIDE CONTAINMENT OUTSIDE CONTAINMENT

NOTE: ALL VALVE NUMBERS
ARE PREFIXED BY
UNLESS OTHERWISE

REF. DWG: D-(17/20)5038
D-(17/20)5039
D-(17/20)5041

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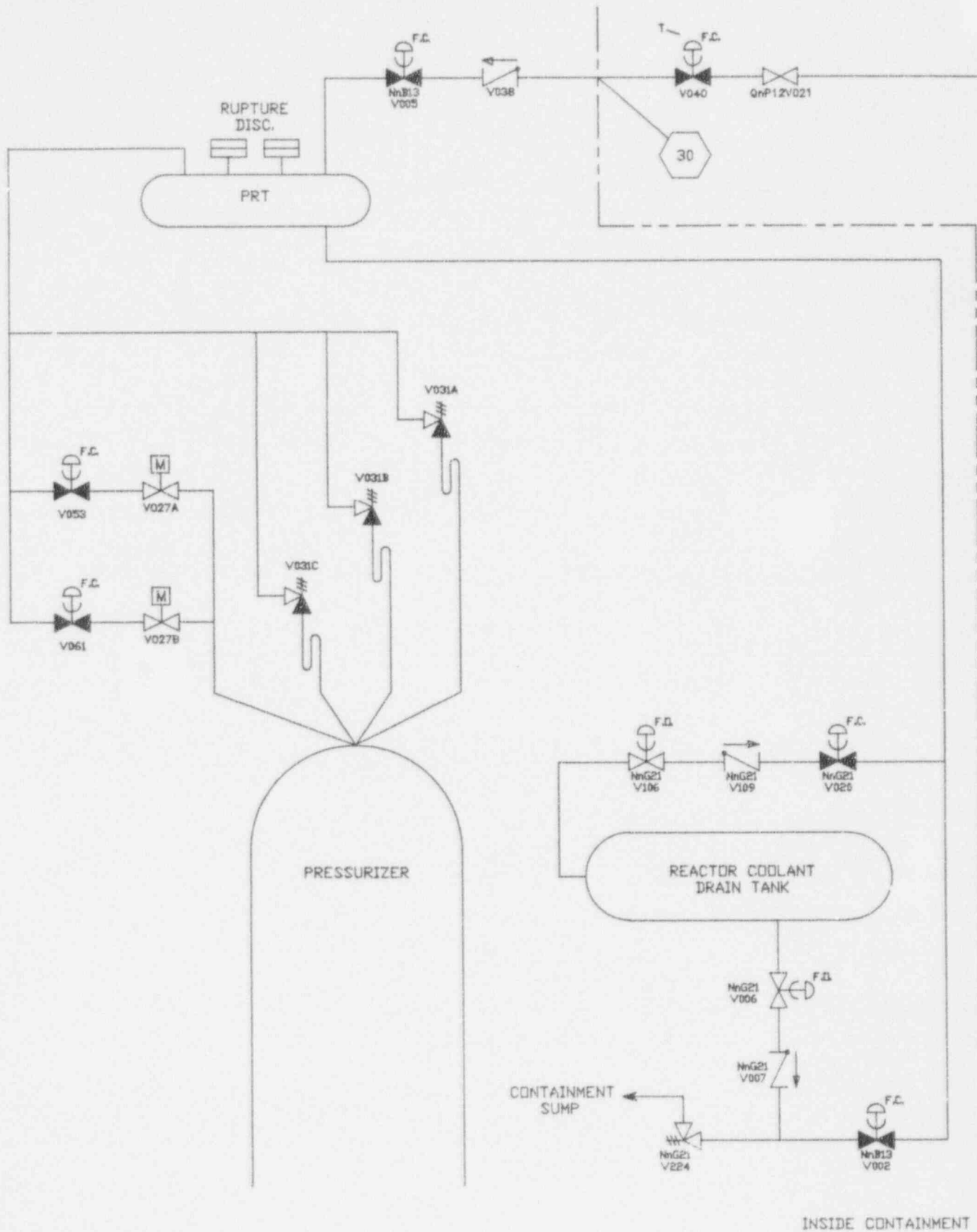
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RS
QnE21
NOTED

SH 1&2
SH 1&6

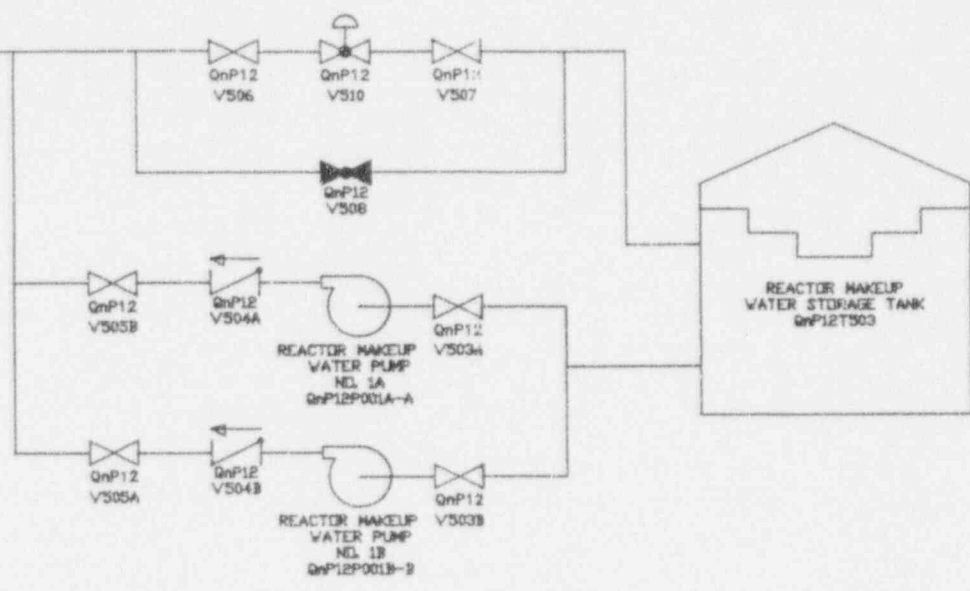
FIGURE 8
FARLEY NUCLEAR PLANT
POTENTIAL CONTAINMENT BYPASS FLOWPATHS
THROUGH CONTAINMENT PENETRATION 24



INSIDE CONTAINMENT

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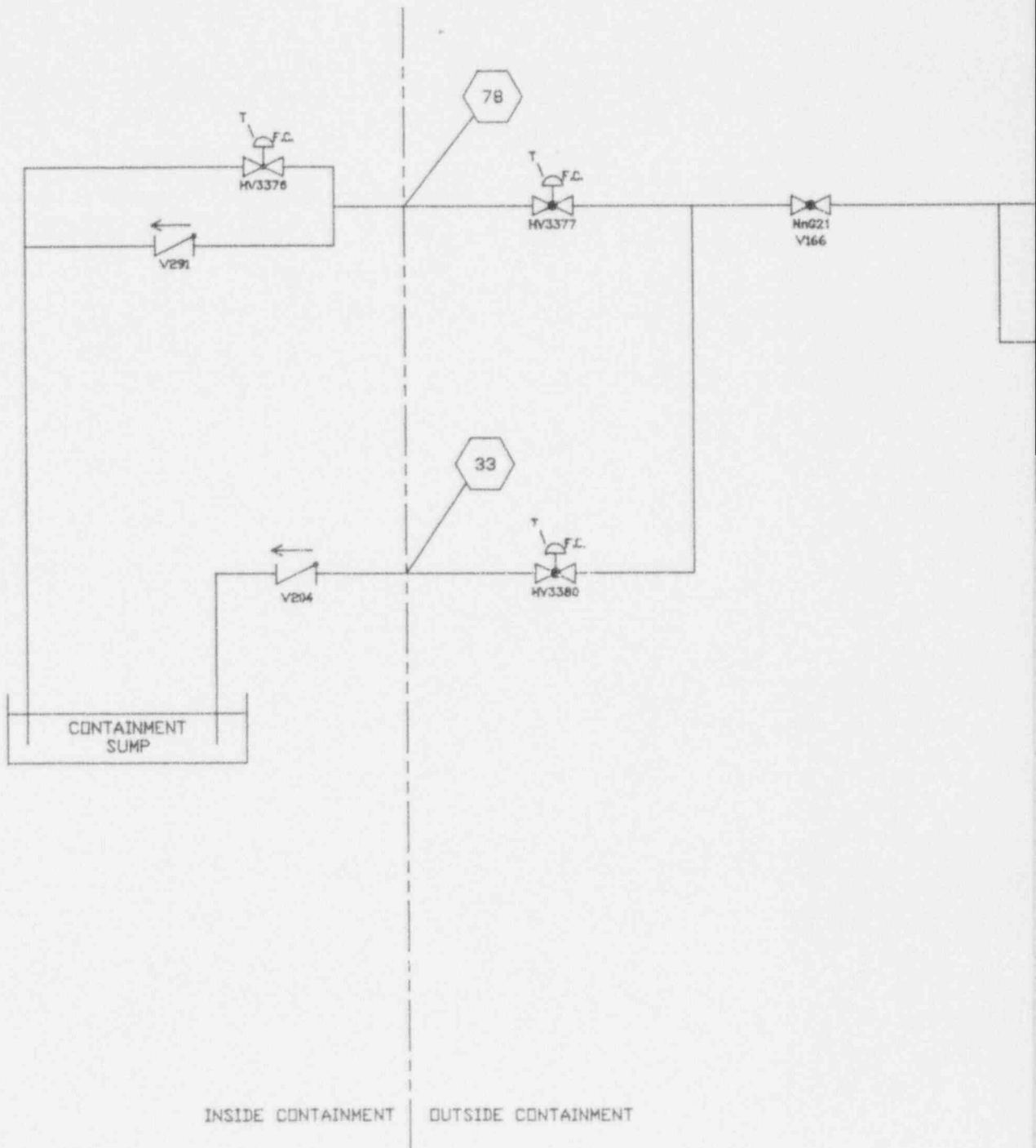
NOTE: ALL VALVE NUMBERS ARE
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REF. DWG: D-(17-20)5037 SH.2
D-(17/20)5042 SH.1
D-(17/20)5004

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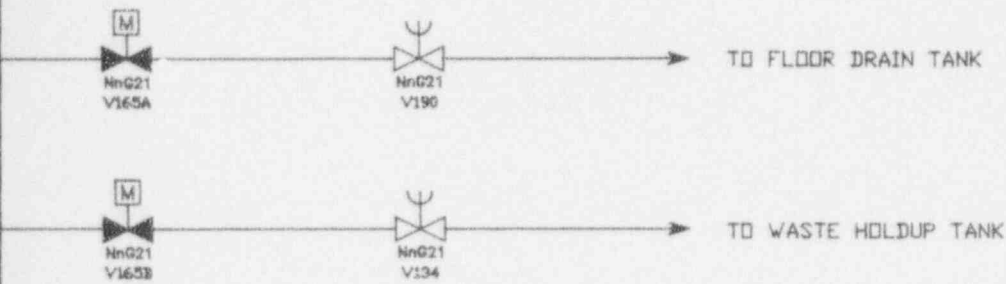
OUTSIDE CONTAINMENT

FIGURE 9
FARLEY NUCLEAR PLANT
POTENTIAL CONTAINMENT BYPASS FLOWPATHS
THROUGH CONTAINMENT PENETRATION 30



ANSTEC
APERTURE
CARD

Also Available On
Aperture Card



NOTE: ALL VALVE NUMBERS ARE
PREFIXED BY QnG21
UNLESS OTHERWISE NOTED

REF. DWG: D-(17/20)5004

9411280300-07

FIGURE 10
FARLEY NUCLEAR PLANT
POTENTIAL CONTAINMENT BYPASS FLOWPATHS
THROUGH CONTAINMENT PENETRATIONS 33 AND 78

3.4 Quantification of Containment Isolation

3.4.1 Containment Penetrations not Needed for Accident Mitigation

The following five critical containment penetrations serve systems not needed for early accident mitigation:

- o Containment Mini Purge Supply Line (Penetration No. 12a)
- o Containment Mini Purge Exhaust Line (Penetration No. 13a)
- o Pressurizer Relief Tank Make-up Line (Penetration No. 30)
- o Containment Sump Pump Sample Recirculation Line (Penetration No. 33)
- o Containment Sump Pump Discharge Line (Penetration No. 78)

In order for the containment to be successfully isolated, all five of these lines must isolate on a Containment Isolation Phase A ("T") signal.

The only automatic isolation mechanisms on the containment leakage pathways through these penetrations are the inboard and outboard containment isolation valves installed on each penetration. Specifically, these are the check valves or air operated valves which close upon receipt of a "T" signal. It is therefore assumed that the penetration is not isolated if both containment isolation valves of each penetration fail to close. There is also no technical specification limitation to the amount of time any of these penetrations can be open during power operation. It is therefore assumed that they are open at the time of accident initiation. No credit is taken for any other valves which may be normally closed to isolate the flowpath.

Since the containment isolation valves installed on these five penetrations are all AOVs which fail closed on loss of DC power or air, their support system dependencies do not require modeling in the quantification. The probability of closure of these valves is determined exclusively by valve closure and isolation signal reliability.

Two fault trees were generated to model isolation of these containment penetrations, one fault tree for use in accident sequences in which an S-signal was generated and one fault tree for use in accident sequences in which an S-signal is not generated. These fault trees are named NSCIWS and NSCI,

respectively, and they are presented in Appendix A as Figures A-1 and A-2. Both fault trees include containment isolation signal modules documented in the Reactor Protection System Notebook (Reference 20). Both fault trees also use the common cause failure data in the master data file (Reference 17) to account for component failure due to common cause. Tables A-3 and A-7 of Appendix A present the common cause component groups incorporated into fault trees NSCIWS and NSCI.

3.4.2 Containment Penetrations which serve Accident Mitigation Functions

The following 12 critical containment penetrations serve systems that are needed for accident mitigation:

- o High Head Safety Injection to Reactor Coolant Loops (Penetrations 19, 20, 24, 80, and 81)
- o Low Head Safety Injection to Reactor Coolant Loops (Penetrations 15, 17, and 101)
- o Residual Heat Removal Pump Suction from Reactor Coolant Loops (Penetrations 15 and 18)
- o Supply to Containment Spray Nozzles (Penetrations 21 and 22)

For each of these 12 containment penetrations, isolation is attained through the closure of check valves and MOVs. For all lines except the normal charging line (penetration 24), MOV position is controlled manually from the control room. The operators are responsible for isolating these penetrations after the system served by the penetration has completed its function or loses operability. The charging line isolation MOVs close automatically on receipt of an "S" signal.

Isolation of these 12 containment penetrations is quantified in three sets of fault trees, one set covering the High Head Safety Injection (HHSI) system lines, one set covering the Low Head Safety Injection (LHSI)/residual heat removal (RHR) system lines, and one set covering the containment spray system lines. These three fault trees are discussed below.

Five containment penetrations critical to containment isolation are part of the HHSI/charging system, penetrations 19, 20, 24, 80, and 81. Penetration 24

serves the normal charging line, penetrations 19 and 20 serve HHSI to the RCS cold legs, and penetrations 80 and 81 serve HHSI to the RCS hot legs. The only identifiable pathway for fission product release through the HHSI/charging system is through the RWST.

Isolation of these HHSI lines is only necessary when no charging/SI pumps and no residual heat removal pumps are operating. This is due to the fact that any operating charging/SI or RHR pump will keep the Emergency Core Cooling System (ECCS) discharge lines filled with water and will maintain the pressure in these discharge lines higher than containment pressure. Given loss of all charging/SI and RHR pumps, a conservatively high containment bypass probability is calculated by accounting only for the check valves. This conservatism does not significantly affect the overall containment isolation probability because of the number of HHSI/charging system check valves which must fail to bypass containment. Fault tree CHGCI was generated to account for these check valves. Figure A-3 of Appendix A presents the CHGCI fault tree and is discussed below.

Of the five containment penetrations associated with the HHSI/charging system, only the cold leg recirculation penetrations (no. 19 and 20) are explicitly modeled in fault tree CHGCI. There are two reasons for this. First, containment bypass through the normal charging line (penetration no. 24) requires failure of at least three check valves and two motor operated valves before fission products can leak back to the charging pump discharge header (assuming that the auxiliary pressurizer spray is not open). Only two check valves must fail before fission products can leak back to the charging pump discharge header through the cold leg recirculation penetrations. (If the auxiliary pressurizer spray is open, only two check valves must fail to allow fission products back through the charging line. However, auxiliary pressurizer spray is almost never open during normal operation and only rarely open during accident conditions. Therefore, fission product leakage back through this line is not explicitly modeled.)

The second reason that only the cold leg recirculation penetrations are explicitly modeled in fault tree CHGCI is that the High Head SI system is aligned for either hot leg or cold leg recirculation. Since the configuration

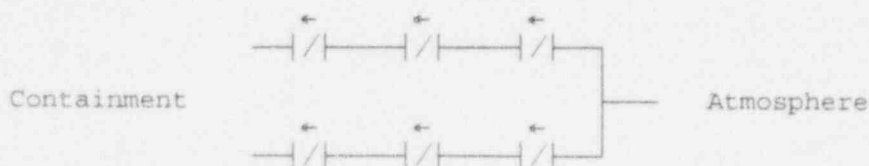
of check valves in the hot leg and cold leg recirculation paths are identical, only one configuration has to be modeled. The hot leg recirculation containment penetrations are those numbered 80 and 81.

Fault tree CHGCI uses the common cause failure data in the master data file to account for component failure due to common cause. Table A-11 of Appendix A presents the common cause component groups incorporated into fault tree CHGCI.

The check valves modeled in Fault Tree CHGCI are divided into two common cause groups. The first group includes all the check valves inside containment. The second group includes the centrifugal charging pump discharge check valves and the check valves between the RWST and the centrifugal charging and RHR pumps. The check valves are divided into these two groups based on the frequency at which they are stroked. The check valves in the first group are stroked open every refueling outage. The check valves in the second group are stroked open during the quarterly charging and RHR pump surveillance tests (Reference 18 and 19).

To simplify the calculation of the failure of these check valves to isolate containment, they are further divided into twelve sub-groups, as shown in Table A-11. The first six of these 12 sub-groups represent all paths through the first group of check valves, and the remaining six of these 12 sub-groups represent all paths through the second group of check valves. Note that this sub-division of check valves associates each valve in several common cause groups. This sub-division of check valves also leads to conservatively high failure rates, as demonstrated in the example below.

Consider the flowpath shown below. Leakage from containment to the atmosphere can occur through two paths, each of which has three check valves impeding flow.



If all six check valves are included in one common cause group, the probability of leakage from containment to the atmosphere due to common cause is calculated as the sum of four probabilities.

1. Four or more (Modeled as all 6) check valves Fail To Close (FTC) due to common cause, $P_{All\ 6\ FTC\ CC}$
2. All three check valves in one line FTC due to common cause, $P_{3\ FTC\ CC}$
3. Three check valves FTC due to common cause and the remaining check valve(s) in one line FTC due to random failure, $P_{3\ FTC\ CC,\ 1\ or\ 2\ FTC\ RF}$
4. Two check valves in one line FTC due to common cause and the remaining check valve in the line FTC due to random failure, $P_{2\ FTC\ CC,\ 1\ FTC\ RF}$

$$Q_{CC,\ 1\ group\ of\ 6} = P_{All\ 6\ FTC\ CC} + 2 P_{3\ FTC\ CC} + 18 P_{3\ FTC\ CC,\ 1\ or\ 2\ FTC\ RF} + 6 P_{2\ FTC\ CC,\ 1\ FTC\ RF}$$

$$= [bcd + (2/10)bc(1-d) + (18/10)bc(1-d)(Q_{rf}+Q_{rf}^2) + (6/5)b(1-c)Q_{rf}] Q_{rf}$$

Using representative MGL common cause factors ($b=0.06$, $c=0.33$, $d=0.52$) and a check valve failure to close probability of $1.00E-03$ per demand, we obtain

$$Q_{CC,\ 1\ group\ of\ 6} = 1.23E-05$$

If the check valves are divided into two common cause groups of three, the probability of leakage from containment to the atmosphere due to common cause is calculated as the sum of two probabilities.

1. Three check valves Fail To Close (FTC) due to common cause, $P_{3\ FTC\ CC}$
2. Two check valves FTC due to common cause and the remaining check valve in the group FTC due to random failure, $P_{2\ FTC\ CC,\ 1\ FTC\ RF}$

$$Q_{CC,\ 2\ groups\ of\ 3} = 2 [P_{3\ FTC\ CC} + 3 P_{2\ FTC\ CC,\ 1\ FTC\ RF}]$$

$$= 2 [bc + (3/2) b(1-c) Q_{rf}] Q_{rf}$$

$$= 2 [1.98E-02 + 6.03E-05] Q_{rf}$$

$$= 3.97E-05$$

As was set out to be shown, the common cause failure of the system of two groups of three valves is higher than the common cause failure of the system

of one group of six valves. Further, the common cause failure probability of the two groups of three valves is dominated by the probability of three valves failing to close due to common cause. The probability of two check valves failing to close due to common cause and the remaining check valve in the group FTC due to random failure, $P_{2\text{FTC CC}, 1\text{FTC RF}}$, can be neglected.

Five containment penetrations critical to containment isolation are part of the Low Head Safety Injection (LHSI)/Residual Heat Removal (RHR) system, penetrations 15, 16, 17, 18, and 101. Penetrations 16 and 18 serve the RHR suction lines from the RCS hot legs, penetration 101 serves the LHSI discharge line to the RCS hot legs, and penetrations 15 and 17 serve the LHSI discharge lines to the RCS cold legs. The only identifiable pathway for fission product release through the LHSI/RHR system is through the RWST.

The isolation valves on containment penetrations 16 and 18 (QnE11V001A, QnE11V016A, QnE11V001B, and QnE11V016B) are interlocked with the valves isolating the RHR suction from the RWST (QnE11V027A and QnE11V027B) and with the valves isolating the RHR discharge from the HHSI/charging pump suction (QnE11V009A and QnE11V009B) such that the RHR suction line from the RCS cannot be opened unless the RHR system is isolated from the RWST and HHSI/charging system. In short, containment penetrations 16 and 18 can only be opened when all pathways back to the RWST have been isolated. Therefore, containment penetrations 16 and 18 require no further consideration.

Containment isolation of these LHSI/RHR lines is only necessary when no charging/SI pumps and no residual heat removal pumps are operating. Any operating charging/SI or RHR pump will keep the Emergency Core Cooling System (ECCS) discharge lines filled with water and will maintain the pressure in these discharge lines higher than containment pressure.

A bounding containment bypass probability is calculated by assuming that only failure of the check valves is necessary for bypass. As an additional conservatism to bound cases where the RHR discharge to either the RCS cold or hot legs is more limiting, both the cold leg and hot leg discharge MOVs are assumed to be open. These conservatisms do not significantly affect the

overall containment isolation probability because of the number of LHSI/RHR system check valves which must fail to bypass containment. Fault tree RHRCI was generated to account for these check valves. Figure A-4 of Appendix A presents fault tree RHRCI.

Fault tree RHRCI uses the common cause failure data in the master data file to account for component failure due to common cause. Table A-15 of Appendix A presents the common cause component groups incorporated into fault tree RHRCI. As was done with the check valves modeled in Fault Tree CHGCI, the check valves modeled in Fault Tree RHRCI are divided into two common cause groups. The first group includes all the check valves inside containment. The second group includes the RHR pump discharge check valves and the check valves between the RWST and the centrifugal charging and RHR pumps. The check valves are divided into these two groups based on the frequency at which they are stroked. The check valves in the first group are only stroked every refueling outage. The check valves in the second group are stroked during the quarterly centrifugal charging and RHR pump surveillance tests (References 18 and 19).

As was done for the CHGCI common cause calculation, these two groups of check valves is further divided into twelve sub-groups, as shown in Table 13. The first six of these 12 sub-groups represent all paths through the first group of check valves, and the remaining six of these 12 sub-groups represent all paths through the second group of check valves. Note that this sub-division of check valves associates each valve in several common cause groups. This sub-division of check valves also leads to conservatively high failure rates.

Two containment penetrations critical to containment isolation are part of the Containment Spray System (CSS), penetrations 21 and 22. Both of these penetrations serve the containment spray discharge lines. The only pathways for fission product release through the containment spray system are through the RWST and Sodium Hydroxide Storage Tank. Isolation of these penetrations is only necessary during accident sequences in which the CSS actuates and then one or both CSS trains fail to continue operating throughout the accident. If the CSS does not actuate, the discharge MOVs never open. These MOVs are verified closed during the monthly containment spray system flow test.

Again, a bounding containment leakage probability through the containment spray system is calculated by accounting only for the check valves present in the lines. Fault tree CSSCI was generated to account for the containment spray system check valves, and Figure A-5 of Appendix A presents fault tree CSSCI.

No common cause calculation is necessary for the CSSCI fault tree since the result from this tree does not depend upon the operation of redundant components which belong to the same common cause group.

3.5 Quantification Results

Table 10 presents the results of the fault trees described in section 3.4. Containment Isolation is categorized into 2 cases based on availability of an "S" signal. Table 11 presents this categorization. The results from Fault Tree CHGCI, RHRCI, and CSSCI were conservatively added into both cases. Finally, Table 12 summarizes the contribution of individual containment penetrations to the overall containment isolation probability. In this summary table, the probability that any administratively-controlled containment penetration is not isolated is assumed to apply exclusively to the largest administratively-controlled containment penetration, the equipment hatch.

TABLE 10
CONTAINMENT ISOLATION FAULT TREE RESULTS

Fault Tree	Figure No.	Description	Applicability	Failure Prob. (1/demand)
none	none	Administratively controlled mechanical and fluid system penetrations	Always	1.2E-04
NSCIWS	A-1	Containment penetrations not needed for accident mitigation	Given "S" signal generation	6.38E-04
NSCI	A-2	Containment penetrations not needed for accident mitigation	Given "S" signal failure	1.69E-03
CHGCI	A-3	Containment penetrations from the High Head SI/Charging Pumps to the RCS	Given no Charging/SI or RHR pumps delivering flow to the RCS	9.33E-07
RHRCI	A-4	Containment penetrations from the Low Head SI/RHR pumps to the RCS	Given no Charging/SI or RHR pumps delivering flow to the RCS	7.09E-07
CSSCI	A-5	Containment penetrations for the containment spray system	Given the containment spray system is activated and failure of spray injection or recirculation regardless of the number of support system trains available	4.00E-06

TABLE 11
CONTAINMENT ISOLATION FINAL RESULTS

Index No.	"S"-Signal Generated ?	CI Failure Probability (per demand)
1	Yes	7.64E-04
2	No	1.82E-03

3.6 Sensitivity of Results to Human Reliability

This section quantifies the impact of gross operator error on containment isolation results. The probability of containment isolation is requantified with the probability of operator error set to unity. Since operator error is modeled in only two containment isolation system fault trees, NSCIWS and NSCI, only these trees require reconsideration. Further, since the operators must manually initiate a containment isolation phase A ("T") signal in the event of a failed SI signal, fault tree NSCI need not be requantified with operator error probability set to 1.0 to determine its sensitivity to human reliability. Containment isolation will not succeed given failure of the SI signal and no manual initiation of a "T" signal.

Table 13 presents the results of fault trees NSCIWS and NSCI with operator error probability set to unity, and Table 14 presents overall containment isolation failure probability utilizing these results. Note that the results from Fault Trees CHGCI, RHRCI, and CSSCI were again conservatively added into both cases.

TABLE 12

BREAKDOWN OF CONTAINMENT ISOLATION PROBABILITY BY PENETRATION

Penetration Number(s) (Ref. 2b)	Description	Line Size (in)	Containment Leakage or Bypass	Isolation Failure Probability Given "S"-signal	Isolation Failure Probability w/o "S"-signal
84	Equipment Hatch	234	Leakage	1.2E-04	1.2E-04
12a	Containment mini purge supply	8	Leakage	2.70E-04	1.32E-03
13a	Containment mini purge exhaust	8	Leakage	2.70E-04	1.32E-03
21	Containment Spray A	8	Leakage	2.00E-06	2.00E-06
22	Containment Spray B	8	Leakage	2.00E-06	2.00E-06
30	Pressurizer Relief Tank Makeup	3	Leakage	8.23E-06	9.28E-06
33	Containment Sump Pump Sample Recirculation	2	Leakage	9.23E-06	1.03E-05
78	Containment Sump Pumps Discharge	3	Leakage	2.79E-04	1.33E-03
15, 17, and 101	RHR Pump Discharge	10	Bypass	7.09E-07	7.09E-07
19, 20, 80, and 81	High Head Safety Injection Pump Discharge	3	Bypass	9.33E-07	9.33E-07

TABLE 13

CONTAINMENT ISOLATION FAULT TREE RESULTS
WITH OPERATOR ERROR PROBABILITY SET TO UNITY

Fault Tree	Figure No.	Description	Applicability	Failure Prob. (1/demand)
NSCIWS	A-1	Containment penetrations not needed for accident mitigation	Given "S" signal generation	6.63E-04
NSCI	A-2	Containment penetrations not needed for accident mitigation	Given "S" signal failure	1.0

TABLE 14

CONTAINMENT ISOLATION FINAL RESULTS
WITH OPERATOR ERROR PROBABILITY SET TO UNITY

Index No.	"S"-Signal Generated ?	CI Failure Probability (per demand)
1	Yes	7.89E-04
2	No	1.0

4.0 REFERENCES

1. IDCOR Technical Report T86.3a2, "IPE Source Term Methodology for PWR's", Fauske and Associates, Inc., March 1987.
2. Farley FSAR Update, Rev 8.
 - 2a. Ref. 2, Section 6.2.4, "Containment Isolation System".
 - 2b. Ref. 2, Table 6.2-38, "Containment Penetrations".
 - 2c. Ref. 2, Table 6.2-31, "Containment Isolation Valve Information".
 - 2d. Ref. 2, Table 6.2-32, "Steam Generator Isolation Valve Information".
 - 2e. Ref. 2, page 9.2-14a.
 - 2f. Ref. 2, page 6.2-58.
 - 2g. Ref. 2, page 6.2-59.
 - 2h. Ref. 2, page 6.2-60.
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6. Farley Unit 1 Technical Specifications, Amendment no. 86 Surveillance Requirement 4.6.1.2 (The reference stating ILRTs are performed at 40 ± 10 month intervals).
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14. Farley Nuclear Plant IPE, Containment Spray System Notebook.
15. Farley Nuclear Plant/Vogtle Electric Generating Plant PRA Program, Plant Response Tree Development Guide, Draft Revision 0, February 1990.
16. Farley Nuclear Plant Surveillance Test Procedures FNP-1-STP-14.0 (Revision 11), "Containment Integrity Verification Test."
17. Sloane, B. D., Westinghouse Letter ET-SOAR-PORI-92-815, "Farley Master Data File for Requantification," February 4, 1992.
18. Farley Nuclear Plant Surveillance Test Procedure FNP-1-STP-4.1 (Revision 19), "Charging Pump 1A Quarterly Inservice Test."
19. Farley Nuclear Plant Surveillance Test Procedure FNP-1-STP-11.1 (Revision 22), "RHR Pump 1A Quarterly Inservice Test."
20. Farley Nuclear Plant IPE, Reactor Protection System Notebook.
21. Fauske & Associates, Inc., Letter; from: J. P. Burelbach (Fauske & Associates, Inc.); to: W. E. Burns (Southern Nuclear Operating Company); date: July 15, 1992; Re: Farley Nuclear Plant IPE; Subject: Closure of IRG Review Comments 29 and 35-38.

APPENDIX A: COMPUTER CODE INPUT AND OUTPUT

Appendix A presents the containment isolation system fault trees and their related computer input and output files. There are three computer files associated with each fault tree. The first file links the fault tree with the master data file. This file's name is the fault tree name suffixed with .SIM. The second file lists the basic event probabilities of the fault tree. This file's name is the fault tree name suffixed with .TAB. The third file presents the fault tree quantification output. This file's name is the fault tree name suffixed with .OUT. Table A-1 lists all figures presented in this appendix, and Table A-2 lists all remaining tables presented in this appendix.

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TABLE A-3

LISTER OUTPUT FOR ALL
CONTAINMENT ISOLATION FAULT TREES

LISTER Version 2.20 9/11/1992 16: 7: 0
LISTER INPUT FILE FOR THE FARLEY CONT. ISOL. TREES
LIST OF BASIC EVENTS AND THEIR DESCRIPTIONS

1	1--AV301/302-KCC	AOV QnP13V302	AND QnP13V301	FAIL TO CLOSE	
2	1--AV303/402-KCC	AOV QnP13V304	AND QnP13V303	FAIL TO CLOSE	
3	1--AVB13V301-K	AOV QnP13V301	FAILS TO CLOSE	(HARDWARE)	
4	1--AVHV3376--K	AOV QnG21HV3376	FAILS TO CLOSE	(HARDWARE)	
5	1--AVHV3376/7KCC	AOV QnG21HV3376	AND QnG21HV3377	FAIL TO CLOSE	(HARDWARE)
6	1--AVHV3377--K	AOV QnG21HV3377	FAILS TO CLOSE	(HARDWARE)	
7	1--AVHV3380--F	QnG21HV3380	FAILS TO CLOSE	(HARDWARE)	
8	1--AVHV3380--K	QnG21HV3380	FAILS TO CLOSE	(HARDWARE)	
9	1--AVP13V302-K	AOV QnP13V302	FAILS TO CLOSE	(HARDWARE)	
10	1--AVP13V303-K	AOV QnP13V303	FAILS TO CLOSE	(HARDWARE)	
11	1--AVP13V304-K	AOV QnP13V304	FAILS TO CLOSE	(HARDWARE)	
12	1--CVB13V038-K	CHECK VALVE	QnB13V038 FAILS	TO CLOSE	
13	1--CVB13V040-K	AOV QnB13V040	FAILS TO CLOSE	(HARDWARE)	
14	1--CVG21V204-K	CHECK VALVE	QnG21V204 FAILS	TO CLOSE	
15	1--CVG21V291-K	CHECK VALVE	QnG21V291 FAILS	TO CLOSE	
16	1CSCVE13V002AK	CHECK VALVE	QnE13V002A FAILS	TO CLOSE	
17	1CSCVE13V002BK	CHECK VALVE	QnE13V002B FAILS	TO CLOSE	
18	1CSCVE13V007AK	CHECK VALVE	QnE13V007A FAILS	TO CLOSE	
19	1CSCVE13V007BK	CHECK VALVE	QnE13V007B FAILS	TO CLOSE	
20	1CSCVE13V014-K	CHECK VALVE	QnE13V014 FAILS	TO CLOSE	
21	1HHCVCHGCI-01KCC	QnE21V051C AND	QnE21V062C FAIL	TO CLOSE, CC	
22	1HHCVCHGCI-02KCC	QnE21V051B AND	QnE21V062B FAIL	TO CLOSE, CC	
23	1HHCVCHGCI-03KCC	QnE21V051A AND	QnE21V062A FAIL	TO CLOSE, CC	
24	1HHCVCHGCI-04KCC	QnE21V051C AND	QnE21V066C FAIL	TO CLOSE, CC	
25	1HHCVCHGCI-05KCC	QnE21V051B AND	QnE21V066B FAIL	TO CLOSE, CC	
26	1HHCVCHGCI-06KCC	QnE21V051A AND	QnE21V066A FAIL	TO CLOSE, CC	
27	1HHCVCHGCI-07KCC	QnE21V122A AND	QnE21V026 FAIL	TO CLOSE, CC	
28	1HHCVCHGCI-08KCC	QnE21V122A AND	QnE11V028 FAIL	TO CLOSE, CC	
29	1HHCVCHGCI-09KCC	QnE21V122B AND	QnE21V026 FAIL	TO CLOSE, CC	
30	1HHCVCHGCI-10KCC	QnE21V122B AND	QnE11V028 FAIL	TO CLOSE, CC	
31	1HHCVCHGCI-11KCC	QnE21V122C AND	QnE21V026 FAIL	TO CLOSE, CC	
32	1HHCVCHGCI-12KCC	QnE21V122C AND	QnE11V028 FAIL	TO CLOSE, CC	
33	1HHCVE11V028-K	CHECK VALVE	QnE11V028 FAILS	TO CLOSE	
34	1HHCVE21V026-K	CHECK VALVE	QnE21V026 FAILS	TO CLOSE	
35	1HHCVE21V051AK	CHECK VALVE	QnE21V051A FAILS	TO CLOSE	
36	1HHCVE21V051BK	CHECK VALVE	QnE21V051B FAILS	TO CLOSE	
37	1HHCVE21V051CK	CHECK VALVE	QnE21V051C FAILS	TO CLOSE	
38	1HHCVE21V062AK	CHECK VALVE	QnE21V062A FAILS	TO CLOSE	
39	1HHCVE21V062BK	CHECK VALVE	QnE21V062B FAILS	TO CLOSE	
40	1HHCVE21V062CK	CHECK VALVE	QnE21V062C FAILS	TO CLOSE	
41	1HHCVE21V066AK	CHECK VALVE	QnE21V066A FAILS	TO CLOSE	
42	1HHCVE21V066BK	CHECK VALVE	QnE21V066B FAILS	TO CLOSE	
43	1HHCVE21V066CK	CHECK VALVE	QnE21V066C FAILS	TO CLOSE	
44	1HHCVE21V076AK	CHECK VALVE	QnE21V076A FAILS	TO CLOSE	
45	1HHCVE21V076BK	CHECK VALVE	QnE21V076B FAILS	TO CLOSE	
46	1HHCVE21V077AK	CHECK VALVE	QnE21V077A FAILS	TO CLOSE	
47	1HHCVE21V077BK	CHECK VALVE	QnE21V077B FAILS	TO CLOSE	
48	1HHCVE21V122AK	CHECK VALVE	QnE21V122A FAILS	TO CLOSE	
49	1HHCVE21V122BK	CHECK VALVE	QnE21V122B FAILS	TO CLOSE	
50	1HHCVE21V122CK	CHECK VALVE	QnE21V122C FAILS	TO CLOSE	
51	1HHCVRHRCI-07KCC	QnE21V077A AND	QnE21V076A FAIL	TO CLOSE, CC	
52	1LHCVE11V021AK	CHECK VALVE	QnE11VP21A FAILS	TO CLOSE	
53	1LHCVE11V021BK	CHECK VALVE	QnE11VP21B FAILS	TO CLOSE	
54	1LHCVE11V021CK	CHECK VALVE	QnE11VP21C FAILS	TO CLOSE	
55	1LHCVE11V028-K	CHECK VALVE	QnE11V028 FAILS	TO CLOSE	
56	1LHCVE11V038AK	CHECK VALVE	QnE11V038A FAILS	TO CLOSE	
57	1LHCVE11V038BK	CHECK VALVE	QnE11V038B FAILS	TO CLOSE	
58	1LHCVE11V042AK	CHECK VALVE	QnE11V042A FAILS	TO CLOSE	
59	1LHCVE11V042BK	CHECK VALVE	QnE11V042B FAILS	TO CLOSE	
60	1LHCVE11V051AK	CHECK VALVE	QnE11V051A FAILS	TO CLOSE	

TABLE A-3 (CONT.)

LISTER OUTPUT FOR ALL
CONTAINMENT ISOLATION FAULT TREES

LISTER Version 2.20 9/11/1992 16: 7: 5
LISTER INPUT FILE FOR THE FARLEY CONT. ISOL. TREES
LIST OF BASIC EVENTS AND THEIR DESCRIPTIONS

61	1LHCVE11V051BK	CHECK VALVE	QnE11V051B FAILS TO CLOSE		
62	1LHCVE11V051CK	CHECK VALVE	QnE11V051C FAILS TO CLOSE		
63	1LHCVRHRCI-01KCC	QnE11V051A,	QnE11V021A, AND QnE11V042A FAIL	TO CLOSE, CC	
64	1LHCVRHRCI-02KCC	QnE11V051A,	QnE11V021A, AND QnE11V042B FAIL	TO CLOSE, CC	
65	1LHCVRHRCI-03KCC	QnE11V051B,	QnE11V021B, AND QnE11V042A FAIL	TO CLOSE, CC	
66	1LHCVRHRCI-04KCC	QnE11V051B,	QnE11V021B, AND QnE11V042B FAIL	TO CLOSE, CC	
67	1LHCVRHRCI-05KCC	QnE11V051C,	QnE11V021C, AND QnE11V042A FAIL	TO CLOSE, CC	
68	1LHCVRHRCI-06KCC	QnE11V051C,	QnE11V021C, AND QnE11V042B FAIL	TO CLOSE, CC	
69	1LHCVRHRCI-08KCC	QnE21V077B AND	QnE21V076B FAIL	TO CLOSE, CC	
70	1LHCVRHRCI-09KCC	QnE11V038A AND	QnE11V02B FAIL	TO CLOSE, CC	
71	1LHCVRHRCI-10KCC	QnE11V038A AND	QnE21V026 FAIL	TO CLOSE, CC	
72	1LHCVRHRCI-11KCC	QnE11V038B AND	QnE11V02B FAIL	TO CLOSE, CC	
73	1LHCVRHRCI-12KCC	QnE11V038B AND	QnE21V026 FAIL	TP CLOSE, CC	
74	1SAREK502TA/BFCC	MASTER RELAY	K502 TRAIN A AND B FAIL TO	OPERATE	
75	1SAREK503TA/BFCC	MASTER RELAY	K503 TRAIN A AND B FAIL TO	OPERATE	
76	1SAREK606TA/BFCC	SLAVE RELAY	K606 TRAIN A AND B FAIL TO	OPERATE	
77	1SAREK613TA/BFCC	SLAVE RELAY	K613 TRAIN A AND B FAIL TO	OPERATE	
78	1SASDA5161A/BFCC	DRIVER CIRCUITS	ON SFGRD DRIVER CARD A516 TRNS	A AND B FAIL	
79	1SASDA5162A/BFCC	DRIVER CIRCUIT	ON SFGRD DRIVER CARD A516-2 TRN	A AND B FAIL	
80	1SASRPHASEASWFCC	MANUAL PHASE A	SWITCHES FAIL	DUE TO COMMON CAUSE	
81	SADEA516-1FAE	DIODE CIRCUIT	ON SAFEGUARDS	DRIVER CARD A516 FAILS	
82	SAARE--K502FAE	MASTER RELAY	K502 FAILS		
83	SAARE--K503FAE	MASTER RELAY	K503 FAILS		
84	SAARE--K522FAE	MASTER RELAY	K522 FAILS		
85	SAARE--K606FAE	SLAVE RELAY	K606 FAILS		
86	SAARE--K612FAE	SLAVE RELAY	K612 FAILS		
87	SAARE--K613FAE	SLAVE RELAY	K613 FAILS		
88	SAARE--K622FAE	SLAVE RELAY	K622 FAILS		
89	SAASDA516-2FAE	DRIVER CIRCUIT	ON SAFEGUARDS	DRIVER CARD A516 FAILS	
90	SAASDA516-3FAE	DRIVER CIRCUIT	ON SAFEGUARDS	DRIVER CARD A516 FAILS	
91	SAASRPHASW1FAE	MAIN CONTROL	BOARD MANUAL	PHASE A SWITCH 1 FAILS	
92	SABDEA516-1FAE	DIODE CIRCUIT	ON SAFEGUARDS	DRIVER CARD A516 FAILS	
93	SABRE--K502FAE	MASTER RELAY	K502 FAILS		
94	SABRE--K503FAE	MASTER RELAY	K503 FAILS		
95	SABRE--K613FAE	SLAVE RELAY	K613 FAILS		
96	SABRE--K622FAE	SLAVE RELAY	K622 FAILS		
97	SABSDA516-2FAE	DRIVER CIRCUIT	ON SAFEGUARDS	DRIVER CARD A516 FAILS	
98	SABSDA516-3FAE	DRIVER CIRCUIT	ON SAFEGUARDS	DRIVER CARD A516 FAILS	
99	SABSRPHASW2FAE	MAIN CONTROL	BOARD MANUAL	PHASE A SWITCH 2 FAILS	
100	SAXOPMANPHA-AE	OPERATOR FAILS	TO MANUALLY	INITIATE PHASE A ISOLATION	

=====
CONFIGURATION CONTROL INFORMATION

Code	Version	Verified	Configured On	Execution
LISTER	3.00	Yes	February 3, 1992	September 11, 1992
Control Number:	1096685311585			@ 16:07:06.86

A record of this configuration exists in the Westinghouse Electric Corp.
Engineering Technology Configuration Control Department.

TABLE A-4

COMPONENT GROUPS USED IN COMMON CAUSE FAILURE
CALCULATION OF THE NSCIWS FAULT TREE

Index No.	Component Numbers	Function	Group Size
1	QnP13V301 QnP13V302	Air Operated Isolation Valves of Containment Penetration 12a	2
2	QnP13V303 QnP13V304	Air Operated Isolation Valves of Containment Penetration 13a	2
3	QnG21HV3376 QnG21HV3377	Air Operated Isolation Valves of Containment Penetration 78	2
4	A516-2A A516-2B	Driver Circuits on Safeguards Driver Card A516 Generating Signals for Isolation Valves of Containment Penetration 78	2
5	A516-3A A516-3B	Driver Circuits of Safeguards Driver Card A516 Generating Signals for Isolation Valves of Containment Penetrations 12a and 13a	2
6	A516-1A A516-1B	Diode Circuits of Safeguards Driver Card A516 Generating Signals for Isolation Valves of Containment Penetration 12a and 13a	2
7	K502A K502B	Master Relays for Processing of Signals for Isolation Valves of Containment Penetration 78	2
8	K503A K503B	Master Relays for Processing of Signals for Isolation Valves of Containment Penetrations 12a and 12b	2
9	K613A K613B	Slave Relays for Processing of Signals for Isolation Valves of Containment Penetration 78	2
10	K622A K622B	Slave Relays for Processing of Signals for Isolation Valves of Containment Penetrations 12a and 13a	2
11	PHASEAS1 PHASEAS2	Main Control Board Switches for Manual Activation of Containment Isolation Phase A	2

TABLE A-5
 NSCIWS.SIM FILE

VER 1.6

'SIMON Case file for Tree: NSCIWS; Created: 02/28/92 14:55'

'1--CVG21V204-K	'	01	062	0.000000	0.0
'1--AVHV3380--K	'	01	051	0.000000	0.0
'SAASDA516-2FAE	'	01	272	744.0000	0.0
'SAARE--K522FAE	'	02	255	744.0000	0.0
			252	0.000000	0.0
'SAARE--K612FAE	'	02	255	13392.00	0.0
			252	0.000000	0.0
'SAASRPHASW1FAE	'	01	262	13392.00	0.0
'SABSRPHASW2FAE	'	01	262	13392.00	0.0
'1SASRPHASEASWFCC	'	01	684	13392.00	0.0
'SAXOPMANPHA-AE	'	01	868	0.000000	0.0
'1--CVG21V291-K	'	01	062	0.000000	0.0
'1--AVHV3376--K	'	01	051	0.000000	0.0
'SABSDA516-2FAE	'	01	272	744.0000	0.0
'SABRE--K502FAE	'	02	255	744.0000	0.0
			252	0.000000	0.0
'SABRE--K613FAE	'	02	255	13392.00	0.0
			252	0.000000	0.0
'1--AVHV3377--K	'	01	051	0.000000	0.0
'SAARE--K502FAE	'	02	255	744.0000	0.0
			252	0.000000	0.0
'SAARE--K613FAE	'	02	255	13392.00	0.0
			252	0.000000	0.0
'1--AVHV3376/7KCC	'	01	784	0.000000	0.0
'1SASDA5161A/BFCC	'	01	740	744.0000	0.0
'1SAREK502TA/BFCC	'	01	700	744.0000	0.0
'1SAREK613TA/BFCC	'	01	700	13392.00	0.0
'1--CVB13V038-K	'	01	062	0.000000	0.0
'1--CVB13V040-K	'	01	062	0.000000	0.0
'SAARE--K606FAE	'	02	255	13392.00	0.0
			252	0.000000	0.0
'1--AVP13V302-K	'	01	051	0.000000	0.0
'SABDEA516-1FAE	'	01	273	744.0000	0.0
'SABSDA516-3FAE	'	01	272	744.0000	0.0
'SABRE--K503FAE	'	02	255	744.0000	0.0
			252	0.000000	0.0
'SABRE--K622FAE	'	03	255	13392.00	0.0
			252	0.000000	0.0
			252	0.000000	0.0
'1--AVB13V301-K	'	01	051	0.000000	0.0
'SADEA516-1FAE	'	01	273	744.0000	0.0
'SAASDA516-3FAE	'	01	272	744.0000	0.0
'SAARE--K503FAE	'	02	255	744.0000	0.0
			252	0.000000	0.0
'SAARE--K622FAE	'	03	255	13392.00	0.0
			252	0.000000	0.0
			252	0.000000	0.0
'1--AV301/302-KCC	'	01	784	0.000000	0.0
'1SASDA5162A/BFCC	'	01	740	744.0000	0.0
'1SAREK503TA/BFCC	'	01	700	744.0000	0.0
'1SAREK606TA/BFCC	'	01	700	13392.00	0.0
'1--AVP13V304-K	'	01	051	0.000000	0.0
'1--AVP13V303-K	'	01	051	0.000000	0.0
'1--AV303/402-KCC	'	01	784	0.000000	0.0

Reviewer Note:

13,392 hrs. represents
 18 month test interval $t/2$.
 744 hrs represents bi-monthly
 test interval $t/2$.

BS 9/22/92

TABLE A-6
NSCIWS.TAB FILE

Simon5, VER 1.6 Table Output File
SIMON Case file for Tree: NSCIWS; Created: 02/28/92 14:55

02/28/92 15:08

FT IDENT	COMP	FAILURE MODE	FAIL RATE	VARIANCE	SOURCE	TIME	PROBABILITY	VARIANCE
1--CVG21V204-K	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1--AVHV3380--K	AV	AOV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
SAASDA516-2FAE	SD	SAFEGUARDS DRIVER CIRCUIT FAILS	3.960E-07	0.000E+00	POR1	7.440E+02	2.95E-04	0.00E+00
SAARE--K522FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	7.440E+02	3.79E-04	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CLOSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	3.88E-04	0.00E+00
SAARE--K612FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	1.339E+04	6.83E-03	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CLOSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	6.84E-03	0.00E+00
SAASRPHASW1FAE	SW	SWITCH (GENERAL TYPE) FAILS	1.700E-07	0.000E+00	TOP0	1.339E+04	2.28E-03	0.00E+00
SABSRPHASW2FAE	SW	SWITCH (GENERAL TYPE) FAILS	1.700E-07	0.000E+00	TOP0	1.339E+04	2.28E-03	0.00E+00
1SASRPHASEASWFCC	SW	CC/MGL; FAC(2/2 FAIL) 2.0E-02 ALL, SWITCH (GENERAL TYPE) FAILS	3.400E-09	0.000E+00	TOP0	1.339E+04	4.55E-05	0.00E+00
SAXOPMANPHA-AE	H	OPERATOR FAILS TO MANUALLY INITIATE CONTAINMENT ISOLATION PHASE A	9.990E-04	0.000E+00	HRA	0.000E+00	9.99E-04	0.00E+00
1--CVG21V291-K	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1--AVHV3376--K	AV	AOV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
SABSDA516-2FAE	SD	SAFEGUARDS DRIVER CIRCUIT FAILS	3.960E-07	0.000E+00	POR1	7.440E+02	2.95E-04	0.00E+00
SABRE--K502FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	7.440E+02	3.79E-04	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CLOSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	3.88E-04	0.00E+00
SABRE--K613FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	1.339E+04	6.83E-03	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CLOSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	6.84E-03	0.00E+00
1--AVHV3377--K	AV	AOV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
SAARE--K502FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	7.440E+02	3.79E-04	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CLOSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	3.88E-04	0.00E+00

TABLE A-6 (CONT.)

NSCIWS.TAB FILE

Simon5, VER 1.6

Table Output File

02/28/92 15:08

SIMON Case file for Tree: NSCIWS; Created: 02/28/92 14:55

FT IDENT	COMP	FAILURE MODE	FAIL RATE	VARIANCE	SOURCE	TIME	PROBABILITY	VARIANCE
SAARE--K613FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	1.339E+04	6.83E-03	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	6.84E-03	0.00E+00
1--AVHV3376/7KCC	AV	CC/MGL; FAC(2/2 FAIL) 2.0E-02 ALL, AOV FAILS TO OPERATE; EF=3	4.000E-05	8.990E-10	4550	0.000E+00	4.00E-05	8.99E-10
1SASDA5161A/BFCC	SD	CC/MGL; FAC(2/2 FAIL) 2.0E-02 ALL, SAFEGUARDS DRIVER CIRCUIT FAILS	7.920E-09	0.000E+00	POR1	7.440E+02	5.89E-06	0.00E+00
1SAREK502TA/BFCC	RE	CC/MGL; F(2/2) 2.0E-02 ALL, RE LAY FAILS DUR. OP. COMP. 251,2 53,254	1.020E-08	0.000E+00	TOP2	7.440E+02	7.59E-06	0.00E+00
1SAREK613TA/BFCC	RE	CC/MGL; F(2/2) 2.0E-02 ALL, RE LAY FAILS DUR. OP. COMP. 251,2 53,254	1.020E-08	0.000E+00	TOP2	1.339E+04	1.37E-04	0.00E+00
1--CVB13V038-K	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1--CVB13V040-K	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
SAARE--K606FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	1.339E+04	6.83E-03	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	6.84E-03	0.00E+00
1--AVP13V302-K	AV	AOV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
SABDEA516-1FAE	SD	SAFEGUARDS DRIVER DIODE FAILS	7.560E-09	0.000E+00	POR1	7.440E+02	5.62E-06	0.00E+00
SABSDA516-3FAE	SD	SAFEGUARDS DRIVER CIRCUIT FAIL S	3.960E-07	0.000E+00	POR1	7.440E+02	2.95E-04	0.00E+00
SABRE--K503FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	7.440E+02	3.79E-04	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	3.88E-04	0.00E+00
SABRE--K622FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	1.339E+04	6.83E-03	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	6.85E-03	0.00E+00
1--AVB13V301-K	AV	AOV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
SADEA516-1FAE	SD	SAFEGUARDS DRIVER DIODE FAILS	7.560E-09	0.000E+00	POR1	7.440E+02	5.62E-06	0.00E+00

TABLE A-6 (CONT.)

NSCIWS.TAB FILE

Simon5, VER 1.6

Table Output File

SIMON Case file for Tree: NSCIWS; Created: 02/28/92 14:55

02/28/92 15:08

FT IDENT	COMP	FAILURE MODE	FAIL RATE	VARIANCE	SOURCE	TIME	PROBABILITY	VARIANCE
SAASDA516-3FAE	SD	SAFEGUARDS DRIVER CIRCUIT FAILS	3.960E-07	0.000E+00	POR1	7.440E+02	2.95E-04	0.00E+00
SAARE--K503FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	7.440E+02	3.79E-04	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CLOSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	3.88E-04	0.00E+00
SAARE--K622FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	1.339E+04	6.83E-03	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CLOSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CLOSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	6.85E-03	0.00E+00
1--AV301/302-KCC	AV	CC/MGL; FAC(2/2 FAIL) 2.0E-02 ALL, ADV FAILS TO OPERATE; EF=3	4.000E-05	8.990E-10	4550	0.000E+00	4.00E-05	8.99E-10
1SASDA5162A/BFCC	SD	CC/MGL; FAC(2/2 FAIL) 2.0E-02 ALL, SAFEGUARDS DRIVER CIRCUIT FAILS	7.920E-09	0.000E+00	POR1	7.440E+02	5.89E-06	0.00E+00
1SAREK503TA/BFCC	RE	CC/MGL; F(2/2) 2.0E-02 ALL, RELAY FAILS DUR. OP. COMP. 251,253,254	1.020E-08	0.000E+00	TOP2	7.440E+02	7.59E-06	0.00E+00
1SAREK606TA/BFCC	RE	CC/MGL; F(2/2) 2.0E-02 ALL, RELAY FAILS DUR. OP. COMP. 251,253,254	1.020E-08	0.000E+00	TOP2	1.335E+04	1.37E-04	0.00E+00
1--AVP13V304-K	AV	ADV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
1--AVP13V303-K	AV	ADV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
1--AV303/402-KCC	AV	CC/MGL; FAC(2/2 FAIL) 2.0E-02 ALL, ADV FAILS TO OPERATE; EF=3	4.000E-05	8.990E-10	4550	0.000E+00	4.00E-05	8.99E-10

TABLE A-6 (CONT.)

NSCIWS.TAB FILE

CONFIGURATION CONTROL

CODE NAME : SIMONS
VERSION NO. : 1.60
DATE OF CONFIGURATION : NOVEMBER 21, 1989
DATE OF ISSUANCE : NOVEMBER 21, 1989
DATE : FEBRUARY 28, 1992
TIME : 15: 8:37: 6
CONFIGURATION NO. : 5079573209626

TABLE A-7
NSCIWS.OUT FILE

NSCIWS.CUT
FAULT TREE DESCRIPTION

Ver. 1.61 2/28/92 15:12:13

- (1) NUMBER OF GATES INPUT
- (2) NUMBER OF COMPONENTS INPUT
- (3) NUMBER OF EVENTS IN COM GATE TO BE CONSIDERED AT ONE TIME

GATE NAME	TYPE	(1)	(2)	(3)	NAMES OF THE INPUTS				
1. G0001	OR	5	0	0	G0002	G0021	G0054	G0067	G0100
2. G0002	AND	1	1	0	G0004	1--CVG21V204-K			
3. G0004	OR	1	1	0	G0006	1--AVHV3380--K			
4. G0006	AND	2	0	0	G0007	G0011			
5. G0007	OR	0	3	0	SAASDA516-2FAE	SAARE--K522FAE	SAARE--K612FAE		
6. G0011	OR	1	2	0	G0012	SAARE--K522FAE	SAARE--K612FAE		
7. G0012	OR	1	1	0	G0013	SAXOPMANPHA-AE			
8. G0013	OR	1	1	0	G0014	1SASRPHASEASWFCC			
9. G0014	AND	0	2	0	SAASRPHASW1FAE	SABSRPHASW2FAE			
10. G0021	OR	2	0	0	G0022	G0047			
11. G0022	AND	2	0	0	G0023	G0036			
12. G0023	OR	1	1	0	G0025	1--CVG21V291-K			
13. G0025	OR	1	1	0	G0027	1--AVHV3376--K			
14. G0027	AND	2	0	0	G0028	G0032			
15. G0028	OR	0	3	0	SABSDA516-2FAE	SABRE--K502FAE	SABRE--K613FAE		
16. G0032	OR	1	2	0	G0012	SABRE--K502FAE	SABRE--K613FAE		
17. G0036	OR	1	1	0	G0038	1--AVHV3377--K			
18. G0038	AND	2	0	0	G0039	G0043			
19. G0039	OR	0	3	0	SAASDA516-2FAE	SAARE--K502FAE	SAARE--K613FAE		
20. G0043	OR	1	2	0	G0012	SAARE--K502FAE	SAARE--K613FAE		
21. G0047	OR	1	3	0	G0049	1--AVHV3376/7KCC	1SAREK502TA/BFCC	1SAREK613TA/BFCC	
22. G0049	AND	1	1	0	G0012	1SASDA5161A/BFCC			
23. G0054	AND	1	1	0	G0056	1--CVB13V038-K			
24. G0056	OR	1	1	0	G0058	1--CVB13V040-K			
25. G0058	AND	2	0	0	G0059	G0063			
26. G0059	OR	0	3	0	SAASDA516-2FAE	SAARE--K522FAE	SAARE--K606FAE		
27. G0063	OR	1	2	0	G0012	SAARE--K522FAE	SAARE--K606FAE		
28. G0067	OR	2	0	0	G0068	G0093			
29. G0068	AND	2	0	0	G0069	G0021			
30. G0069	OR	1	1	0	G0071	1--AVP13V302-K			
31. G0071	AND	2	0	0	G0072	G0077			
32. G0072	OR	0	4	0	SABDEA516-1FAE	SABSDA516-3FAE	SABRE--K503FAE	SABRE--K622FAE	
33. G0077	OR	1	2	0	G0012	SABRE--K503FAE	SABRE--K622FAE		
34. G0081	OR	1	1	0	G0083	1--AVB13V301-K			
35. G0083	AND	2	0	0	G0084	G0089			
36. G0084	OR	0	4	0	SAASDA516-1FAE	SAASDA516-3FAE	SAARE--K503FAE	SAARE--K622FAE	

TABLE A-7 (CONT.)

NSCIWS.OUT FILE

NSCIWS.CUT
 FAULT TREE DESCRIPTION (CONT.)

Ver. 1.61 2/28/92 15:12:13

GATE NAME	TYPE	(1)	(2)	(3)	NAMES OF THE INPUTS	
37. G0089	OR	1	2	0	G0012	SAARE--K503FAE SAARE--K622FAE
38. G0093	OR	1	3	0	G0095	1--AV301/302-KCC 1SAREK503TA/BFCC 1SAREK606TA/BFCC
39. G0095	AND	1	1	0	G0012	1SASDA5162A/BFCC
40. G0100	OR	2	0	0	G0101	G0112
41. G0101	AND	2	0	0	G0102	G0107
42. G0102	OR	1	1	0	G0104	1--AVP13V304-K
43. G0104	AND	2	0	0	G0072	G0077
44. G0107	OR	1	1	0	G0109	1--AVP13V303-K
45. G0109	AND	2	0	0	G0084	G0089
46. G0112	OR	1	3	0	G0095	1--AV303/402-KCC 1SAREK503TA/BFCC 1SAREK606TA/BFCC

OUTPUT GATES REQUESTED

G0002 G0021 G0054 G0067
 G0100

TABLE A-7 (CONT.)

NSCIWS.OUT FILE

NSCIWS.CUT
BASIC EVENT LIST

Ver. 1.61 2/28/92 15:12:13

COMPONENT NAME	PROBABILITY	VARIANCE	GATES INPUT TO...
1. 1--CVG21V204-K	1.0000E-03	5.6200E-07	G0002
2. 1--AVHV3380--K	2.0000E-03	2.2500E-06	G0004
3. SAASDA516-2FAE	2.9500E-04	0.0000E+00	G0007
4. SAARE--K522FAE	3.8800E-04	0.0000E+00	G0007
5. SAARE--K612FAE	6.8400E-03	0.0000E+00	G0007
6. SAASRPHASW1FAE	2.2800E-03	0.0000E+00	G0014
7. SABS RPHASW2FAE	2.2800E-03	0.0000E+00	G0014
8. 1SASRPHASEASWFCC	4.5500E-05	0.0000E+00	G0013
9. SAXOPMANPHA-AE	9.9900E-04	0.0000E+00	G0012
10. 1--LVG21V291-K	1.0000E-03	5.6200E-07	G0023
11. 1--AVHV3376--K	2.0000E-03	2.2500E-06	G0025
12. SABS DA516-2FAE	2.9500E-04	0.0000E+00	G0028
13. SABRE--K502FAE	3.8800E-04	0.0000E+00	G0028
14. SABRE--K613FAE	6.8400E-03	0.0000E+00	G0028
15. 1--AVHV3377--K	2.0000E-03	2.2500E-06	G0036
16. SAARE--K502FAE	3.8800E-04	0.0000E+00	G0039
17. SAARE--K613FAE	6.8400E-03	0.0000E+00	G0039
18. 1--AVHV3376/7KCC	4.0000E-05	8.9900E-10	G0047
19. 1SASDA5161A/BFCC	5.8900E-06	0.0000E+00	G0049
20. 1SAREK502TA/BFCC	7.5900E-06	0.0000E+00	G0047
21. 1SAREK613TA/BFCC	1.3700E-04	0.0000E+00	G0047
22. 1--CVB13V038-K	1.0000E-03	5.6200E-07	G0054
23. 1--CVB13V040-K	1.0000E-03	5.6200E-07	G0056
24. SAARE--K606FAE	6.8400E-03	0.0000E+00	G0059
25. 1--AVP13V302-K	2.0000E-03	2.2500E-06	G0069
26. SABDEA516-1FAE	5.6200E-06	0.0000E+00	G0072
27. SABS DA516-3FAE	2.9500E-04	0.0000E+00	G0072
28. SABRE--K503FAE	3.8800E-04	0.0000E+00	G0072
29. SABRE--K622FAE	6.8500E-03	0.0000E+00	G0072
30. 1--AVB13V301-K	2.0000E-03	2.2500E-06	G0081
31. SADEA516-1FAE	5.6200E-06	0.0000E+00	G0084
32. SAAL7A516-3FAE	2.9500E-04	0.0000E+00	G0084
33. SAARE--K503FAE	3.8800E-04	0.0000E+00	G0084
34. SAARE--K622FAE	6.8500E-03	0.0000E+00	G0084
35. 1--AV301/302-KCC	4.0000E-05	8.9900E-10	G0093
36. 1SASDA5162A/BFCC	5.8900E-06	0.0000E+00	G0095
37. 1SAREK503TA/BFCC	7.5900E-06	0.0000E+00	G0093
38. 1SAREK606TA/BFCC	1.3700E-04	0.0000E+00	G0093
39. 1--AVP13V304-K	2.0000E-03	2.2500E-06	G0102
40. 1--AVP13V303-K	2.0000E-03	2.2500E-06	G0107
41. 1--AV303/402-KCC	4.0000E-05	8.9900E-10	G0112

TABLE A-7 (CONT.)

NSCIWS.OUT FILE

NSCIWS.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 15:12:13

Cutsets for GATE G0100 with a cutoff probability of 1.00E-09

1.	1.37E-04	1SAREK606TA/BFCC		
2.	4.69E-05	SABRE--K622FAE	SAARE--K622FAE	
3.	4.00E-05	1--AV303/402-KCC		
4.	1.37E-05	SAARE--K622FAE	1--AVP13V304-K	
5.	1.37E-05	SABRE--K622FAE	1--AVP13V303-K	
6.	7.59E-06	1SAREK503TA/BFCC		
7.	4.00E-06	1--AVP13V304-K	1--AVP13V303-K	
8.	2.66E-06	SABRE--K622FAE	SAARE--K503FAE	
9.	2.66E-06	SABRE--K503FAE	SAARE--K622FAE	
10.	7.76E-07	SAARE--K503FAE	1--AVP13V304-K	
11.	7.76E-07	SABRE--K503FAE	1--AVP13V303-K	
12.	1.51E-07	SABRE--K503FAE	SAARE--K503FAE	
13.	5.88E-09	SAXOPMANPHA-AE	1SASDA5162A/BFCC	
14.	2.02E-09	SAXOPMANPHA-AE	SABRE--K622FAE	SAASDA516-3FAE
15.	2.02E-09	SAXOPMANPHA-AE	SABSDA516-3FAE	SAARE--K622FAE

Reduced sum of cutset probabilities= 2.699E-04

Moments Results

Mean Probability of Failure= 2.696E-04

TABLE A-7 (CONT.)

NSCIWS.OUT FILE

NSCIWS.OUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 15:12:13

Cutsets for GATE G0054 with a cutoff probability of 1.00E-09

1.	6.84E-06	1--CVB13V038-K	SAARE--K606FAE
2.	1.00E-06	1--CVB13V038-K	1--CVB13V040-K
3.	3.88E-07	SAARE--K522FAE	1--CVB13V038-K

Reduced sum of cutset probabilities= 8.228E-06

Moments Results

Mean Probability of Failure= 8.228E-06

TABLE A-7 (CONT.)

NSCIWS.OUT FILE

NSCIWS.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 15:12:13

Cutsets for GATE G0002 with a cutoff probability of 1.00E-09

1.	6.84E-06	1--CVG21V204-K	SAARE--K612FAE
2.	2.00E-06	1--CVG21V204-K	1--AVHV3380--K
3.	3.88E-07	1--CVG21V204-K	SAARE--K522FAE

Reduced sum of cutset probabilities= 9.228E-06

Moments Results

Mean Probability of Failure= 9.228E-06

TABLE A-7 (CONT.)

NSCIWS.OUT FILE

NSCIWS.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 15:12:13

Cutsets for GATE G0021 with a cutoff probability of 1.00E-09

1.	1.37E-04	1SAREK613TA/BFCC		
2.	4.68E-05	SABRE--K613FAE	SAARE--K613FAE	
3.	4.00E-05	1--AVHV3376/7KCC		
4.	1.37E-05	1--AVHV3376--K	SAARE--K613FAE	
5.	1.37E-05	SABRE--K613FAE	1--AVHV3377--K	
6.	7.59E-06	1SAREK502TA/BFCC		
7.	6.84E-06	1--CVG21V291-K	SAARE--K613FAE	
8.	4.00E-06	1--AVHV3376--K	1--AVHV3377--K	
9.	2.65E-06	SABRE--K613FAE	SAARE--K502FAE	
10.	2.65E-06	SABRE--K502FAE	SAARE--K613FAE	
11.	2.00E-06	1--CVG21V291-K	1--AVHV3377--K	
12.	7.76E-07	1--AVHV3376--K	SAARE--K502FAE	
13.	7.76E-07	SABRE--K502FAE	1--AVHV3377--K	
14.	3.88E-07	1--CVG21V291-K	SAARE--K502FAE	
15.	1.51E-07	SABRE--K502FAE	SAARE--K502FAE	
16.	5.88E-09	SAXOPMANPHA-AE	1SASDA5161A/BFCC	
17.	2.02E-09	SAASDA516-2FAE	SAXOPMANPHA-AE	SABRE--K613FAE
18.	2.02E-09	SAXOPMANPHA-AE	SABSDA516-2FAE	SAARE--K613FAE

Reduced sum of cutset probabilities= 2.790E-04

Moments Results

Mean Probability of Failure= 2.786E-04

TABLE A-7 (CONT.)

NSCIWS.OUT FILE

NSCIWS.OUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 15:12:13

Cutsets for GATE G0067 with a cutoff probability of 1.00E-09

1.	1.37E-04	1SAR2K606TA/BFCC		
2.	4.69E-05	SABRE--K622FAE	SAARE--K622FAE	
3.	4.00E-05	1--AV301/302-KCC		
4.	1.37E-05	1--AVP13V302-K	SAARE--K622FAE	
5.	1.37E-05	SABRE--K622FAE	1--AVB13V301-K	
6.	7.59E-06	1SAREK503TA/BFCC		
7.	4.00E-06	1--AVP13V302-K	1--AVB13V301-K	
8.	2.66E-06	SABRE--K622FAE	SAARE--K503FAE	
9.	2.66E-06	SABRE--K503FAE	SAARE--K622FAE	
10.	7.76E-07	1--AVP13V302-K	SAARE--K503FAE	
11.	7.76E-07	SABRE--K503FAE	1--AVB13V301-K	
12.	1.51E-07	SABRE--K503FAE	SAARE--K503FAE	
13.	5.88E-09	SAXOPMANPHA-AE	1SASDA5162A/BFCC	
14.	2.02E-09	SAXOPMANPHA-AE	SABRE--K622FAE	SAASDA516-3FAE
15.	2.02E-09	SAXOPMANPHA-AE	SABSDA516-3FAE	SAARE--K622FAE

Reduced sum of cutset probabilities= 2.699E-04

Moments Results

Mean Probability of Failure= 2.696E-04

TABLE A-7 (CONT.)

NSCIWS.OUT FILE

NSCIWS.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 15:12:13

Cutsets for GATE G0001 with a cutoff probability of 1.00E-09

1.	1.37E-04	1SAREK606TA/BFCC		
2.	1.37E-04	1SAREK613TA/BFCC		
3.	4.69E-05	SABRE--K622FAE	SAARE--K622FAE	
4.	4.68E-05	SABRE--K613FAE	SAARE--K613FAE	
5.	4.00E-05	1--AV303/402-KCC		
6.	4.00E-05	1--AV301/302-KCC		
7.	4.00E-05	1--AVHV3376/7KCC		
8.	1.37E-05	SAARE--K622FAE	1--AVP13V304-K	
9.	1.37E-05	SABRE--K622FAE	1--AVP13V303-K	
10.	1.37E-05	1--AVP13V302-K	SAARE--K622FAE	
11.	1.37E-05	SABRE--K622FAE	1--AVB13V301-K	
12.	1.37E-05	1--AVHV3376--K	SAARE--K613FAE	
13.	1.37E-05	SABRE--K613FAE	1--AVHV3377--K	
14.	7.59E-06	1SAREK503TA/BFCC		
15.	7.59E-06	1SAREK502TA/BFCC		
16.	6.84E-06	1--CVB13V038-K	SAARE--K606FAE	
17.	6.84E-06	1--CVG21V291-K	SAARE--K613FAE	
18.	6.84E-06	1--CVG21V204-K	SAARE--K612FAE	
19.	4.00E-06	1--AVP13V304-K	1--AVP13V303-K	
20.	4.00E-06	1--AVP13V302-K	1--AVB13V301-K	
21.	4.00E-06	1--AVHV3376--K	1--AVHV3377--K	
22.	2.66E-06	SABRE--K622FAE	SAARE--K503FAE	
23.	2.66E-06	SABRE--K503FAE	SAARE--K622FAE	
24.	2.65E-06	SABRE--K613FAE	SAARE--K502FAE	
25.	2.65E-06	SABRE--K502FAE	SAARE--K613FAE	
26.	2.00E-06	1--CVG21V291-K	1--AVHV3377--K	
27.	2.00E-06	1--CVG21V204-K	1--AVHV3380--K	
28.	1.00E-06	1--CVB13V038-K	1--CVB13V040-K	
29.	7.76E-07	SAARE--K503FAE	1--AVP13V304-K	
30.	7.76E-07	SABRE--K503FAE	1--AVP13V303-K	
31.	7.76E-07	1--AVP13V302-K	SAARE--K503FAE	
32.	7.76E-07	SABRE--K503FAE	1--AVB13V301-K	
33.	7.76E-07	1--AVHV3376--K	SAARE--K502FAE	
34.	7.76E-07	SABRE--K502FAE	1--AVHV3377--K	
35.	3.88E-07	SAARE--K522FAE	1--CVB13V038-K	
36.	3.88E-07	1--CVG21V291-K	SAARE--K502FAE	
37.	3.88E-07	1--CVG21V204-K	SAARE--K522FAE	
38.	1.51E-07	SABRE--K503FAE	SAARE--K503FAE	
39.	1.51E-07	SABRE--K502FAE	SAARE--K502FAE	
40.	5.88E-09	SAXOPMANPHA-AE	1SASDA5162A/BFCC	
41.	5.88E-09	SAXOPMANPHA-AE	1SASDA5161A/BFCC	
42.	2.02E-09	SAXOPMANPHA-AE	SABRE--K622FAE	SAASDA516-3FAE
43.	2.02E-09	SAXOPMANPHA-AE	SABSDA516-3FAE	SAARE--K622FAE
44.	2.02E-09	SAASDA516-2FAE	SAXOPMANPHA-AE	SABRE--K613FAE
45.	2.02E-09	SAXOPMANPHA-AE	SABSDA516-2FAE	SAARE--K613FAE

Reduced sum of cutset probabilities= 6.392E-04

Moments Results

Mean Probability of Failure= 6.381E-04

Run ended at 15:12:22

TABLE A-7 (CONT.)

NSCIWS.OUT FILE

CONFIGURATION CONTROL

CODE NAME : WESCUT
VERSION NO. : 1.61
DATE OF CONFIGURATION : September 13, 1990
DATE OF ISSUANCE : September 13, 1990
DATE : FEBRUARY 28, 1992
TIME : 15:12:24:23
CONFIGURATION NO. : 5393361269634

TABLE A-8
NSCIWS.DES FILE

PAGE 1

TREE NAME: NSCIWS
CUTDES VER.1.7, 11-17-89
INPUT FILE: NSCIWS.CDS

CUT SETS FOR GATE G0100 WITH CUTOFF PROBABILITY OF 1.00E-09
GATE G0100 IS: CONTAINMENT LEAKAGE THROUGH PENETRATION 13A

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
1.	1.37E-04	SLAVE RELAY K606 TRAIN A AND B FAIL TO OPERATE	1.37E-04	1SAREK606TA/BFCC
2.	4.69E-05	SLAVE RELAY K622 FAILS SLAVE RELAY K622 FAILS	6.85E-03 6.85E-03	SABRE--K622FAE SAARE--K622FAE
3.	4.00E-05	AOV QnP13V304 AND QnP13V303 FAIL TO CLOSE	4.00E-05	1--AV303/402-KCC
4.	1.37E-05	SLAVE RELAY K622 FAILS AOV QnP13V304 FAILS TO CLOSE (HARDWARE)	6.85E-03 2.00E-03	SAARE--K622FAE 1--AVP13V304-K
5.	1.37E-05	SLAVE RELAY K622 FAILS AOV QnP13V303 FAILS TO CLOSE (HARDWARE)	6.85E-03 2.00E-03	SABRE--K622FAE 1--AVP13V303-K
6.	7.59E-06	MASTER RELAY K503 TRAIN A AND B FAIL TO OPERATE	7.59E-06	1SAREK503TA/BFCC
7.	4.00E-06	AOV QnP13V304 FAILS TO CLOSE (HARDWARE) AOV QnP13V303 FAILS TO CLOSE (HARDWARE)	2.00E-03 2.00E-03	1--AVP13V304-K 1--AVP13V303-K
8.	2.66E-06	SLAVE RELAY K622 FAILS MASTER RELAY K503 FAILS	6.85E-03 3.88E-04	SABRE--K622FAE SAARE--K503FAE
9.	2.66E-06	MASTER RELAY K503 FAILS SLAVE RELAY K622 FAILS	3.88E-04 6.85E-03	SABRE--K503FAE SAARE--K622FAE
10.	7.76E-07	MASTER RELAY K503 FAILS AOV QnP13V304 FAILS TO CLOSE (HARDWARE)	3.88E-04 2.00E-03	SAARE--K503FAE 1--AVP13V304-K
11.	7.76E-07	MASTER RELAY K503 FAILS AOV QnP13V303 FAILS TO CLOSE (HARDWARE)	3.88E-04 2.00E-03	SABRE--K503FAE 1--AVP13V303-K
12.	1.51E-07	MASTER RELAY K503 FAILS MASTER RELAY K503 FAILS	3.88E-04 3.88E-04	SABRE--K503FAE SAARE--K503FAE
13.	5.88E-09	OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION DRIVER CIRCUIT ON SFGDR DRIVER CARD A516-2 TRN A AND B FAIL	1.00E+00 5.89E-06	SAXOPMANPHA-AE 1SASDA5162A/BFCC
14.	2.02E-09	OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION SLAVE RELAY K622 FAILS DRIVER CIRCUIT ON SAFEGUARDS DRIVER CARD A516 FAILS	1.00E+00 6.85E-03 2.95E-04	SAXOPMANPHA-AE SABRE--K622FAE SAASDA516-3FAE
15.	2.02E-09	OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION DRIVER CIRCUIT ON SAFEGUARDS DRIVER CARD A516 FAILS SLAVE RELAY K622 FAILS	1.00E+00 2.95E-04 6.85E-03	SAXOPMANPHA-AE SABSDA516-3FAE SAARL--K622FAE

REDUCED SUM OF PROBABILITY OF FAILURE = 2.699E-04

TABLE A-8 (CONT.)

NSCIWS.DES FILE

PAGE 1 TREE NAME: NSCIWS
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: NSCIWS.CDS

CUT SETS FOR GATE G0054 WITH CUTOFF PROBABILITY OF 1.00E-09
 GATE G0054 IS: CONTAINMENT LEAKAGE THROUGH PENETRATION 30

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
1.	6.84E-06	CHECK VALVE QnB13V038 FAILS TO CLOSE SLAVE RELAY K606 FAILS	1.00E-03 6.84E-03	1--CVB13V038-K SAARE--K606FAE
2.	1.00E-06	CHECK VALVE QnB13V038 FAILS TO CLOSE AOV QnB13V040 FAILS TO CLOSE (HARDWARE)	1.00E-03 1.00E-03	1--CVB13V038-K 1--CVB13V040-K
3.	3.88E-07	MASTER RELAY K522 FAILS CHECK VALVE QnB13V038 FAILS TO CLOSE	3.88E-04 1.00E-03	SAARE--K522FAE 1--CVB13V038-K

REDUCED SUM OF PROBABILITY OF FAILURE = 8.228E-06

TABLE A-8 (CONT.)

NSCIWS.DES FILE

PAGE 1 TREE NAME: NSCIWS
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: NSCIWS.CDS

CUT SETS FOR GATE G0002 WITH CUTOFF PROBABILITY OF 1.00E-09
 GATE G0002 IS: CONTAINMENT LEAKAGE THROUGH PENETRATION 33

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
1.	6.84E-06	CHECK VALVE QnG21V204 FAILS TO CLOSE SLAVE RELAY K612 FAILS	1.00E-03 6.84E-03	1--CVG21V204-K SAARE--K612-AE
2.	2.00E-06	CHECK VALVE QnG21V204 FAILS TO CLOSE QnG21HV3380 FAILS TO CLOSE (HARDWARE)	1.00E-03 2.00E-03	1--CVG21V204-K 1--AVHV3380--K
3.	3.88E-07	CHECK VALVE QnG21V204 FAILS TO CLOSE MASTER RELAY K522 FAILS	1.00E-03 3.88E-04	1--CVG21V204-K SAARE--K522FAE

REDUCED SUM OF PROBABILITY OF FAILURE = 9.228E-06

TABLE A-8 (CONT.)

NSCIWS.DES FILE

PAGE 1

TREE NAME: NSCIWS
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: NSCIWS.CDS

CUT SETS FOR GATE G0021 WITH CUTOFF PROBABILITY OF 1.00E-09
 GATE G0021 IS: CONTAINMENT LEAKAGE THROUGH PENETRATION 78

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
1.	1.37E-04	SLAVE RELAY K613 TRAIN A AND B FAIL TO OPERATE	1.37E-04	1SAREK613TA/BFCC
2.	4.68E-05	SLAVE RELAY K613 FAILS SLAVE RELAY K613 FAILS	6.84E-03 6.84E-03	SABRE--K613FAE SAARE--K613FAE
3.	4.00E-05	AOV QnG21HV3376 AND QnG21HV3377 FAIL TO CLOSE (HARDWARE)	4.00E-05	1--AVHV3376/7KCC
4.	1.37E-05	AOV QnG21HV3376 FAILS TO CLOSE (HARDWARE) SLAVE RELAY K613 FAILS	2.00E-03 6.84E-03	1--AVHV3376--K SAARE--K613FAE
5.	1.37E-05	SLAVE RELAY K613 FAILS AOV QnG21HV3377 FAILS TO CLOSE (HARDWARE)	6.84E-03 2.00E-03	SABRE--K613FAE 1--AVHV3377--K
6.	7.59E-06	MASTER RELAY K502 TRAIN A AND B FAIL TO OPERATE	7.59E-06	1SAREK502TA/BFCC
7.	6.84E-06	CHECK VALVE QnG21V291 FAILS TO CLOSE SLAVE RELAY K613 FAILS	1.00E-03 6.84E-03	1--CVG21V291-K SAARE--K613FAE
8.	4.00E-06	AOV QnG21HV3376 FAILS TO CLOSE (HARDWARE) AOV QnG21HV3377 FAILS TO CLOSE (HARDWARE)	2.00E-03 2.00E-03	1--AVHV3376--K 1--AVHV3377--K
9.	2.65E-06	SLAVE RELAY K613 FAILS MASTER RELAY K502 FAILS	6.84E-03 3.88E-04	SABRE--K613FAE SAARE--K502FAE
10.	2.65E-06	MASTER RELAY K502 FAILS SLAVE RELAY K613 FAILS	3.88E-04 6.84E-03	SABRE--K502FAE SAARE--K613FAE
11.	2.00E-06	CHECK VALVE QnG21V291 FAILS TO CLOSE AOV QnG21HV3377 FAILS TO CLOSE (HARDWARE)	1.00E-03 2.00E-03	1--CVG21V291-K 1--AVHV3377--K
12.	6E-07	AOV QnG21HV3376 FAILS TO CLOSE (HARDWARE) MASTER RELAY K502 FAILS	2.00E-03 3.88E-04	1--AVHV3376--K SAARE--K502FAE
13.	7.76E-07	MASTER RELAY K502 FAILS AOV QnG21HV3377 FAILS TO CLOSE (HARDWARE)	3.88E-04 2.00E-03	SABRE--K502FAE 1--AVHV3377--K
14.	3.88E-07	CHECK VALVE QnG21V291 FAILS TO CLOSE MASTER RELAY K502 FAILS	1.00E-03 3.88E-04	1--CVG21V291-K SAARE--K502FAE
15.	1.51E-07	MASTER RELAY K502 FAILS MASTER RELAY K502 FAILS	3.88E-04 3.88E-04	SABRE--K502FAE SAARE--K502FAE
16.	5.88E-09	OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION DRIVER CIRCUITS ON SFGRD DRIVER CARD A516 TRNS A AND B FAIL	1.00E+00 5.89E-06	SAXOPMANPHA-AE 1SASDA5161A/BFCC
17.	2.02E-09	DRIVER CIRCUIT ON SAFEGUARDS DRIVER CARD A516 FAILS OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION SLAVE RELAY K613 FAILS	2.95E-04 1.00E+00 6.84E-03	SAASDA516-2FAE SAXOPMANPHA-AE SABRE--K613FAE
18.	2.02E-09	OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION DRIVER CIRCUIT ON SAFEGUARDS DRIVER CARD A516 FAILS SLAVE RELAY K613 FAILS	1.00E+00 2.95E-04 6.84E-03	SAXOPMANPHA-AE SABSDA516-2FAE SAARE--K613FAE

REDUCED SUM OF PROBABILITY OF FAILURE = 2.790E-04

TABLE A-8 (CONT.)

NSCIWS.DES FILE

PAGE 1

TREE NAME: NSCIWS
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: NSCIWS.CDS

CUT SETS FOR GATE G0067 WITH CUTOFF PROBABILITY OF 1.00E-09
 GATE G0067 IS: CONTAINMENT LEAKAGE THROUGH PENETRATION 12A

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
1.	1.37E-04	SLAVE RELAY K606 TRAIN A AND B FAIL TO OPERATE	1.37E-04	1SAREK606TA/BFCC
2.	4.69E-05	SLAVE RELAY K622 FAILS SLAVE RELAY K622 FAILS	6.85E-03 6.85E-03	SABRE--K622FAE SAARE--K622FAE
3.	4.00E-05	AOV QnP13V302 AND QnP13V301 FAIL TO CLOSE	4.00E-05	1--AV301/302-KCC
4.	1.37E-05	AOV QnP13V302 FAILS TO CLOSE (HARDWARE) SLAVE RELAY K622 FAILS	2.00E-03 6.85E-03	1--AVP13V302-K SAARE--K622FAE
5.	1.37E-05	SLAVE RELAY K622 FAILS AOV QnP13V301 FAILS TO CLOSE (HARDWARE)	6.85E-03 2.00E-03	SABRE--K622FAE 1--AVB13V301-K
6.	7.59E-06	MASTER RELAY K503 TRAIN A AND B FAIL TO OPERATE	7.59E-06	1SAREK503TA/BFCC
7.	4.00E-06	AOV QnP13V302 FAILS TO CLOSE (HARDWARE) AOV QnP13V301 FAILS TO CLOSE (HARDWARE)	2.00E-03 2.00E-03	1--AVP13V302-K 1--AVB13V301-K
8.	2.66E-06	SLAVE RELAY K622 FAILS MASTER RELAY K503 FAILS	6.85E-03 3.88E-04	SABRE--K622FAE SAARE--K503FAE
9.	2.66E-06	MASTER RELAY K503 FAILS SLAVE RELAY K622 FAILS	3.88E-04 6.85E-03	SABRE--K503FAE SAARE--K622FAE
10.	7.76E-07	AOV QnP13V302 FAILS TO CLOSE (HARDWARE) MASTER RELAY K503 FAILS	2.00E-03 3.88E-04	1--AVP13V302-K SAARE--K503FAE
11.	7.76E-07	MASTER RELAY K503 FAILS AOV QnP13V301 FAILS TO CLOSE (HARDWARE)	3.88E-04 2.00E-03	SABRE--K503FAE 1--AVB13V301-K
12.	1.51E-07	MASTER RELAY K503 FAILS MASTER RELAY K503 FAILS	3.88E-04 3.88E-04	SABRE--K503FAE SAARE--K503FAE
13.	5.88E-09	OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION DRIVER CIRCUIT ON SFGDR DRIVER CARD A516-2 TRN A AND B FAIL	1.00E+00 5.89E-06	SAXOPMANPHA-AE 1SASDA5162A/BFCC
14.	2.02E-09	OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION SLAVE RELAY K622 FAILS DRIVER CIRCUIT ON SAFEGUARDS DRIVER CARD A516 FAILS	1.00E+00 6.85E-03 2.95E-04	SAXOPMANPHA-AE SABRE--K622FAE SASDA516-3FAE
15.	2.02E-09	OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION DRIVER CIRCUIT ON SAFEGUARDS DRIVER CARD A516 FAILS SLAVE RELAY K622 FAILS	1.00E+00 2.95E-04 6.85E-03	SAXOPMANPHA-AE SABSDA516-3FAE SAARE--K622FAE

REDUCED SUM OF PROBABILITY OF FAILURE = 2.699E-04

TABLE A-8 (CONT.)

NSCIWS.DES FILE

PAGE 1 TREE NAME: NSCIWS
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: NSCIWS.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-09
 GATE G0001 IS: CNT. ISOL. THRU NON-SAFETY LINES GIVEN "S" SIGNAL

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
1.	1.37E-04	SLAVE RELAY K606 TRAIN A AND B FAIL TO OPERATE	1.37E-04	1SAREK606TA/BFCC
2.	1.37E-04	SLAVE RELAY K613 TRAIN A AND B FAIL TO OPERATE	1.37E-04	1SAREK613TA/BFCC
3.	4.69E-05	SLAVE RELAY K622 FAILS SLAVE RELAY K622 FAILS	6.85E-03 6.85E-03	SABRE--K622FAE SAARE--K622FAE
4.	4.68E-05	SLAVE RELAY K613 FAILS SLAVE RELAY K613 FAILS	6.84E-03 6.84E-03	SABRE--K613FAE SAARE--K613FAE
5.	4.00E-05	AOV QnP13V304 AND QnP13V303 FAIL TO CLOSE	4.00E-05	1--AV303/402-KCC
6.	4.00E-05	AOV QnP13V302 AND QnP13V301 FAIL TO CLOSE	4.00E-05	1--AV301/302-KCC
7.	4.00E-05	AOV QnG21HV3376 AND QnG21HV3377 FAIL TO CLOSE (HARDWARE)	4.00E-05	1--AVHV3376/7KCC
8.	1.37E-05	SLAVE RELAY K622 FAILS AOV QnP13V304 FAILS TO CLOSE (HARDWARE)	6.85E-03 2.00E-03	SAARE--K622FAE 1--AVP13V304-K
9.	1.37E-05	SLAVE RELAY K622 FAILS AOV QnP13V303 FAILS TO CLOSE (HARDWARE)	6.85E-03 2.00E-03	SABRE--K622FAE 1--AVP13V303-K
10.	1.37E-05	AOV QnP13V302 FAILS TO CLOSE (HARDWARE) SLAVE RELAY K622 FAILS	2.00E-03 6.85E-03	1--AVP13V302-K SAARE--K622FAE
11.	1.37E-05	SLAVE RELAY K622 FAILS AOV QnP13V301 FAILS TO CLOSE (HARDWARE)	6.85E-03 2.00E-03	SABRE--K622FAE 1--AVB13V301-K
12.	1.37E-05	AOV QnG21HV3376 FAILS TO CLOSE (HARDWARE) SLAVE RELAY K613 FAILS	2.00E-03 6.84E-03	1--AVHV3376--K SAARE--K613FAE
13.	1.37E-05	SLAVE RELAY K613 FAILS AOV QnG21HV3377 FAILS TO CLOSE (HARDWARE)	6.84E-03 2.00E-03	SABRE--K613FAE 1--AVHV3377--K
14.	7.59E-06	MASTER RELAY K503 TRAIN A AND B FAIL TO OPERATE	7.59E-06	1SAREK503TA/BFCC
15.	7.59E-06	MASTER RELAY K502 TRAIN A AND B FAIL TO OPERATE	7.59E-06	1SAREK502TA/BFCC
16.	6.84E-06	CHECK VALVE QnB13V038 FAILS TO CLOSE SLAVE RELAY K606 FAILS	1.00E-03 6.84E-03	1--CVB13V038-K SAARE--K606FAE
17.	6.84E-06	CHECK VALVE QnG21V291 FAILS TO CLOSE SLAVE RELAY K613 FAILS	1.00E-03 6.84E-03	1--CVG21V291-K SAARE--K613FAE
18.	6.84E-06	CHECK VALVE QnG21V204 FAILS TO CLOSE SLAVE RELAY K612 FAILS	1.00E-03 6.84E-03	1--CVG21V204-K SAARE--K612FAE
19.	4.00E-06	AOV QnP13V304 FAILS TO CLOSE (HARDWARE) AOV QnP13V303 FAILS TO CLOSE (HARDWARE)	2.00E-03 2.00E-03	1--AVP13V304-K 1--AVP13V303-K

TABLE A-8 (CONT.)

NSCIWS.DES FILE

PAGE 2

TREE NAME: NSCIWS
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: NSCIWS.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-09 (page 2)
 GATE G0001 IS: CNT. ISOL. THRU NON-SAFETY LINES GIVEN "S" SIGNAL

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
20.	4.00E-06	AOV QnP13V302 FAILS TO CLOSE (HARDWARE) AOV QnP13V301 FAILS TO CLOSE (HARDWARE)	2.00E-03 2.00E-03	1--AVP13V302-K 1--AVB13V301-K
21.	4.00E-06	AOV QnG21HV3376 FAILS TO CLOSE (HARDWARE) AOV QnG21HV3377 FAILS TO CLOSE (HARDWARE)	2.00E-03 2.00E-03	1--AVHV3376--K 1--AVHV3377--K
22.	2.66E-06	SLAVE RELAY K622 FAILS MASTER RELAY K503 FAILS	6.85E-03 3.88E-04	SABRE--K622FAE SAARE--K503FAE
23.	2.66E-06	MASTER RELAY K503 FAILS SLAVE RELAY K622 FAILS	3.88E-04 6.85E-03	SABRE--K503FAE SAARE--K622FAE
24.	2.65E-06	SLAVE RELAY K613 FAILS MASTER RELAY K502 FAILS	6.84E-03 3.88E-04	SABRE--K613FAE SAARE--K502FAE
25.	2.65E-06	MASTER RELAY K502 FAILS SLAVE RELAY K613 FAILS	3.88E-04 6.84E-03	SABRE--K502FAE SAARE--K613FAE
26.	2.00E-06	CHECK VALVE QnG21V291 FAILS TO CLOSE AOV QnG21HV3377 FAILS TO CLOSE (HARDWARE)	1.00E-03 2.00E-03	1--CVG21V291-K 1--AVHV3377--K
27.	2.00E-06	CHECK VALVE QnG21V204 FAILS TO CLOSE QnG21HV3380 FAILS TO CLOSE (HARDWARE)	1.00E-03 2.00E-03	1--CVG21V204-K 1--AVHV3380--K
28.	1.00E-06	CHECK VALVE QnB13V038 FAILS TO CLOSE AOV QnB13V040 FAILS TO CLOSE (HARDWARE)	1.00E-03 1.00E-03	1--CVB13V038-K 1--CVB13V040-K
29.	7.76E-07	MASTER RELAY K503 FAILS AOV QnP13V304 FAILS TO CLOSE (HARDWARE)	3.88E-04 2.00E-03	SAARE--K503FAE 1--AVP13V304-K
30.	7.76E-07	MASTER RELAY K503 FAILS AOV QnP13V303 FAILS TO CLOSE (HARDWARE)	3.88E-04 2.00E-03	SABRE--K503FAE 1--AVP13V303-K
31.	7.76E-07	AOV QnP13V302 FAILS TO CLOSE (HARDWARE) MASTER RELAY K503 FAILS	2.00E-03 3.88E-04	1--AVP13V302-K SAARE--K503FAE
32.	7.76E-07	MASTER RELAY K503 FAILS AOV QnP13V301 FAILS TO CLOSE (HARDWARE)	3.88E-04 2.00E-03	SABRE--K503FAE 1--AVB13V301-K
33.	7.76E-07	AOV QnG21HV3376 FAILS TO CLOSE (HARDWARE) MASTER RELAY K502 FAILS	2.00E-03 3.88E-04	1--AVHV3376--K SAARE--K502FAE
34.	7.76E-07	MASTER RELAY K502 FAILS AOV QnG21HV3377 FAILS TO CLOSE (HARDWARE)	3.88E-04 2.00E-03	SABRE--K502FAE 1--AVHV3377--K
35.	3.88E-07	MASTER RELAY K522 FAILS CHECK VALVE QnB13V038 FAILS TO CLOSE	3.88E-04 1.00E-03	SAARE--K522FAE 1--CVB13V038-K

TABLE A-8 (CONT.)

NSCIWS.DES FILE

PAGE 3

TREE NAME: NSCIWS
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: NSCIWS.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-09 (page 3)
 GATE G0001 IS: CNT. ISOL. THRU NON-SAFETY LINES GIVEN "S" SIGNAL

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
36.	3.88E-07	CHECK VALVE QnG21V291 FAILS TO CLOSE MASTER RELAY K502 FAILS	1.00E-03 3.88E-04	1--CVG21V291-K SAARE--K502FAE
37.	3.88E-07	CHECK VALVE QnG21V204 FAILS TO CLOSE MASTER RELAY K522 FAILS	1.00E-03 3.88E-04	1--CVG21V204-K SAARE--K522FAE
38.	1.51E-07	MASTER RELAY K503 FAILS MASTER RELAY K503 FAILS	3.88E-04 3.88E-04	SABRE--K503FAE SAARE--K503FAE
39.	1.51E-07	MASTER RELAY K502 FAILS MASTER RELAY K502 FAILS	3.88E-04 3.88E-04	SABRE--K502FAE SAARE--K502FAE
40.	5.88E-09	OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION DRIVER CIRCUIT ON SFGDR DRIVER CARD A516-2 TRN A AND B FAIL	1.00E+00 5.89E-06	SAXOPMANPHA-AE 1SASDA5162A/BFCC
41.	5.88E-09	OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION DRIVER CIRCUITS ON SFGDR DRIVER CARD A516 TRNS A AND B FAIL	1.00E+00 5.89E-06	SAXOPMANPHA-AE 1SASDA5161A/BFCC
42.	2.02E-09	OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION SLAVE RELAY K622 FAILS DRIVER CIRCUIT ON SAFEGUARDS DRIVER CARD A516 FAILS	1.00E+00 6.85E-03 2.95E-04	SAXOPMANPHA-AE SABRE--K622FAE SAASDA516-3FAE
43.	2.02E-09	OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION DRIVER CIRCUIT ON SAFEGUARDS DRIVER CARD A516 FAILS SLAVE RELAY K622 FAILS	1.00E+00 2.95E-04 6.85E-03	SAXOPMANPHA-AE SABSDA516-3FAE SAARE--K622FAE
44.	2.02E-09	DRIVER CIRCUIT ON SAFEGUARDS DRIVER CARD A516 FAILS OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION SLAVE RELAY K613 FAILS	2.95E-04 1.00E+00 6.84E-03	SAASDA516-2FAE SAXOPMANPHA-AE SABRE--K613FAE
45.	2.02E-09	OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION DRIVER CIRCUIT ON SAFEGUARDS DRIVER CARD A516 FAILS SLAVE RELAY K613 FAILS	1.00E+00 2.95E-04 6.84E-03	SAXOPMANPHA-AE SABSDA516-2FAE SAARE--K613FAE

REDUCED SUM OF PROBABILITY OF FAILURE = 6.392E-04

TABLE A-8 (CONT.)

NSCIWS.DES FILE

CONFIGURATION CONTROL

CODE NAME : CUTDES
VERSION NO. : 1.70
DATE OF CONFIGURATION : NOVEMBER 21, 1989
DATE OF ISSUANCE : NOVEMBER 21, 1989
DATE : DECEMBER 4, 1992
TIME : 12: 7: 9:90
CONFIGURATION NO. : 5201672232766

TABLE A-9

COMPONENT GROUPS USED IN COMMON CAUSE FAILURE
CALCULATION OF THE NSCI FAULT TREE

Index No.	Component Numbers	Function	Group Size
1	QnP13V301 QnP13V302	Air Operated Isolation Valves of Containment Penetration 12a	2
2	QnP13V303 QnP13V304	Air Operated Isolation Valves of Containment Penetration 13a	2
3	QnG21HV3376 QnG21HV3377	Air Operated Isolation Valves of Containment Penetration 78	2
4	K502A K502B	Master Relays for Processing of Signals for Isolation Valves of Containment Penetration 78	2
5	K503A K503B	Master Relays for Processing of Signals for Isolation Valves of Containment Penetrations 12a and 12b	2
6	K613A K613B	Slave Relays for Processing of Signals for Isolation Valves of Containment Penetration 78	2
7	K622A K622B	Slave Relays for Processing of Signals for Isolation Valves of Containment Penetrations 12a and 13a	2
8	PHASEAS1 PHASEAS2	Main Control Board Switches for Manual Activation of Containment Isolation Phase A	2

TABLE A-10
NSCI.SIM FILE

VER 1.6

'SIMON Case file for Tree: NSCI; Created: 12/06/91 14:54'

33

'1--CVG21V204-K	'	01	062	0.000000	0.0
'1--AVHV3380--F	'	01	051	0.000000	0.0
'SAASRPHASW1FAE	'	01	262	13392.00	0.0
'SABSRPHASW2FAE	'	01	262	13392.00	0.0
'1SASRPHASEASWFCC'	'	01	684	13392.00	0.0
'SAXOPMANPHA-AE	'	01	868	0.000000	0.0
'SAARE--K522FAE	'	02	255	744.0000	0.0
			252	0.000000	0.0
'SAARE--K612FAE	'	02	255	13392.00	0.0
			252	0.000000	0.0
'1--CVG21V291-K	'	01	062	0.000000	0.0
'1--AVHV3376--K	'	01	051	0.000000	0.0
'SABRE--K502FAE	'	02	255	744.0000	0.0
			252	0.000000	0.0
'SABRE--K613FAE	'	02	255	13392.00	0.0
			252	0.000000	0.0
'1--AVHV3377--K	'	01	051	0.000000	0.0
'SAARE--K502FAE	'	02	255	744.0000	0.0
			252	0.000000	0.0
'SAARE--K613FAE	'	02	255	13392.00	0.0
			252	0.000000	0.0
'1--AVHV3376/7KCC'	'	01	784	0.000000	0.0
'1SAREK502TA/BFCC'	'	01	700	744.0000	0.0
'1SAREK613TA/BFCC'	'	01	700	13392.00	0.0
'1--CVB13V038-K	'	01	062	0.000000	0.0
'1--CVB13V040-K	'	01	062	0.000000	0.0
'SAARE--K606FAE	'	02	255	13392.00	0.0
			252	0.000000	0.0
'1--AVP13V302-K	'	01	051	0.000000	0.0
'SABRE--K503FAE	'	02	255	744.0000	0.0
			252	0.000000	0.0
'SABRE--K622FAE	'	03	255	13392.00	0.0
			252	0.000000	0.0
			252	0.000000	0.0
'1--AVB13V301-K	'	01	051	0.000000	0.0
'SAARE--K503FAE	'	02	255	744.0000	0.0
			252	0.000000	0.0
'SAARE--K622FAE	'	03	255	13392.00	0.0
			252	0.000000	0.0
			252	0.000000	0.0
'1--AV301/302-KCC'	'	01	784	0.000000	0.0
'1SAREK502TA/BFCC'	'	01	700	744.0000	0.0
'1SAREK606TA/BFCC'	'	01	700	13392.00	0.0
'1--AVP13V304-K	'	01	051	0.000000	0.0
'1--AVP13V303-K	'	01	051	0.000000	0.0
'1--AV303/402-KCC'	'	01	784	0.000000	0.0

TABLE A-11
NSCI.TAB FILE

Simon5, VER 1.6 Table Output File
SIMON Case file for Tree: NSCI; Created: 12/06/91 14:54

02/28/92 15:38

FT IDENT	COMP	FAILURE MODE	FAIL RATE	VARIANCE	SOURCE	TIME	PROBABILITY	VARIANCE
1--CVG21V204-K	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1--AVHV3380--F	AV	ADV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
SAASRPHASW1FAE	SW	SWITCH (GENERAL TYPE) FAILS	1.700E-07	0.000E+00	TOP0	1.339E+04	2.28E-03	0.00E+00
SABSRPHASW2FAE	SW	SWITCH (GENERAL TYPE) FAILS	1.700E-07	0.000E+00	TOP0	1.339E+04	2.28E-03	0.00E+00
1SASRPHASEASWFCC	SW	CC/MGL; FAC(2/2 FAIL) 2.0E-02 ALL, SWITCH (GENERAL TYPE) FAI LS	3.400E-09	0.000E+00	TOP0	1.339E+04	4.55E-05	0.00E+00
SAXOPMANPHA-AE	H	OPERATOR FAILS TO MANUALLY INI TIA TE CONTAINMENT ISOLATION PH ASE A	9.990E-04	0.000E+00	HRA	0.000E+00	9.99E-04	0.00E+00
SAARE--K522FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	7.440E+02	3.79E-04	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	3.88E-04	0.00E+00
SAARE--K612FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	1.339E+04	6.83E-03	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	6.84E-03	0.00E+00
1--CVG21V291-K	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1--AVHV3376--K	AV	ADV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
SABRE--K502FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	7.440E+02	3.79E-04	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	3.88E-04	0.00E+00
SABRE--K613FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	1.339E+04	6.83E-03	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	6.84E-03	0.00E+00
1--AVHV3377--K	AV	ADV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
SAARE--K502FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	7.440E+02	3.79E-04	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	3.88E-04	0.00E+00
SAARE--K613FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	1.339E+04	6.83E-03	0.00E+00

TABLE A-11 (CONT.)

NSCI.TAB FILE

Simon5, VER 1.6
SIMON Case file for Tree: NSCI; Created: 12/06/91 14:54

Table Output File

02/28/92 15:38

FT IDENT	COMP	FAILURE MODE	FAIL RATE	VARIANCE	SOURCE	TIME	PROBABILITY	VARIANCE
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	6.84E-03	0.00E+00
1--AVHV3376/7KCC	AV	CC/MGL; FAC(2/2 FAIL) 2.0E-02 ALL, AOV FAILS TO OPERATE; EF=3	4.000E-05	8.990E-10	4550	0.000E+00	4.00E-05	8.99E-10
1SAREK502TA/BFCC	RE	CC/MGL; F(2/2) 2.0E-02 ALL, RE LAY FAILS DUR. OP. COMP. 251,2 53,254	1.020E-08	0.000E+00	TOP2	7.440E+02	7.59E-06	0.00E+00
1SAREK613TA/BFCC	RE	CC/MGL; F(2/2) 2.0E-02 ALL, RE LAY FAILS DUR. OP. COMP. 251,2 53,254	1.020E-08	0.000E+00	TOP2	1.339E+04	1.37E-04	0.00E+00
1--CVB13V038-K	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1--CVB13V040-K	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
SAARE--K606FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	1.339E+04	6.83E-03	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	6.84E-03	0.00E+00
1--AVP13V302-K	AV	AOV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
SABRE--K503FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	7.440E+02	3.79E-04	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	3.88E-04	0.00E+00
SABRE--K622FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	1.339E+04	6.83E-03	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	6.85E-03	0.00E+00
1--AVB13V301-K	AV	AOV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
SAARE--K503FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	7.440E+02	3.79E-04	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	3.88E-04	0.00E+00
SAARE--K622FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	1.339E+04	6.83E-03	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00

TABLE A-11 (CONT.)

NSCI.TAB FILE

Simon5, VER 1.6 Table Output File
 SIMON Case file for Tree: NSCI; Created: 12/06/91 14:54

02/28/92 15:38

FT IDENT	COMP	FAILURE MODE	FAIL RATE	VARIANCE	SOURCE	TIME	PROBABILITY	VARIANCE
	DN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	6.85E-03	0.00E+00
1--AV301/302-KCC	AV	CC/MGL; FAC(2/2 FAIL) 2.0E-02 ALL, ADV FAILS TO OPERATE; EF=3	4.000E-05	8.990E-10	4550	0.000E+00	4.00E-05	8.99E-10
1SAREK503TA/BFCC	RE	CC/MGL; F(2/2) 2.0E-02 ALL, RE LAY FAILS DUR. OP. COMP. 251,2 53,254	1.020E-08	0.000E+00	TOP2	7.440E+02	7.59E-06	0.00E+00
1SAREK606TA/BFCC	RE	CC/MGL; F(2/2) 2.0E-02 ALL, RE LAY FAILS DUR. OP. COMP. 251,2 53,254	1.020E-08	0.000E+00	TOP2	1.339E+04	1.37E-04	0.00E+00
1--AVP13V304-K	AV	AOV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
1--AVP13V303-K	AV	AOV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
1--AV303/402-KCC	AV	CC/MGL; FAC(2/2 FAIL) 2.0E-02 ALL, ADV FAILS TO OPERATE; EF=3	4.000E-05	8.990E-10	4550	0.000E+00	4.00E-05	8.99E-10

TABLE A-11 (CONT.)

NSCI.TAB FILE

CONFIGURATION CONTROL

CODE NAME : SIMON5
VERSION NO. : 1.60
DATE OF CONFIGURATION : NOVEMBER 21, 1989
DATE OF ISSUANCE : NOVEMBER 21, 1989
DATE : FEBRUARY 28, 1992
TIME : 15:38:23:13
CONFIGURATION NO. : 5079573202619

TABLE A-12
NSCI.OUT FILE

NSCI.CUT
FAULT TREE DESCRIPTION

Ver. 1.61 2/28/92 15:41:00

- (1) NUMBER OF GATES INPUT
- (2) NUMBER OF COMPONENTS INPUT
- (3) NUMBER OF EVENTS IN COM GATE TO BE CONSIDERED AT ONE TIME

GATE NAME	TYPE	(1)	(2)	(3)	NAMES OF THE INPUTS				
1. G0001	OR	5	0	0	G0002	G0016	G0036	G0044	G0062
2. G0002	AND	1	1	0	G0004	1--CVG21V204-K			
3. G0004	OR	1	1	0	G0006	1--AVHV3380--F			
4. G0006	OR	1	2	0	G0007	SAARE--K522FAE	SAARE--K612FAE		
5. G0007	OR	1	1	0	G0008	SAXOPMANPHA-AE			
6. G0008	OR	1	1	0	G0009	1SASRPHASEASWFCC			
7. G0009	AND	0	2	0	SAASRPHASW1FAE	SABSRPHASW2FAE			
8. G0016	OR	2	0	0	G0017	G0032			
9. G0017	AND	2	0	0	G0018	G0026			
10. G0018	OR	1	1	0	G0020	1--CVG21V291-K			
11. G0020	OR	1	1	0	G0022	1--AVHV3376--K			
12. G0022	OR	1	2	0	G0007	SABRE--K502FAE	SABRE--K613FAE		
13. G0026	OR	1	1	0	G0028	1--AVHV3377--K			
14. G0028	OR	1	2	0	G0007	SAARE--K502FAE	SAARE--K613FAE		
15. G0032	OR	0	3	0	1--AVHV3376/7KCC	1SAREK502TA/BFCC	1SAREK613TA/BFCC		
16. G0036	AND	1	1	0	G0038	1--CVB13V038-K			
17. G0038	OR	1	1	0	G0040	1--CVB13V040-K			
18. G0040	OR	1	2	0	G0007	SAARE--K522FAE	SAARE--K606FAE		
19. G0044	OR	2	0	0	G0045	G0058			
20. G0045	AND	2	0	0	G0046	G0052			
21. G0046	OR	1	1	0	G0048	1--AVP13V302-K			
22. G0048	OR	1	2	0	G0007	SABRE--K503FAE	SABRE--K622FAE		
23. G0052	OR	1	1	0	G0054	1--AVB13V301-K			
24. G0054	OR	1	2	0	G0007	SAARE--K503FAE	SAARE--K622FAE		
25. G0058	OR	0	3	0	1--AV301/302-KCC	1SAREK503TA/BFCC	1SAREK606TA/BFCC		
26. G0062	OR	2	0	0	G0063	G0070			
27. G0063	AND	2	0	0	G0064	G0067			
28. G0064	OR	1	1	0	G0048	1--AVP13V304-K			
29. G0067	OR	1	1	0	G0054	1--AVP13V303-K			
30. G0070	OR	0	3	0	1--AV303/402-KCC	1SAREK503TA/BFCC	1SAREK606TA/BFCC		

OUTPUT GATES REQUESTED

G0002 G0016 G0036 G0044
G0062

TABLE A-12 (CONT.)

NSCI.OUT FILE

NSCI.CUT
BASIC EVENT LIST

Ver. 1.61 2/28/92 15:41:00

COMPONENT NAME	PROBABILITY	VARIANCE	GATES INPUT TO...
1. 1--CVG21V204-K	1.0000E-03	5.6200E-07	G0002
2. 1--AVHV3380--F	2.0000E-03	2.2500E-06	G0004
3. SAASRPHASW1FAE	2.2800E-03	0.0000E+00	G0009
4. SABSRPHASW2FAE	2.2800E-03	0.0000E+00	G0009
5. 1SASRPHASEASWFCC	4.5500E-05	0.0000E+00	G0008
6. SAXOPMANPHA-AE	9.9900E-04	0.0000E+00	G0007
7. SAARE--K522FAE	3.8800E-04	0.0000E+00	G0006
8. SAARE--K612FAE	6.8400E-03	0.0000E+00	G0006
9. 1--CVG21V291-K	1.0000E-03	5.6200E-07	G0018
10. 1--AVHV3376--K	2.0000E-03	2.2500E-06	G0020
11. SAJRE--K502FAE	3.8800E-04	0.0000E+00	G0022
12. SABRE--K613FAE	6.8400E-03	0.0000E+00	G0022
13. 1--AVHV3377--K	2.0000E-03	2.2500E-06	G0026
14. SAARE--K502FAE	3.8800E-04	0.0000E+00	G0028
15. SAARE--K613FAE	6.8400E-03	0.0000E+00	G0028
16. 1--AVHV3376/7KCC	4.0000E-05	8.9900E-10	G0032
17. 1SAREK502TA/BFCC	7.5900E-06	0.0000E+00	G0032
18. 1SAREK613TA/BFCC	1.3700E-04	0.0000E+00	G0032
19. 1--CVB13V038-K	1.0000E-03	5.6200E-07	G0036
20. 1--CVB13V040-K	1.0000E-03	5.6200E-07	G0038
21. SAARE--K606FAE	6.8400E-03	0.0000E+00	G0040
22. 1--AVP13V302-K	2.0000E-03	2.2500E-06	G0046
23. SABRE--K503FAE	3.8800E-04	0.0000E+00	G0048
24. SABRE--K622FAE	6.8500E-03	0.0000E+00	G0048
25. 1--AVB13V301-K	2.0000E-03	2.2500E-06	G0052
26. SAARE--K503FAE	3.8800E-04	0.0000E+00	G0054
27. SAARE--K622FAE	6.8500E-03	0.0000E+00	G0054
28. 1--AV301/302-KCC	4.0000E-05	8.9900E-10	G0058
29. 1SAREK503TA/BFCC	7.5900E-06	0.0000E+00	G0058
30. 1SAREK606TA/BFCC	1.3700E-04	0.0000E+00	G0058
31. 1--AVP13V304-K	2.0000E-03	2.2500E-06	G0064
32. 1--AVP13V303-K	2.0000E-03	2.2500E-06	G0067
33. 1--AV303/402-KCC	4.0000E-05	8.9900E-10	G0070

TABLE A-12 (CONT.)

NSCI.OUT FILE

NSCI.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 15:41:00

Cutsets for GATE G0062 with a cutoff probability of 1.00E-09

1.	9.99E-04	SAXOPMANPHA-AE	
2.	1.37E-04	1SAREK606TA/BFCC	
3.	4.69E-05	SABRE--K622FAE	SAARE--K622FAE
4.	4.55E-05	1SASRPHASEASWFCC	
5.	4.00E-05	1--AV303/402-KCC	
6.	1.37E-05	SAARE--K622FAE	1--AVP13V304-K
7.	1.37E-05	SABRE--K622FAE	1--AVP13V303-K
8.	7.59E-06	1SAREK503TA/BFCC	
9.	5.20E-06	SAASRPHASW1FAE	SABSRPHASW2FAE
10.	4.00E-06	1--AVP13V304-K	1--AVP13V303-K
11.	2.66E-06	SABRE--K622FAE	SAARE--K503FAE
12.	2.66E-06	SABRE--K503FAE	SAARE--K622FAE
13.	7.76E-07	SAARE--K503FAE	1--AVP13V304-K
14.	7.76E-07	SABRE--K503FAE	1--AVP13V303-K
15.	1.51E-07	SABRE--K503FAE	SAARE--K503FAE

Reduced sum of cutset probabilities= 1.319E-03

Moments Results

Mean Probability of Failure= 1.319E-03

TABLE A-12 (CONT.)

NSCI.OUT FILE

NSCI.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 15:41:00

Cutsets for GATE G0036 with a cutoff probability of 1.0JE-09

1.	6.84E-06	1--CVB13V038-K	SAARE--K606FAE	
2.	1.00E-06	1--CVB13V038-K	1--CVB13V040-K	
3.	9.99E-07	SAXOPMANPHA-AE	1--CVB13V038-K	
4.	3.88E-07	SAARE--K522FAE	1--CVB13V038-K	
5.	4.55E-08	1SASRPHASEASWFCC	1--CVB13V038-K	
6.	5.20E-09	SAASRPHASW1FAE	SABSRPHASW2FAE	1--CVB13V038-K

Reduced sum of cutset probabilities= 9.278E-06

Moments Results

Mean Probability of Failure= 9.278E-06

TABLE A-12 (CONT.)

NSCI.OUT FILE

NSCI.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 15:41:00

Cutsets for GATE G0002 with a cutoff probability of 1.00E-09

1.	6.84E-06	1--CVG21V204-K	SAARE--K612FAE	
2.	2.00E-06	1--CVG21V204-K	1--AVHV3380--F	
3.	9.99E-07	1--CVG21V204-K	SAXOPMANPHA-AE	
4.	3.88E-07	1--CVG21V204-K	SAARE--K522FAE	
5.	4.55E-08	1--CVG21V204-K	1SASRPHASEASWFCC	
6.	5.20E-09	1--CVG21V204-K	SAASRPHASW1FAE	SABSRPHASW2FAE

Reduced sum of cutset probabilities= 1.028E-05

Moments Results

Mean Probability of Failure= 1.028E-05

TABLE A-12 (CONT.)

NSCI.OUT FILE

NSCI.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 15:41:00

Cutsets for GATE G0016 with a cutoff probability of 1.00E-09

1.	9.99E-04	SAXOPMANPHA-AE	
2.	1.37E-04	1SAREK613TA/BFCC	
3.	4.68E-05	SABRE--K613FAE	SAARE--K613FAE
4.	4.55E-05	1SASRPHASEASWFCC	
5.	4.00E-05	1--AVHV3376/7KCC	
6.	1.37E-05	1--AVHV3376--K	SAARE--K613FAE
7.	1.37E-05	SABRE--K613FAE	1--AVHV3377--K
8.	7.59E-06	1SAREK502TA/BFCC	
9.	6.84E-06	1--CVG21V291-K	SAARE--K613FAE
10.	5.20E-06	SAASRPHASW1FAE	SABSRPHASW2FAE
11.	4.00E-06	1--AVHV3376--K	1--AVHV3377--K
12.	2.5E-06	SABRE--K613FAE	SAARE--K502FAE
13.	2.65E-06	SABRE--K502FAE	SAARE--K613FAE
14.	2.00E-06	1--CVG21V291-K	1--AVHV3377--K
15.	7.76E-07	1--AVHV3376--K	SAARE--K502FAE
16.	7.76E-07	SABRE--K502FAE	1--AVHV3377--K
17.	3.88E-07	1--CVG21V291-K	SAARE--K502FAE
18.	1.51E-07	SABRE--K502FAE	SAARE--K502FAE

Reduced sum of cutset probabilities= 1.328E-03

Moments Results

Mean Probability of Failure= 1.328E-03

TABLE A-12 (CONT.)

NSCI.OUT FILE

NSCI.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 15:41:00

Cutsets for GATE G0044 with a cutoff probability of 1.00E-09

1.	9.99E-04	SAXOPMANPHA-AE	
2.	1.37E-04	1SAREK606TA/BFCC	
3.	4.69E-05	SABRE--K622FAE	SAARE--K622FAE
4.	4.55E-05	1SASRPHASEASWFCC	
5.	4.00E-05	1--AV301/302-KCC	
6.	1.37E-05	1--AVP13V302-K	SAARE--K622FAE
7.	1.37E-05	SABRE--K622FAE	1--AVB13V301-K
8.	7.59E-06	1SAREK503TA/BFCC	
9.	5.20E-06	SAASRPHASW1FAE	SABSRPHASW2FAE
10.	4.00E-06	1--AVP13V302-K	1--AVB13V301-K
11.	2.66E-06	SABRE--K622FAE	SAARE--K503FAE
12.	2.66E-06	SABRE--K503FAE	SAARE--K622FAE
13.	7.76E-07	1--AVP13V302-K	SAARE--K503FAE
14.	7.76E-07	SABRE--K503FAE	1--AVB13V301-K
15.	1.51E-07	SABRE--K503FAE	SAARE--K503FAE

Reduced sum of cutset probabilities= 1.319E-03

Moments Results

Mean Probability of Failure= 1.319E-03

TABLE A-12 (CONT.)

NSCI.OUT FILE

NSCI.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 15:41:00

Cutsets for GATE G0001 with a cutoff probability of 1.00E-09

1.	9.99E-04	SAXOPMANPHA-AE	
2.	1.37E-04	1SAREK606TA/BFCC	
3.	1.37E-04	1SAREK613TA/BFCC	
4.	4.69E-05	SABRE--K622FAE	SAARE--K622FAE
5.	4.68E-05	SABRE--K613FAE	SAARE--K613FAE
6.	4.55E-05	1SASRPHASEASWFCC	
7.	4.00E-05	1--AV303/402-KCC	
8.	4.00E-05	1--AV301/302-KCC	
9.	4.00E-05	1--AVHV3376/7KCC	
10.	1.37E-05	SAARE--K622FAE	1--AVP13V304-K
11.	1.37E-05	SABRE--K622FAE	1--AVP13V303-K
12.	1.37E-05	1--AVP13V302-K	SAARE--K622FAE
13.	1.37E-05	SABRE--K622FAE	1--AVB13V301-K
14.	1.37E-05	1--AVHV3376--K	SAARE--K613FAE
15.	1.37E-05	SABRE--K613FAE	1--AVHV3377--K
16.	7.59E-06	1SAREK503TA/BFCC	
17.	7.59E-06	1SAREK502TA/BFCC	
18.	6.84E-06	1--CVB13V038-K	SAARE--K606FAE
19.	6.84E-06	1--CVG21V291-K	SAARE--K613FAE
20.	6.84E-06	1--CVG21V204-K	SAARE--K612FAE
21.	5.20E-06	SAASRPHASW1FAE	SABSRPHASW2FAE
22.	4.00E-06	1--AVP13V304-K	1--AVP13V303-K
23.	4.00E-06	1--AVP13V302-K	1--AVB13V301-K
24.	4.00E-06	1--AVHV3376--K	1--AVHV3377--K
25.	2.66E-06	SABRE--K622FAE	SAARE--K503FAE
26.	2.66E-06	SABRE--K503FAE	SAARE--K622FAE
27.	2.65E-06	SABRE--K613FAE	SAARE--K502FAE
28.	2.65E-06	SABRE--K502FAE	SAARE--K613FAE
29.	2.00E-06	1--CVG21V291-K	1--AVHV3377--K
30.	2.00E-06	1--CVG21V204-K	1--AVHV3380--F
31.	1.00E-06	1--CVB13V038-K	1--CVB13V040-K
32.	7.76E-07	SAARE--K503FAE	1--AVP13V304-K
33.	7.76E-07	SABRE--K503FAE	1--AVP13V303-K
34.	7.76E-07	1--AVP13V302-K	SAARE--K503FAE
35.	7.76E-07	SABRE--K503FAE	1--AVB13V301-K
36.	7.76E-07	1--AVHV3376--K	SAARE--K502FAE
37.	7.76E-07	SABRE--K502FAE	1--AVHV3377--K
38.	3.88E-07	SAARE--K522FAE	1--CVB13V038-K
39.	3.88E-07	1--CVG21V291-K	SAARE--K502FAE
40.	3.88E-07	1--CVG21V204-K	SAARE--K522FAE
41.	1.51E-07	SABRE--K503FAE	SAARE--K503FAE
42.	1.51E-07	SABRE--K502FAE	SAARE--K502FAE

Reduced sum of cutset probabilities= 1.688E-03

Moments Results

Mean Probability of Failure= 1.687E-03

Run ended at 15:41:08

TABLE A-12 (CONT.)

NSCI.OUT FILE

CONFIGURATION CONTROL

CODE NAME : WESCUT
VERSION NO. : 1.61
DATE OF CONFIGURATION : September 13, 1990
DATE OF ISSUANCE : September 13, 1990
DATE : FEBRUARY 28, 1992
TIME : 15:41:10:38
CONFIGURATION NO. : 5393361262535

TABLE A-13
NSCI.DES FILE

PAGE 1

TREE NAME: NSCI
CUTDES VER.1.7, 11-17-89
INPUT FILE: NSCI.CDS

CUT SETS FOR GATE G0062 WITH CUTOFF PROBABILITY OF 1.00E-09
GATE G0062 IS: CONTAINMENT LEAKAGE THROUGH PENETRATION 13A

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
1.	9.99E-04	OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION	1.00E+00	SAXOPMANPHA-AE
2.	1.37E-04	SLAVE RELAY K606 TRAIN A AND B FAIL TO OPERATE	1.37E-04	1SAREK606TA/BFCC
3.	4.69E-05	SLAVE RELAY K622 FAILS SLAVE RELAY K622 FAILS	6.85E-03 6.85E-03	SABRE--K622FAE SAARE--K622FAE
4.	4.55E-05	MANUAL PHASE A SWITCHES FAIL DUT TO COMMON CAUSE	4.55E-05	1SASRPHASEASWFCC
5.	4.00E-05	AOV QnP13V304 AND QnP13V303 FAIL TO CLOSE	4.00E-05	1--AV303/402-KCC
6.	1.37E-05	SLAVE RELAY K622 FAILS AOV QnP13V304 FAILS TO CLOSE (HARDWARE)	6.85E-03 2.00E-03	SAARE--K622FAE 1--AVP13V304-K
7.	1.37E-05	SLAVE RELAY K622 FAILS AOV QnP13V303 FAILS TO CLOSE (HARDWARE)	6.85E-03 2.00E-03	SABRE--K622FAE 1--AVP13V303-K
8.	7.59E-06	MASTER RELAY K503 TRAIN A AND B FAIL TO OPERATE	7.59E-06	1SAREK503TA/BFCC
9.	5.20E-06	MAIN CONTROL BOARD MANUAL PHASE A SWITCH 1 FAILS MAIN CONTROL BOARD MANUAL PHASE A SWITCH 2 FAILS	2.28E-03 2.28E-03	SAASRPHASW1FAE SABSRPHASW2FAE
10.	4.00E-06	AOV QnP13V304 FAILS TO CLOSE (HARDWARE) AOV QnP13V303 FAILS TO CLOSE (HARDWARE)	2.00E-03 2.00E-03	1--AVP13V304-K 1--AVP13V303-K
11.	2.66E-06	SLAVE RELAY K622 FAILS MASTER RELAY K503 FAILS	6.85E-03 3.88E-04	SABRE--K622FAE SAARE--K503FAE
12.	2.66E-06	MASTER RELAY K503 FAILS SLAVE RELAY K622 FAILS	3.88E-04 6.85E-03	SABRE--K503FAE SAARE--K622FAE
13.	7.76E-07	MASTER RELAY K503 FAILS AOV QnP13V304 FAILS TO CLOSE (HARDWARE)	3.88E-04 2.00E-03	SAARE--K503FAE 1--AVP13V304-K
14.	7.76E-07	MASTER RELAY K503 FAILS AOV QnP13V303 FAILS TO CLOSE (HARDWARE)	3.88E-04 2.00E-03	SABRE--K503FAE 1--AVP13V303-K
15.	1.51E-07	MASTER RELAY K503 FAILS MASTER RELAY K503 FAILS	3.88E-04 3.88E-04	SABRE--K503FAE SAARE--K503FAE

REDUCED SUM OF PROBABILITY OF FAILURE = 1.319E-03

TABLE A-13 (CONT.)

NSCI.DES FILE

PAGE 1

TREE NAME: NSCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: NSCI.CDS

CUT SETS FOR GATE G0036 WITH CUTOFF PROBABILITY OF 1.00E-09
 GATE G0036 IS: CONTAINMENT LEAKAGE THROUGH PENETRATION 30

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
1.	6.84E-06	CHECK VALVE QnB13V038 FAILS TO CLOSE SLAVE RELAY K606 FAILS	1.00E-03 6.84E-03	1--CVB13V038-K SAARE--K606FAE
2.	1.00E-06	CHECK VALVE QnB13V038 FAILS TO CLOSE ADV QnB13V040 FAILS TO CLOSE (HARDWARE)	1.00E-03 1.00E-03	1--CVB13V038-K 1--CVB13V040-K
3.	9.99E-07	OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION CHECK VALVE QnB13V038 FAILS TO CLOSE	1.00E+00 1.00E-03	SAXOPMANPHA-AE 1--CVB13V038-K
4.	3.88E-07	MASTER RELAY K522 FAILS CHECK VALVE QnB13V038 FAILS TO CLOSE	3.88E-04 1.00E-03	SAARE--K522FAE 1--CVB13V038-K
5.	4.55E-08	MANUAL PHASE A SWITCHES FAIL DUT TO COMMON CAUSE CHECK VALVE QnB13V038 FAILS TO CLOSE	4.55E-05 1.00E-03	1SASRPHASEASWFCC 1--CVB13V038-K
6.	5.20E-09	MAIN CONTROL BOARD MANUAL PHASE A SWITCH 1 FAILS MAIN CONTROL BOARD MANUAL PHASE A SWITCH 2 FAILS CHECK VALVE QnB13V038 FAILS TO CLOSE	2.28E-03 2.28E-03 1.00E-03	SAASRPHASW1FAE SABSRPHASW2FAE 1--CVB13V038-K

REDUCED SUM OF PROBABILITY OF FAILURE = 9.278E-06

TABLE A-13 (CONT.)

NSCI.DES FILE

PAGE 1

TREE NAME: NSCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: NSCI.CDS

CUT SETS FOR GATE G0002 WITH CUTOFF PROBABILITY OF 1.00E-09
 GATE G0002 IS: CONTAINMENT LEAKAGE THROUGH PENETRATION 33

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
1.	6.84E-06	CHECK VALVE QnG21V204 FAILS TO CLOSE SLAVE RELAY K612 FAILS	1.00E-03 6.84E-03	1--CVG21V204-K SAARE--K612FAE
2.	2.00E-06	CHECK VALVE QnG21V204 FAILS TO CLOSE QnG21HV3380 FAILS TO CLOSE (HARDWARE)	1.00E-03 2.00E-03	1--CVG21V204-K 1--AVHV3380--F
3.	9.99E-07	CHECK VALVE QnG21V204 FAILS TO CLOSE OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION	1.00E-03 1.00E+00	1--CVG21V204-K SAXOPMANPHA-AE
4.	3.88E-07	CHECK VALVE QnG21V204 FAILS TO CLOSE MASTER RELAY K522 FAILS	1.00E-03 3.88E-04	1--CVG21V204-K SAARE--K522FAE
5.	4.55E-08	CHECK VALVE QnG21V204 FAILS TO CLOSE MANUAL PHASE A SWITCHES FAIL DUT TO COMMON CAUSE	1.00E-03 4.55E-05	1--CVG21V204-K 1SASRPHASEASWFCC
6.	5.20E-09	CHECK VALVE QnG21V204 FAILS TO CLOSE MAIN CONTROL BOARD MANUAL PHASE A SWITCH 1 FAILS MAIN CONTROL BOARD MANUAL PHASE A SWITCH 2 FAILS	1.00E-03 2.28E-03 2.28E-03	1--CVG21V204-K SAASRPHASW1FAE SABSRPHASW2FAE

REDUCED SUM OF PROBABILITY OF FAILURE = 1.028E-05

TABLE A-13 (CONT.)

NSCI.DES FILE

PAGE 1 TREE NAME: NSCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: NSCI.CDS

CUT SETS FOR GATE G0016 WITH CUTOFF PROBABILITY OF 1.00E-09
 GATE G0016 IS: CONTAINMENT LEAKAGE THROUGH PENETRATION 78

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
1.	9.99E-04	OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION	1.00E+00	SAXOPMANPHA-AE
2.	1.37E-04	SLAVE RELAY K613 TRAIN A AND B FAIL TO OPERATE	1.37E-04	1SAREK613TA/BFCC
3.	4.68E-05	SLAVE RELAY K613 FAILS SLAVE RELAY K613 FAILS	6.84E-03 6.84E-03	SABRE--K613FAE SAARE--K613FAE
4.	4.55E-05	MANUAL PHASE A SWITCHES FAIL DUT TO COMMON CAUSE	4.55E-05	1SASRPHASEASWFCC
5.	4.00E-05	AOV QnG21HV3376 AND QnG21HV3377 FAIL TO CLOSE (HARDWARE)	4.00E-05	1--AVHV3376/7KCC
6.	1.37E-05	AOV QnG21HV3376 FAILS TO CLOSE (HARDWARE) SLAVE RELAY K613 FAILS	2.00E-03 6.84E-03	1--AVHV3376--K SAARE--K613FAE
7.	1.37E-05	SLAVE RELAY K613 FAILS AOV QnG21HV3377 FAILS TO CLOSE (HARDWARE)	6.84E-03 2.00E-03	SABRE--K613FAE 1--AVHV3377--K
8.	7.59E-06	MASTER RELAY K502 TRAIN A AND B FAIL TO OPERATE	7.59E-06	1SAREK502TA/BFCC
9.	6.84E-06	CHECK VALVE QnG21V291 FAILS TO CLOSE SLAVE RELAY K613 FAILS	1.00E-03 6.84E-03	1--CVG21V291-K SAARE--K613FAE
10.	5.20E-06	MAIN CONTROL BOARD MANUAL PHASE A SWITCH 1 FAILS MAIN CONTROL BOARD MANUAL PHASE A SWITCH 2 FAILS	2.28E-03 2.28E-03	SAASRPHASW1FAE SABSRPHASW2FAE
11.	4.00E-06	AOV QnG21HV3376 FAILS TO CLOSE (HARDWARE) AOV QnG21HV3377 FAILS TO CLOSE (HARDWARE)	2.00E-03 2.00E-03	1--AVHV3376--K 1--AVHV3377--K
12.	2.65E-06	SLAVE RELAY K613 FAILS MASTER RELAY K502 FAILS	6.84E-03 3.88E-04	SABRE--K613FAE SAARE--K502FAE
13.	2.65E-06	MASTER RELAY K502 FAILS SLAVE RELAY K613 FAILS	3.88E-04 6.84E-03	SABRE--K502FAE SAARE--K613FAE
14.	2.00E-06	CHECK VALVE QnG21V291 FAILS TO CLOSE AOV QnG21HV3377 FAILS TO CLOSE (HARDWARE)	1.00E-03 2.00E-03	1--CVG21V291-K 1--AVHV3377--K
15.	7.76E-07	AOV QnG21HV3376 FAILS TO CLOSE (HARDWARE) MASTER RELAY K502 FAILS	2.00E-03 3.88E-04	1--AVHV3376--K SAARE--K502FAE
16.	7.76E-07	MASTER RELAY K502 FAILS AOV QnG21HV3377 FAILS TO CLOSE (HARDWARE)	3.88E-04 2.00E-03	SABRE--K502FAE 1--AVHV3377--K
17.	3.88E-07	CHECK VALVE QnG21V291 FAILS TO CLOSE MASTER RELAY K502 FAILS	1.00E-03 3.88E-04	1--CVG21V291-K SAARE--K502FAE
18.	1.51E-07	MASTER RELAY K502 FAILS MASTER RELAY K502 FAILS	3.88E-04 3.88E-04	SABRE--K502FAE SAARE--K502FAE

REDUCED SUM OF PROBABILITY OF FAILURE = 1.328E-03

TABLE A-13 (CONT.)

NSCI.DES FILE

PAGE 1

TREE NAME: NSCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: NSCI.CDS

CUT SETS FOR GATE G0044 WITH CUTOFF PROBABILITY OF 1.00E-09
 GATE G0044 IS: CONTAINMENT LEAKAGE THROUGH PENETRATION 12A

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
1.	9.99E-04	OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION	1.00E+00	SAXOPMANPHA-AE
2.	1.37E-04	SLAVE RELAY K606 TRAIN A AND B FAIL TO OPERATE	1.37E-04	1SAREK606TA/BFCC
3.	4.69E-05	SLAVE RELAY K622 FAILS SLAVE RELAY K622 FAILS	6.85E-03 6.85E-03	SABRE--K622FAE SAARE--K622FAE
4.	4.55E-05	MANUAL PHASE A SWITCHES FAIL DUE TO COMMON CAUSE	4.55E-05	1SASRPHASW1FCC
5.	4.00E-05	AOV QnP13V302 AND QnP13V301 FAIL TO CLOSE	4.00E-05	1--AV301/302-KCC
6.	1.37E-05	AOV QnP13V302 FAILS TO CLOSE (HARDWARE) SLAVE RELAY K622 FAILS	2.00E-03 6.85E-03	1--AVP13V302-K SAARE--K622FAE
7.	1.37E-05	SLAVE RELAY K622 FAILS AOV QnP13V301 FAILS TO CLOSE (HARDWARE)	6.85E-03 2.00E-03	SABRE--K622FAE 1--AVB13V301-K
8.	7.59E-06	MASTER RELAY K503 TRAIN A AND B FAIL TO OPERATE	7.59E-06	1SAREK503TA/BFCC
9.	5.20E-06	MAIN CONTROL BOARD MANUAL PHASE A SWITCH 1 FAILS MAIN CONTROL BOARD MANUAL PHASE A SWITCH 2 FAILS	2.28E-03 2.28E-03	SAASRPHASW1FAE SASRPHASW2FAE
10.	4.00E-06	AOV QnP13V302 FAILS TO CLOSE (HARDWARE) AOV QnP13V301 FAILS TO CLOSE (HARDWARE)	2.00E-03 2.00E-03	1--AVP13V302-K 1--AVB13V301-K
11.	2.66E-06	SLAVE RELAY K622 FAILS MASTER RELAY K503 FAILS	6.85E-03 3.88E-04	SABRE--K622FAE SAARE--K503FAE
12.	2.66E-06	MASTER RELAY K503 FAILS SLAVE RELAY K622 FAILS	3.88E-04 6.85E-03	SABRE--K503FAE SAARE--K622FAE
13.	7.76E-07	AOV QnP13V302 FAILS TO CLOSE (HARDWARE) MASTER RELAY K503 FAILS	2.00E-03 3.88E-04	1--AVP13V302-K SAARE--K503FAE
14.	7.76E-07	MASTER RELAY K503 FAILS AOV QnP13V301 FAILS TO CLOSE (HARDWARE)	3.88E-04 2.00E-03	SABRE--K503FAE 1--AVB13V301-K
15.	1.51E-07	MASTER RELAY K503 FAILS MASTER RELAY K503 FAILS	3.88E-04 3.88E-04	SABRE--K503FAE SAARE--K503FAE

REDUCED SUM OF PROBABILITY OF FAILURE = 1.319E-03

TABLE A-13 (CONT.)

NSCI.DES FILE

PAGE 1 TREE NAME: NSCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: NSCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-09
 GATE G0001 IS: CNT. ISOL. THRU NON-SAFETY LINES GIVEN FAILURE OF "S" SIGNAL

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
1.	9.99E-04	OPERATOR FAILS TO MANUALLY INITIATE PHASE A ISOLATION	1.00E+00	SAXOPMANPHA-AE
2.	1.37E-04	SLAVE RELAY K606 TRAIN A AND B FAIL TO OPERATE	1.37E-04	1SAREK606TA/BFCC
3.	1.37E-04	SLAVE RELAY K613 TRAIN A AND B FAIL TO OPERATE	1.37E-04	1SAREK613TA/BFCC
..	4.69E-05	SLAVE RELAY K622 FAILS SLAVE RELAY K622 FAILS	6.85E-03 6.85E-03	SABRE--K622FAE SAARE--K622FAE
5.	4.68E-05	SLAVE RELAY K613 FAILS SLAVE RELAY K613 FAILS	6.84E-03 6.84E-03	SABRE--K613FAE SAARE--K613FAE
6.	4.55E-05	MANUAL PHASE A SWITCHES FAIL DUT TO COMMON CAUSE	4.55E-05	1SASRPHASEASWFCC
7.	4.00E-05	AOV QnP13V304 AND QnP13V303 FAIL TO CLOSE	4.00E-05	1--AV303/402-KCC
8.	4.00E-05	AOV QnP13V302 AND QnP13V301 FAIL TO CLOSE	4.00E-05	1--AV301/302-KCC
9.	4.00E-05	AOV QnG21HV3376 AND QnG21HV3377 FAIL TO CLOSE (HARDWARE)	4.00E-05	1--AVHV3376/7KCC
10.	1.37E-05	SLAVE RELAY K622 FAILS AOV QnP13V304 FAILS TO CLOSE (HARDWARE)	6.85E-03 2.00E-03	SAARE--K622FAE 1--AVP13V304-K
11.	1.37E-05	SLAVE RELAY K622 FAILS AOV QnP13V303 FAILS TO CLOSE (HARDWARE)	6.85E-03 2.00E-03	SABRE--K622FAE 1--AVP13V303-K
12.	1.37E-05	AOV QnP13V302 FAILS TO CLOSE (HARDWARE) SLAVE RELAY K622 FAILS	2.00E-03 6.85E-03	1--AVP13V302-K SAARE--K622FAE
13.	1.37E-05	SLAVE RELAY K622 FAILS AOV QnP13V301 FAILS TO CLOSE (HARDWARE)	6.85E-03 2.00E-03	SABRE--K622FAE 1--AVB13V301-K
14.	1.37E-05	AOV QnG21HV3376 FAILS TO CLOSE (HARDWARE) SLAVE RELAY K613 FAILS	2.00E-03 6.84E-03	1--AVHV3376--K SAARE--K613FAE
15.	1.37E-05	SLAVE RELAY K613 FAILS AOV QnG21HV3377 FAILS TO CLOSE (HARDWARE)	6.84E-03 2.00E-03	SABRE--K613FAE 1--AVHV3377--K
16.	7.59E-06	MASTER RELAY K503 TRAIN A AND B FAIL TO OPERATE	7.59E-06	1SAREK503TA/BFCC
17.	7.59E-06	MASTER RELAY K502 TRAIN A AND B FAIL TO OPERATE	7.59E-06	1SAREK502TA/BFCC
18.	6.84E-06	CHECK VALVE QnB13V038 FAILS TO CLOSE SLAVE RELAY K606 FAILS	1.00E-03 6.84E-03	1--CVB13V038-K SAARE--K606FAE
19.	6.84E-06	CHECK VALVE QnG21V291 FAILS TO CLOSE SLAVE RELAY K613 FAILS	1.00E-03 .84E-03	1--CVG21V291-K SAARE--K613FAE

TABLE A-13 (CONT.)

NSCI.DES FILE

PAGE 2

TREE NAME: NSCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: NSCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-09 (page 2)
 GATE G0001 IS: CNT. ISOL. THRU NON-SAFETY LINES GIVEN FAILURE OF "S" SIGNAL

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
20.	6.84E-06	CHECK VALVE QnG21V204 FAILS TO CLOSE SLAVE RELAY K612 FAILS	1.00E-03 6.84E-03	1--CVG21V204-K SAARE--K612FAE
21.	5.20E-06	MAIN CONTROL BOARD MANUAL PHASE A SWITCH 1 FAILS MAIN CONTROL BOARD MANUAL PHASE A SWITCH 2 FAILS	2.28E-03 2.28E-03	SAASRPHASW1FAE SABSRPHASW2FAE
22.	4.00E-06	AOV QnP13V304 FAILS TO CLOSE (HARDWARE) AOV QnP13V303 FAILS TO CLOSE (HARDWARE)	2.00E-03 2.00E-03	1--AVP13V304-K 1--AVP13V303-K
23.	4.00E-06	AOV QnP13V302 FAILS TO CLOSE (HARDWARE) AOV QnP13V301 FAILS TO CLOSE (HARDWARE)	2.00E-03 2.00E-03	1--AVP13V302-K 1--AVB13V301-K
24.	4.00E-06	AOV QnG21HV3376 FAILS TO CLOSE (HARDWARE) AOV QnG21HV3377 FAILS TO CLOSE (HARDWARE)	2.00E-03 2.00E-03	1--AVHV3376--K 1--AVHV3377--K
25.	2.66E-06	SLAVE RELAY K622 FAILS MASTER RELAY K503 FAILS	6.85E-03 3.88E-04	SABRE--K622FAE SAARE--K503FAE
26.	2.66E-06	MASTER RELAY K503 FAILS SLAVE RELAY K622 FAILS	3.88E-04 6.85E-03	SABRE--K503FAE SAARE--K622FAE
27.	2.65E-06	SLAVE RELAY K613 FAILS MASTER RELAY K502 FAILS	6.84E-03 3.88E-04	SABRE--K613FAE SAARE--K502FAE
28.	2.65E-06	MASTER RELAY K502 FAILS SLAVE RELAY K613 FAILS	3.88E-04 6.84E-03	SABRE--K502FAE SAARE--K613FAE
29.	2.00E-06	CHECK VALVE QnG21V291 FAILS TO CLOSE AOV QnG21HV3377 FAILS TO CLOSE (HARDWARE)	1.00E-03 2.00E-03	1--CVG21V291-K 1--AVHV3377--K
30.	2.00E-06	CHECK VALVE QnG21V204 FAILS TO CLOSE QnG21HV3380 FAILS TO CLOSE (HARDWARE)	1.00E-03 2.00E-03	1--CVG21V204-K 1--AVHV3380--F
31.	1.00E-06	CHECK VALVE QnB13V038 FAILS TO CLOSE AOV QnB13V040 FAILS TO CLOSE (HARDWARE)	1.00E-03 1.00E-03	1--CVB13V038-K 1--CVB13V040-K
32.	7.76E-07	MASTER RELAY K503 FAILS AOV QnP13V304 FAILS TO CLOSE (HARDWARE)	3.88E-04 2.00E-03	SAARE--K503FAE 1--AVP13V304-K
33.	7.76E-07	MASTER RELAY K503 FAILS AOV QnP13V303 FAILS TO CLOSE (HARDWARE)	3.88E-04 2.00E-03	SABRE--K503FAE 1--AVP13V303-K
34.	7.76E-07	AOV QnP13V302 FAILS TO CLOSE (HARDWARE) MASTER RELAY K503 FAILS	2.00E-03 3.88E-04	1--AVP13V302-K SAARE--K503FAE
35.	7.76E-07	MASTER RELAY K503 FAILS AOV QnP13V301 FAILS TO CLOSE (HARDWARE)	3.88E-04 2.00E-03	SABRE--K503FAE 1--AVB13V301-K

TABLE A-13 (CONT.)

NSCI.DES FILE

PAGE 3

TREE NAME: NSCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: NSCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-09 (page 3)
 GATE G0001 IS: CNT. ISOL. THRU NON-SAFETY LINES GIVEN FAILURE OF "S" SIGNAL

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
36.	7.76E-07	AOV QnG21HV3376 FAILS TO CLOSE (HARDWARE) MASTER RELAY K502 FAILS	2.00E-03 3.88E-04	1--AVHV3376--K SAARE--K502FAE
37.	7.76E-07	MASTER RELAY K502 FAILS AOV QnG21HV3377 FAILS TO CLOSE (HARDWARE)	3.88E-04 2.00E-03	SABRE--K502FAE 1--AVHV3377--K
38.	3.88E-07	MASTER RELAY K522 FAILS CHECK VALVE QnB13V038 FAILS TO CLOSE	3.88E-04 1.00E-03	SAARE--K522FAE 1--CVB13V038-K
39.	3.88E-07	CHECK VALVE QnG21V291 FAILS TO CLOSE MASTER RELAY K502 FAILS	1.00E-03 3.88E-04	1--CVG21V291-K SAARE--K502FAE
40.	3.88E-07	CHECK VALVE QnG21V204 FAILS TO CLOSE MASTER RELAY K522 FAILS	1.00E-03 3.88E-04	1--CVG21V204-K SAARE--K522FAE
41.	1.51E-07	MASTER RELAY K503 FAILS MASTER RELAY K503 FAILS	3.88E-04 3.88E-04	SABRE--K503FAE SAARE--K503FAE
42.	1.51E-07	MASTER RELAY K502 FAILS MASTER RELAY K502 FAILS	3.88E-04 3.88E-04	SABRE--K502FAE SAARE--K502FAE

REDUCED SUM OF PROBABILITY OF FAILURE = 1.688E-03

TABLE A-13 (CONT.)

NSCI.DES FILE

CONFIGURATION CONTROL

CODE NAME : CUTDES
VERSION NO. : 1.70
DATE OF CONFIGURATION : NOVEMBER 21, 1989
DATE OF ISSUANCE : NOVEMBER 21, 1989
DATE : DECEMBER 4, 1992
TIME : 12:37:24:96
CONFIGURATION NO. : 5201672233487

TABLE A-14

CHECK VALVE GROUPS USED IN COMMON CAUSE FAILURE
CALCULATION OF THE CHGCI FAULT TREE

Index No.	Component Numbers	Function	Group Size
1	QnE11V051C QnE21V062C	Check Valves between Loop 1 Cold Leg and CCP Discharge via Containment Penetration 19	2
2	QnE11V051B QnE21V062B	Check Valves between Loop 2 Cold Leg and CCP Discharge via Containment Penetration 19	2
3	QnE11V051A QnE21V062A	Check Valves between Loop 3 Cold Leg and CCP Discharge via Containment Penetration 19	2
4	QnE11V051C QnE21V066C	Check Valves between Loop 1 Cold Leg and CCP Discharge via Containment Penetration 20	2
5	QnE11V051B QnE21V066B	Check Valves between Loop 2 Cold Leg and CCP Discharge via Containment Penetration 20	2
6	QnE11V051A QnE21V066A	Check Valves between Loop 3 Cold Leg and CCP Discharge via Containment Penetration 20	2
7	QnE21V122A QnE21V026	Check Valves Between CCP Discharge and RWST through CCP A and CCP Suction Piping	2
8	QnE21V122A QnE11V028	Check Valves Between CCP Discharge and RWST through CCP A and RHR Suction Piping	2
9	QnE21V122B QnE21V026	Check Valves Between CCP Discharge and RWST through CCP B and CCP Suction Piping	2
10	QnE21V122B QnE11V028	Check Valves Between CCP Discharge and RWST through CCP B and RHR Suction Piping	2
11	QnE21V122C QnE21V026	Check Valves Between CCP Discharge and RWST through CCP C and CCP Suction Piping	2
12	QnE21V122C QnE11V028	Check Valves Between CCP Discharge and RWST through CCP C and RHR Suction Piping	2

TABLE A-15
CHGCI.SIM FILE

VER 1.6

'SIMON Case file for Tree: CHGCI; Created: 12/06/91 16:17'

26

'1HHCVE21V051CK'	'	01	062	0.000000	0.0
'1HHCVE21V062CK'	'	01	062	0.000000	0.0
'1HHCVCHGCI-01KCC'	'	01	621	0.000000	0.0
'1HHCVE21V051BK'	'	01	062	0.000000	0.0
'1HHCVE21V062BK'	'	01	062	0.000000	0.0
'1HHCVCHGCI-02KCC'	'	01	621	0.000000	0.0
'1HHCVE21V051AK'	'	01	062	0.000000	0.0
'1HHCVE21V062AK'	'	01	062	0.000000	0.0
'1HHCVCHGCI-03KCC'	'	01	621	0.000000	0.0
'1HHCVE21V066CK'	'	01	062	0.000000	0.0
'1HHCVCHGCI-04KCC'	'	01	621	0.000000	0.0
'1HHCVE21V066BK'	'	01	062	0.000000	0.0
'1HHCVCHGCI-05KCC'	'	01	621	0.000000	0.0
'1HHCVE21V066AK'	'	01	062	0.000000	0.0
'1HHCVCHGCI-06KCC'	'	01	621	0.000000	0.0
'1HHCVE21V122AK'	'	01	062	0.000000	0.0
'1HHCVE21V026-K'	'	01	062	0.000000	0.0
'1HHCVCHGCI-07KCC'	'	01	621	0.000000	0.0
'1HHCVE11V028-K'	'	01	062	0.000000	0.0
'1HHCVCHGCI-08KCC'	'	01	621	0.000000	0.0
'1HHCVE21V122BK'	'	01	062	0.000000	0.0
'1HHCVCHGCI-09KCC'	'	01	621	0.000000	0.0
'1HHCVCHGCI-10KCC'	'	01	621	0.000000	0.0
'1HHCVE21V122CK'	'	01	062	0.000000	0.0
'1HHCVCHGCI-11KCC'	'	01	621	0.000000	0.0
'1HHCVCHGCI-12KCC'	'	01	621	0.000000	0.0

TABLE A-16
CHGCI.TAB FILE

Simon5, VER 1.6 Table Output File
SIMON Case file for Tree: CHGCI; Created: 12/06/91 16:17

02/28/92 15:47

FT IDENT	COMP	FAILURE MODE	FAIL RATE	VARIANCE	SOURCE	TIME	PROBABILITY	VARIANCE
1HHCVE21V051CK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1HHCVE21V062CK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1HHCVCHGCI-01KCC	CV	CC/MGL; FAC(2/2 FAIL) 1.6E-01 CV T, CV FAILS TO CLOSE; EF=3	1.600E-04	1.440E-08	4550	0.000E+00	1.60E-04	1.44E-08
1HHCVE21V051BK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1HHCVE21V062BK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1HHCVCHGCI-02KCC	CV	CC/MGL; FAC(2/2 FAIL) 1.6E-01 CV T, CV FAILS TO CLOSE; EF=3	1.600E-04	1.440E-08	4550	0.000E+00	1.60E-04	1.44E-08
1HHCVE21V051AK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1HHCVE21V062AK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1HHCVCHGCI-03KCC	CV	CC/MGL; FAC(2/2 FAIL) 1.6E-01 CV T, CV FAILS TO CLOSE; EF=3	1.600E-04	1.440E-08	4550	0.000E+00	1.60E-04	1.44E-08
1HHCVE21V066CK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1HHCVCHGCI-04KCC	CV	CC/MGL; FAC(2/2 FAIL) 1.6E-01 CV T, CV FAILS TO CLOSE; EF=3	1.600E-04	1.440E-08	4550	0.000E+00	1.60E-04	1.44E-08
1HHCVE21V066BK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1HHCVCHGCI-05KCC	CV	CC/MGL; FAC(2/2 FAIL) 1.6E-01 CV T, CV FAILS TO CLOSE; EF=3	1.600E-04	1.440E-08	4550	0.000E+00	1.60E-04	1.44E-08
1HHCVE21V066AK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1HHCVCHGCI-06KCC	CV	CC/MGL; FAC(2/2 FAIL) 1.6E-01 CV T, CV FAILS TO CLOSE; EF=3	1.600E-04	1.440E-08	4550	0.000E+00	1.60E-04	1.44E-08
1HHCVE21V122AK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1HHCVE21V026-K	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1HHCVCHGCI-07KCC	CV	CC/MGL; FAC(2/2 FAIL) 1.6E-01 CV T, CV FAILS TO CLOSE; EF=3	1.600E-04	1.440E-08	4550	0.000E+00	1.60E-04	1.44E-08
1HHCVE11V028-K	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1HHCVCHGCI-08KCC	CV	CC/MGL; FAC(2/2 FAIL) 1.6E-01 CV T, CV FAILS TO CLOSE; EF=3	1.600E-04	1.440E-08	4550	0.000E+00	1.60E-04	1.44E-08
1HHCVE21V122BK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1HHCVCHGCI-09KCC	CV	CC/MGL; FAC(2/2 FAIL) 1.6E-01 CV T, CV FAILS TO CLOSE; EF=3	1.600E-04	1.440E-08	4550	0.000E+00	1.60E-04	1.44E-08
1HHCVCHGCI-10KCC	CV	CC/MGL; FAC(2/2 FAIL) 1.6E-01 CV T, CV FAILS TO CLOSE; EF=3	1.600E-04	1.440E-08	4550	0.000E+00	1.60E-04	1.44E-08
1HHCVE21V122CK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1HHCVCHGCI-11KCC	CV	CC/MGL; FAC(2/2 FAIL) 1.6E-01 CV T, CV FAILS TO CLOSE; EF=3	1.600E-04	1.440E-08	4550	0.000E+00	1.60E-04	1.44E-08
1HHCVCHGCI-12KCC	CV	CC/MGL; FAC(2/2 FAIL) 1.6E-01 CV T, CV FAILS TO CLOSE; EF=3	1.600E-04	1.440E-08	4550	0.000E+00	1.60E-04	1.44E-08

TABLE A-16 (CONT.)

CHGCI.TAB FILE

CONFIGURATION CONTROL

CODE NAME : SIMONS
VERSION NO. : 1.60
DATE OF CONFIGURATION : NOVEMBER 21, 1989
DATE OF ISSUANCE : NOVEMBER 21, 1989
DATE : FEBRUARY 28, 1992
TIME : 15:47:3:66
CONFIGURATION NO. : 5079573203552

TABLE A-17
CHGCI.OUT FILE

CHGCI.CUT
FAULT TREE DESCRIPTION

Ver. 1.61 2/28/92 15:47:30

- (1) NUMBER OF GATES INPUT
- (2) NUMBER OF COMPONENTS INPUT
- (3) NUMBER OF EVENTS IN COM GATE TO BE CONSIDERED AT ONE TIME

GATE NAME	TYPE	(1)	(2)	(3)	NAMES OF THE INPUTS					
1. G0001	AND	2	0	0	G0002	G0035				
2. G0002	OR	2	0	0	G0003	G0019				
3. G0003	OR	3	0	0	G0004	G0009				
4. G0004	OR	1	1	0	G0005	1HHCVCHGCI-01KCC		G0014		
5. G0005	AND	0	2	0	1HHCVE21V051CK	1HHCVE21V062CK				
6. G0009	OR	1	1	0	G0010	1HHCVCHGCI-02KCC				
7. G0010	AND	0	2	0	1HHCVE21V051BK	1HHCVE21V062BK				
8. G0014	OR	1	1	0	G0015	1HHCVCHGCI-03KCC				
9. G0015	AND	0	2	0	1HHCVE21V051AK	1HHCVE21V062AK				
10. G0019	OR	3	0	0	G0020	G0025		G0030		
11. G0020	OR	1	1	0	G0021	1HHCVCHGCI-04KCC				
12. G0021	AND	0	2	0	1HHCVE21V051CK	1HHCVE21V066CK				
13. G0025	OR	1	1	0	G0026	1HHCVCHGCI-05KCC				
14. G0026	AND	0	2	0	1HHCVE21V051BK	1HHCVE21V066BK				
15. G0030	OR	1	1	0	G0031	1HHCVCHGCI-06KCC				
16. G0031	AND	0	2	0	1HHCVE21V051AK	1HHCVE21V066AK				
17. G0035	OR	6	0	0	G0036	G0041		G0046	G0051	G0056
					G0061					
18. G0036	OR	1	1	0	G0037	1HHCVCHGCI-07KCC				
19. G0037	AND	0	2	0	1HHCVE21V122AK	1HHCVE21V026-K				
20. G0041	OR	1	1	0	G0042	1HHCVCHGCI-08KCC				
21. G0042	AND	0	2	0	1HHCVE21V122AK	1HHCVE11V028-K				
22. G0046	OR	1	1	0	G0047	1HHCVCHGCI-09KCC				
23. G0047	AND	0	2	0	1HHCVE21V122BK	1HHCVE21V026-K				
24. G0051	OR	1	1	0	G0052	1HHCVCHGCI-10KCC				
25. G0052	AND	0	2	0	1HHCVE21V122BK	1HHCVE11V028-K				
26. G0056	OR	1	1	0	G0057	1HHCVCHGCI-11KCC				
27. G0057	AND	0	2	0	1HHCVE21V122CK	1HHCVE21V026-K				
28. G0061	OR	1	1	0	G0062	1HHCVCHGCI-12KCC				
29. G0062	AND	0	2	0	1HHCVE21V122CK	1HHCVE11V028-K				

TABLE A-17 (CONT.)

CHGCI.OUT FILE

CHGCI.CUT
BASIC EVENT LIST

Ver. 1.61 2/28/92 15:47:30

COMPONENT NAME	PROBABILITY	VARIANCE	GATES INPUT TO...	
1. 1HHCVE21V051CK	1.0000E-03	5.6200E-07	G0005	G0021
2. 1HHCVE21V062CK	1.0000E-03	5.6200E-07	G0005	
3. 1HHCVCHGCI-01KCC	1.6000E-04	1.4400E-08	G0004	
4. 1HHCVE21V051BK	1.0000E-03	5.6200E-07	G0010	G0026
5. 1HHCVE21V062BK	1.0000E-03	5.6200E-07	G0010	
6. 1HHCVCHGCI-02KCC	1.6000E-04	1.4400E-08	G0009	
7. 1HHCVE21V051AK	1.0000E-03	5.6200E-07	G0015	G0031
8. 1HHCVE21V062AK	1.0000E-03	5.6200E-07	G0015	
9. 1HHCVCHGCI-03KCC	1.6000E-04	1.4400E-08	G0014	
10. 1HHCVE21V066CK	1.0000E-03	5.6200E-07	G0021	
11. 1HHCVCHGCI-04KCC	1.6000E-04	1.4400E-08	G0020	
12. 1HHCVE21V066BK	1.0000E-03	5.6200E-07	G0026	
13. 1HHCVCHGCI-05KCC	1.6000E-04	1.4400E-08	G0025	
14. 1HHCVE21V066AK	1.0000E-03	5.6200E-07	G0031	
15. 1HHCVCHGCI-06KCC	1.6000E-04	1.4400E-08	G0030	
16. 1HHCVE21V122AK	1.0000E-03	5.6200E-07	G0037	G0042
17. 1HHCVE21V026-K	1.0000E-03	5.6200E-07	G0037	G0047
18. 1HHCVCHGCI-07KCC	1.6000E-04	1.4400E-08	G0036	G0057
19. 1HHCVE11V028-K	1.0000E-03	5.6200E-07	G0042	G0052
20. 1HHCVCHGCI-08KCC	1.6000E-04	1.4400E-08	G0041	G0062
21. 1HHCVE21V122BK	1.0000E-03	5.6200E-07	G0047	
22. 1HHCVCHGCI-09KCC	1.6000E-04	1.4400E-08	G0046	
23. 1HHCVCHGCI-10KCC	1.6000E-04	1.4400E-08	G0051	
24. 1HHCVE21V122CK	1.0000E-03	5.6200E-07	G0057	G0062
25. 1HHCVCHGCI-11KCC	1.6000E-04	1.4400E-08	G0056	
26. 1HHCVCHGCI-12KCC	1.6000E-04	1.4400E-08	G0061	

TABLE A-17 (CONT.)

CHGCI.OUT FILE

CHGCI.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 15:47:30

Cutsets for GATE G0001 with a cutoff probability of 1.00E-15

1.	2.56E-08	1HHCVCHGCI-06KCC	1HHCVCHGCI-12KCC	
2.	2.56E-08	1HHCVCHGCI-06KCC	1HHCVCHGCI-11KCC	
3.	2.56E-08	1HHCVCHGCI-06KCC	1HHCVCHGCI-10KCC	
4.	2.56E-08	1HHCVCHGCI-06KCC	1HHCVCHGCI-09KCC	
5.	2.56E-08	1HHCVCHGCI-06KCC	1HHCVCHGCI-08KCC	
6.	2.56E-08	1HHCVCHGCI-06KCC	1HHCVCHGCI-07KCC	
7.	2.56E-08	1HHCVCHGCI-05KCC	1HHCVCHGCI-12KCC	
8.	2.56E-08	1HHCVCHGCI-05KCC	1HHCVCHGCI-11KCC	
9.	2.56E-08	1HHCVCHGCI-05KCC	1HHCVCHGCI-10KCC	
10.	2.56E-08	1HHCVCHGCI-05KCC	1HHCVCHGCI-09KCC	
11.	2.56E-08	1HHCVCHGCI-05KCC	1HHCVCHGCI-08KCC	
12.	2.56E-08	1HHCVCHGCI-05KCC	1HHCVCHGCI-07KCC	
13.	2.56E-08	1HHCVCHGCI-04KCC	1HHCVCHGCI-12KCC	
14.	2.56E-08	1HHCVCHGCI-04KCC	1HHCVCHGCI-11KCC	
15.	2.56E-08	1HHCVCHGCI-04KCC	1HHCVCHGCI-10KCC	
16.	2.56E-08	1HHCVCHGCI-04KCC	1HHCVCHGCI-09KCC	
17.	2.56E-08	1HHCVCHGCI-04KCC	1HHCVCHGCI-08KCC	
18.	2.56E-08	1HHCVCHGCI-04KCC	1HHCVCHGCI-07KCC	
19.	2.56E-08	1HHCVCHGCI-03KCC	1HHCVCHGCI-12KCC	
20.	2.56E-08	1HHCVCHGCI-03KCC	1HHCVCHGCI-11KCC	
21.	2.56E-08	1HHCVCHGCI-03KCC	1HHCVCHGCI-10KCC	
22.	2.56E-08	1HHCVCHGCI-03KCC	1HHCVCHGCI-09KCC	
23.	2.56E-08	1HHCVCHGCI-03KCC	1HHCVCHGCI-08KCC	
24.	2.56E-08	1HHCVCHGCI-03KCC	1HHCVCHGCI-07KCC	
25.	2.56E-08	1HHCVCHGCI-02KCC	1HHCVCHGCI-12KCC	
26.	2.56E-08	1HHCVCHGCI-02KCC	1HHCVCHGCI-11KCC	
27.	2.56E-08	1HHCVCHGCI-02KCC	1HHCVCHGCI-10KCC	
28.	2.56E-08	1HHCVCHGCI-02KCC	1HHCVCHGCI-09KCC	
29.	2.56E-08	1HHCVCHGCI-02KCC	1HHCVCHGCI-08KCC	
30.	2.56E-08	1HHCVCHGCI-02KCC	1HHCVCHGCI-07KCC	
31.	2.56E-08	1HHCVCHGCI-01KCC	1HHCVCHGCI-12KCC	
32.	2.56E-08	1HHCVCHGCI-01KCC	1HHCVCHGCI-11KCC	
33.	2.56E-08	1HHCVCHGCI-01KCC	1HHCVCHGCI-10KCC	
34.	2.56E-08	1HHCVCHGCI-01KCC	1HHCVCHGCI-09KCC	
35.	2.56E-08	1HHCVCHGCI-01KCC	1HHCVCHGCI-08KCC	
36.	2.56E-08	1HHCVCHGCI-01KCC	1HHCVCHGCI-07KCC	
37.	1.60E-10	1HHCVCHGCI-06KCC	1HHCVE11V028-K	1HHCVE21V122CK
38.	1.60E-10	1HHCVCHGCI-06KCC	1HHCVE21V026-K	1HHCVE21V122CK
39.	1.60E-10	1HHCVCHGCI-06KCC	1HHCVE11V028-K	1HHCVE21V122BK
40.	1.60E-10	1HHCVCHGCI-06KCC	1HHCVE21V026-K	1HHCVE21V122BK
41.	1.60E-10	1HHCVCHGCI-06KCC	1HHCVE21V122AK	1HHCVE11V028-K
42.	1.60E-10	1HHCVCHGCI-06KCC	1HHCVE21V122AK	1HHLVE21V026-K
43.	1.60E-10	1HHCVE21V051AK	1HHCVE21V066AK	1HHCVCHGCI-12KCC
44.	1.60E-10	1HHCVE21V051AK	1HHCVE21V066AK	1HHCVCHGCI-11KCC
45.	1.60E-10	1HHCVE21V051AK	1HHCVE21V066AK	1HHCVCHGCI-10KCC
46.	1.60E-10	1HHCVE21V051AK	1HHCVE21V066AK	1HHCVCHGCI-09KCC
47.	1.60E-10	1HHCVE21V051AK	1HHCVE21V066AK	1HHCVCHGCI-08KCC
48.	1.60E-10	1HHCVE21V051AK	1HHCVE21V066AK	1HHCVCHGCI-07KCC
49.	1.60E-10	1HHCVCHGCI-05KCC	1HHCVE11V028-K	1HHCVE21V122CK
50.	1.60E-10	1HHCVCHGCI-05KCC	1HHCVE21V026-K	1HHCVE21V122CK
51.	1.60E-10	1HHCVCHGCI-05KCC	1HHCVE11V028-K	1HHCVE21V122BK
52.	1.60E-10	1HHCVCHGCI-05KCC	1HHCVE21V026-K	1HHCVE21V122BK
53.	1.60E-10	1HHCVCHGCI-05KCC	1HHCVE21V122AK	1HHCVE11V028-K
54.	1.60E-10	1HHCVCHGCI-05KCC	1HHCVE21V122AK	1HHCVE21V026-K
55.	1.60E-10	1HHCVE21V051BK	1HHCVE21V066BK	1HHCVCHGCI-12KCC
56.	1.60E-10	1HHCVE21V051BK	1HHCVE21V066BK	1HHCVCHGCI-11KCC
57.	1.60E-10	1HHCVE21V051BK	1HHCVE21V066BK	1HHCVCHGCI-10KCC
58.	1.60E-10	1HHCVE21V051BK	1HHCVE21V066BK	1HHCVCHGCI-09KCC
59.	1.60E-10	1HHCVE21V051BK	1HHCVE21V066BK	1HHCVCHGCI-08KCC
60.	1.60E-10	1HHCVE21V051BK	1HHCVE21V066BK	1HHCVCHGCI-07KCC

TABLE A-17 (CONT.)

CHGCI.OUT FILE

CHGCI.OUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 15:47:30

Cutsets for GATE G0001 with a cutoff probability of 1.00E-15

61.	1.60E-10	1HHCVCHGCI-04KCC	1HHCVE11V028-K	1HHCVE21V122CK	
62.	1.60E-10	1HHCVCHGCI-04KCC	1HHCVE21V026-K	1HHCVE21V122CK	
63.	1.60E-10	1HHCVCHGCI-04KCC	1HHCVE11V028-K	1HHCVE21V122BK	
64.	1.60E-10	1HHCVCHGCI-04KCC	1HHCVE21V026-K	1HHCVE21V122BK	
65.	1.60E-10	1HHCVCHGCI-04KCC	1HHCVE21V122AK	1HHCVE11V028-K	
66.	1.60E-10	1HHCVCHGCI-04KCC	1HHCVE21V122AK	1HHCVE21V026-K	
67.	1.60E-10	1HHCVE21V051CK	1HHCVE21V066CK	1HHCVCHGCI-12KCC	
68.	1.60E-10	1HHCVE21V051CK	1HHCVE21V066CK	1HHCVCHGCI-11KCC	
69.	1.60E-10	1HHCVE21V051CK	1HHCVE21V066CK	1HHCVCHGCI-10KCC	
70.	1.60E-10	1HHCVE21V051CK	1HHCVE21V066CK	1HHCVCHGCI-09KCC	
71.	1.60E-10	1HHCVE21V051CK	1HHCVE21V066CK	1HHCVCHGCI-08KCC	
72.	1.60E-10	1HHCVE21V051CK	1HHCVE21V066CK	1HHCVCHGCI-07KCC	
73.	1.60E-10	1HHCVCHGCI-03KCC	1HHCVE11V028-K	1HHCVE21V122CK	
74.	1.60E-10	1HHCVCHGCI-03KCC	1HHCVE21V026-K	1HHCVE21V122CK	
75.	1.60E-10	1HHCVCHGCI-03KCC	1HHCVE11V028-K	1HHCVE21V122BK	
76.	1.60E-10	1HHCVCHGCI-03KCC	1HHCVE21V026-K	1HHCVE21V122BK	
77.	1.60E-10	1HHCVCHGCI-03KCC	1HHCVE21V122AK	1HHCVE11V028-K	
78.	1.60E-10	1HHCVCHGCI-03KCC	1HHCVE21V122AK	1HHCVE21V026-K	
79.	1.60E-10	1HHCVE21V051AK	1HHCVE21V062AK	1HHCVCHGCI-12KCC	
80.	1.60E-10	1HHCVE21V051AK	1HHCVE21V062AK	1HHCVCHGCI-11KCC	
81.	1.60E-10	1HHCVE21V051AK	1HHCVE21V062AK	1HHCVCHGCI-10KCC	
82.	1.60E-10	1HHCVE21V051AK	1HHCVE21V062AK	1HHCVCHGCI-09KCC	
83.	1.60E-10	1HHCVE21V051AK	1HHCVE21V062AK	1HHCVCHGCI-08KCC	
84.	1.60E-10	1HHCVE21V051AK	1HHCVE21V062AK	1HHCVCHGCI-07KCC	
85.	1.60E-10	1HHCVCHGCI-02KCC	1HHCVE11V028-K	1HHCVE21V122CK	
86.	1.60E-10	1HHCVCHGCI-02KCC	1HHCVE21V026-K	1HHCVE21V122CK	
87.	1.60E-10	1HHCVCHGCI-02KCC	1HHCVE11V028-K	1HHCVE21V122BK	
88.	1.60E-10	1HHCVCHGCI-02KCC	1HHCVE21V026-K	1HHCVE21V122BK	
89.	1.60E-10	1HHCVCHGCI-02KCC	1HHCVE21V122AK	1HHCVE11V028-K	
90.	1.60E-10	1HHCVCHGCI-02KCC	1HHCVE21V122AK	1HHCVE21V026-K	
91.	1.60E-10	1HHCVE21V051BK	1HHCVE21V062BK	1HHCVCHGCI-12KCC	
92.	1.60E-10	1HHCVE21V051BK	1HHCVE21V062BK	1HHCVCHGCI-11KCC	
93.	1.60E-10	1HHCVE21V051BK	1HHCVE21V062BK	1HHCVCHGCI-10KCC	
94.	1.60E-10	1HHCVE21V051BK	1HHCVE21V062BK	1HHCVCHGCI-09KCC	
95.	1.60E-10	1HHCVE21V051BK	1HHCVE21V062BK	1HHCVCHGCI-08KCC	
96.	1.60E-10	1HHCVE21V051BK	1HHCVE21V062BK	1HHCVCHGCI-07KCC	
97.	1.60E-10	1HHCVCHGCI-01KCC	1HHCVE11V028-K	1HHCVE21V122CK	
98.	1.60E-10	1HHCVCHGCI-01KCC	1HHCVE21V026-K	1HHCVE21V122CK	
99.	1.60E-10	1HHCVCHGCI-01KCC	1HHCVE11V028-K	1HHCVE21V122BK	
100.	1.60E-10	1HHCVCHGCI-01KCC	1HHCVE21V026-K	1HHCVE21V122BK	
101.	1.60E-10	1HHCVCHGCI-01KCC	1HHCVE21V122AK	1HHCVE11V028-K	
102.	1.60E-10	1HHCVCHGCI-01KCC	1HHCVE21V122AK	1HHCVE21V026-K	
103.	1.60E-10	1HHCVE21V051CK	1HHCVE21V062CK	1HHCVCHGCI-12KCC	
104.	1.60E-10	1HHCVE21V051CK	1HHCVE21V062CK	1HHCVCHGCI-11KCC	
105.	1.60E-10	1HHCVE21V051CK	1HHCVE21V062CK	1HHCVCHGCI-10KCC	
106.	1.60E-10	1HHCVE21V051CK	1HHCVE21V062CK	1HHCVCHGCI-09KCC	
107.	1.60E-10	1HHCVE21V051CK	1HHCVE21V062CK	1HHCVCHGCI-08KCC	
108.	1.60E-10	1HHCVE21V051CK	1HHCVE21V062CK	1HHCVCHGCI-07KCC	
109.	1.00E-12	1HHCVE21V051AK	1HHCVE21V066AK	1HHCVE11V028-K	1HHCVE21V122CK
110.	1.00E-12	1HHCVE21V051AK	1HHCVE21V066AK	1HHCVE21V026-K	1HHCVE21V122CK
111.	1.00E-12	1HHCVE21V051AK	1HHCVE21V066AK	1HHCVE11V028-K	1HHCVE21V122BK
112.	1.00E-12	1HHCVE21V051AK	1HHCVE21V066AK	1HHCVE21V026-K	1HHCVE21V122BK
113.	1.00E-12	1HHCVE21V051AK	1HHCVE21V066AK	1HHCVE21V122AK	1HHCVE11V028-K
114.	1.00E-12	1HHCVE21V051AK	1HHCVE21V066AK	1HHCVE21V122AK	1HHCVE21V026-K
115.	1.00E-12	1HHCVE21V051BK	1HHCVE21V066BK	1HHCVE11V028-K	1HHCVE21V122CK
116.	1.00E-12	1HHCVE21V051BK	1HHCVE21V066BK	1HHCVE21V026-K	1HHCVE21V122CK
117.	1.00E-12	1HHCVE21V051BK	1HHCVE21V066BK	1HHCVE11V028-K	1HHCVE21V122BK
118.	1.00E-12	1HHCVE21V051BK	1HHCVE21V066BK	1HHCVE21V026-K	1HHCVE21V122BK
119.	1.00E-12	1HHCVE21V051BK	1HHCVE21V066BK	1HHCVE21V122AK	1HHCVE11V028-K
120.	1.00E-12	1HHCVE21V051BK	1HHCVE21V066BK	1HHCVE21V122AK	1HHCVE21V026-K
121.	1.00E-12	1HHCVE21V051CK	1HHCVE21V066CK	1HHCVE11V028-K	1HHCVE21V122CK

TABLE A-17 (CONT.)

CHGCI.OUT FILE

CHGCI.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 15:47:30

Cutsets for GATE G0001 with a cutoff probability of 1.00E-15

122.	1.00E-12	1HHCVE21V051CK	1HHCVE21V066CK	1HHCVE21V026-K	1HHCVE21V122CK
123.	1.00E-12	1HHCVE21V051CK	1HHCVE21V066CK	1HHCVE11V028-K	1HHCVE21V122BK
124.	1.00E-12	1HHCVE21V051CK	1HHCVE21V066CK	1HHCVE21V026-K	1HHCVE21V122BK
125.	1.00E-12	1HHCVE21V051CK	1HHCVE21V066CK	1HHCVE21V122AK	1HHCVE11V028-K
126.	1.00E-12	1HHCVE21V051CK	1HHCVE21V066CK	1HHCVE21V122AK	1HHCVE21V026-K
127.	1.00E-12	1HHCVE21V051AK	1HHCVE21V062AK	1HHCVE11V028-K	1HHCVE21V122CK
128.	1.00E-12	1HHCVE21V051AK	1HHCVE21V062AK	1HHCVE21V026-K	1HHCVE21V122CK
129.	1.00E-12	1HHCVE21V051AK	1HHCVE21V062AK	1HHCVE11V028-K	1HHCVE21V122BK
130.	1.00E-12	1HHCVE21V051AK	1HHCVE21V062AK	1HHCVE21V026-K	1HHCVE21V122BK
131.	1.00E-12	1HHCVE21V051AK	1HHCVE21V062AK	1HHCVE21V122AK	1HHCVE11V028-K
132.	1.00E-12	1HHCVE21V051AK	1HHCVE21V062AK	1HHCVE21V122AK	1HHCVE21V026-K
133.	1.00E-12	1HHCVE21V051BK	1HHCVE21V062BK	1HHCVE11V028-K	1HHCVE21V122CK
134.	1.00E-12	1HHCVE21V051BK	1HHCVE21V062BK	1HHCVE21V026-K	1HHCVE21V122CK
135.	1.00E-12	1HHCVE21V051BK	1HHCVE21V062BK	1HHCVE11V028-K	1HHCVE21V122BK
136.	1.00E-12	1HHCVE21V051BK	1HHCVE21V062BK	1HHCVE21V026-K	1HHCVE21V122BK
137.	1.00E-12	1HHCVE21V051BK	1HHCVE21V062BK	1HHCVE21V122AK	1HHCVE11V028-K
138.	1.00E-12	1HHCVE21V051BK	1HHCVE21V062BK	1HHCVE21V122AK	1HHCVE21V026-K
139.	1.00E-12	1HHCVE21V051CK	1HHCVE21V062CK	1HHCVE11V028-K	1HHCVE21V122CK
140.	1.00E-12	1HHCVE21V051CK	1HHCVE21V062CK	1HHCVE21V026-K	1HHCVE21V122CK
141.	1.00E-12	1HHCVE21V051CK	1HHCVE21V062CK	1HHCVE11V028-K	1HHCVE21V122BK
142.	1.00E-12	1HHCVE21V051CK	1HHCVE21V062CK	1HHCVE21V026-K	1HHCVE21V122BK
143.	1.00E-12	1HHCVE21V051CK	1HHCVE21V062CK	1HHCVE21V122AK	1HHCVE11V028-K
144.	1.00E-12	1HHCVE21V051CK	1HHCVE21V062CK	1HHCVE21V122AK	1HHCVE21V026-K

Reduced sum of cutset probabilities= 9.332E-07

Moments Results

Mean Probability of Failure= 9.332E-07

Run ended at 15:47:40

TABLE A-17 (CONT.)

CHGCI.OUT FILE

CONFIGURATION CONTROL

CODE NAME : WESCUT
VERSION NO. : 1.61
DATE OF CONFIGURATION : September 13, 1990
DATE OF ISSUANCE : September 13, 1990
DATE : FEBRUARY 28, 1992
TIME : 15:47:41:56
CONFIGURATION NO. : 5393361263184

TABLE A-18
CHGCI.DES FILE

PAGE 1 TREE NAME: CHGCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: CHGCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-15
 GATE G0001 IS: CONT. BYPASS THROUGH PENE. 19 OR 20

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
1.	2.56E-08	QnE21V051A AND QnE21V066A FAIL TO CLOSE, CC QnE21V122C AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-06 1HHCVCHGCI-12
2.	2.56E-08	QnE21V051A AND QnE21V066A FAIL TO CLOSE, CC QnE21V122C AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-06 1HHCVCHGCI-11
3.	2.56E-08	QnE21V051A AND QnE21V066A FAIL TO CLOSE, CC QnE21V122B AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-06 1HHCVCHGCI-10
4.	2.56E-08	QnE21V051A AND QnE21V066A FAIL TO CLOSE, CC QnE21V122B AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-06 1HHCVCHGCI-09
5.	2.56E-08	QnE21V051A AND QnE21V066A FAIL TO CLOSE, CC QnE21V122A AND QnE11V029 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-06 1HHCVCHGCI-08
6.	2.56E-08	QnE21V051A AND QnE21V066A FAIL TO CLOSE, CC QnE21V122A AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-06 1HHCVCHGCI-07
7.	2.56E-08	QnE21V051B AND QnE21V066B FAIL TO CLOSE, CC QnE21V122C AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-05 1HHCVCHGCI-12
8.	2.56E-08	QnE21V051B AND QnE21V066B FAIL TO CLOSE, CC QnE21V122C AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-05 1HHCVCHGCI-11
9.	2.56E-08	QnE21V051B AND QnE21V066B FAIL TO CLOSE, CC QnE21V122B AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-05 1HHCVCHGCI-10
10.	2.56E-08	QnE21V051B AND QnE21V066B FAIL TO CLOSE, CC QnE21V122B AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-05 1HHCVCHGCI-09
11.	2.56E-08	QnE21V051B AND QnE21V066B FAIL TO CLOSE, CC QnE21V122A AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-05 1HHCVCHGCI-08
12.	2.56E-08	QnE21V051B AND QnE21V066B FAIL TO CLOSE, CC QnE21V122A AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-05 1HHCVCHGCI-07
13.	2.56E-08	QnE21V051C AND QnE21V066C FAIL TO CLOSE, CC QnE21V122C AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-04 1HHCVCHGCI-12
14.	2.56E-08	QnE21V051C AND QnE21V066C FAIL TO CLOSE, CC QnE21V122C AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-04 1HHCVCHGCI-11
15.	2.56E-08	QnE21V051C AND QnE21V066C FAIL TO CLOSE, CC QnE21V122B AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-04 1HHCVCHGCI-10
16.	2.56E-08	QnE21V051C AND QnE21V066C FAIL TO CLOSE, CC QnE21V122B AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-04 1HHCVCHGCI-09

TABLE A-18 (CONT.)

CHGCI.DES FILE

PAGE 2

TREE NAME: CHGCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: CHGCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-15 (page 2)
 GATE G0001 IS: CONT. BYPASS THROUGH PENE. 19 OR 20

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
17.	2.56E-08	QnE21V051C AND QnE21V066C FAIL TO CLOSE, CC QnE21V122A AND QnE11V02B FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-04 1HHCVCHGCI-08
18.	2.56E-08	QnE21V051C AND QnE21V066C FAIL TO CLOSE, CC QnE21V122A AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-04 1HHCVCHGCI-07
19.	2.56E-08	QnE21V051A AND QnE21V062A FAIL TO CLOSE, CC QnE21V122C AND QnE11V02B FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-03 1HHCVCHGCI-12
20.	2.56E-08	QnE21V051A AND QnE21V062A FAIL TO CLOSE, CC QnE21V122C AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-03 1HHCVCHGCI-11
21.	2.56E-08	QnE21V051A AND QnE21V062A FAIL TO CLOSE, CC QnE21V122B AND QnE11V02B FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-03 1HHCVCHGCI-10
22.	2.56E-08	QnE21V051A AND QnE21V062A FAIL TO CLOSE, CC QnE21V122B AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-03 1HHCVCHGCI-09
23.	2.56E-08	QnE21V051A AND QnE21V062A FAIL TO CLOSE, CC QnE21V122A AND QnE11V02B FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-03 1HHCVCHGCI-08
24.	2.56E-08	QnE21V051A AND QnE21V062A FAIL TO CLOSE, CC QnE21V122A AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-03 1HHCVCHGCI-07
25.	2.56E-08	QnE21V051B AND QnE21V062B FAIL TO CLOSE, CC QnE21V122C AND QnE11V02B FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-02 1HHCVCHGCI-12
26.	2.56E-08	QnE21V051B AND QnE21V062B FAIL TO CLOSE, CC QnE21V122C AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-02 1HHCVCHGCI-11
27.	2.56E-08	QnE21V051B AND QnE21V062B FAIL TO CLOSE, CC QnE21V122B AND QnE11V02B FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-02 1HHCVCHGCI-10
28.	2.56E-08	QnE21V051B AND QnE21V062B FAIL TO CLOSE, CC QnE21V122B AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-02 1HHCVCHGCI-09
29.	2.56E-08	QnE21V051B AND QnE21V062B FAIL TO CLOSE, CC QnE21V122A AND QnE11V02B FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-02 1HHCVCHGCI-08
30.	2.56E-08	QnE21V051B AND QnE21V062B FAIL TO CLOSE, CC QnE21V122A AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-02 1HHCVCHGCI-07
31.	2.56E-08	QnE21V051C AND QnE21V062C FAIL TO CLOSE, CC QnE21V122C AND QnE11V02B FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-01 1HHCVCHGCI-12
32.	2.56E-08	QnE21V051C AND QnE21V062C FAIL TO CLOSE, CC QnE21V122C AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-01 1HHCVCHGCI-11

TABLE A-18 (CONT.)

CHGCI.DES FILE

PAGE 3

TREE NAME: CHGCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: CHGCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-15 (page 3)
 GATE G0001 JS: CONT. BYPASS THROUGH PENE. 19 OR 20

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
33.	2.56E-08	QnE21V051C AND QnE21V062C FAIL TO CLOSE, CC QnE21V122B AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-01 1HHCVCHGCI-10
34.	2.56E-08	QnE21V051C AND QnE21V062C FAIL TO CLOSE, CC QnE21V122B AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-01 1HHCVCHGCI-09
35.	2.56E-08	QnE21V051C AND QnE21V062C FAIL TO CLOSE, CC QnE21V122A AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-01 1HHCVCHGCI-08
36.	2.56E-08	QnE21V051C AND QnE21V062C FAIL TO CLOSE, CC QnE21V122A AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVCHGCI-01 1HHCVCHGCI-07
37.	1.60E-10	QnE21V051A AND QnE21V066A FAIL TO CLOSE, CC CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE21V122C FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-06 1HHCVE11V028- 1HHCVE21V122C
38.	1.60E-10	QnE21V051A AND QnE21V066A FAIL TO CLOSE, CC CHECK VALVE QnE21V026 FAILS TO CLOSE CHECK VALVE QnE21V122C FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-06 1HHCVE21V026- 1HHCVE21V122C
39.	1.60E-10	QnE21V051A AND QnE21V066A FAIL TO CLOSE, CC CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE21V122B FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-06 1HHCVE11V028- 1HHCVE21V122B
40.	1.60E-10	QnE21V051A AND QnE21V066A FAIL TO CLOSE, CC CHECK VALVE QnE21V026 FAILS TO CLOSE CHECK VALVE QnE21V122B FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-06 1HHCVE21V026- 1HHCVE21V122B
41.	1.60E-10	QnE21V051A AND QnE21V066A FAIL TO CLOSE, CC CHECK VALVE QnE21V122A FAILS TO CLOSE CHECK VALVE QnE11V028 FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-06 1HHCVE21V122A 1HHCVE11V028-
42.	1.60E-10	QnE21V051A AND QnE21V066A FAIL TO CLOSE, CC CHECK VALVE QnE21V122A FAILS TO CLOSE CHECK VALVE QnE21V026 FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-06 1HHCVE21V122A 1HHCVE21V026-
43.	1.60E-10	CHECK VALVE QnE21V051A FAILS TO CLOSE CHECK VALVE QnE21V066A FAILS TO CLOSE QnE21V122C AND QnE11V028 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051A 1HHCVE21V066A 1HHCVCHGCI-12
44.	1.60E-10	CHECK VALVE QnE21V051A FAILS TO CLOSE CHECK VALVE QnE21V066A FAILS TO CLOSE QnE21V122C AND QnE21V026 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051A 1HHCVE21V066A 1HHCVCHGCI-11
45.	1.60E-10	CHECK VALVE QnE21V051A FAILS TO CLOSE CHECK VALVE QnE21V066A FAILS TO CLOSE QnE21V122B AND QnE11V028 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051A 1HHCVE21V066A 1HHCVCHGCI-10

TABLE A-18 (CONT.)

CHGCI.DES FILE

PAGE 4

TREE NAME: CHGCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: CHGCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-15 (page 4)
 GATE G0001 IS: CONT. BYPASS THROUGH PENE. 19 OR 20

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
46.	1.60E-10	CHECK VALVE QnE21V051A FAILS TO CLOSE	1.00E-03	1HHCVE21V051A
		CHECK VALVE QnE21V066A FAILS TO CLOSE	1.00E-03	1HHCVE21V066A
		QnE21V122B AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-09
47.	1.60E-10	CHECK VALVE QnE21V051A FAILS TO CLOSE	1.00E-03	1HHCVE21V051A
		CHECK VALVE QnE21V066A FAILS TO CLOSE	1.00E-03	1HHCVE21V066A
		QnE21V122A AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-08
48.	1.60E-10	CHECK VALVE QnE21V051A FAILS TO CLOSE	1.00E-03	1HHCVE21V051A
		CHECK VALVE QnE21V066A FAILS TO CLOSE	1.00E-03	1HHCVE21V066A
		QnE21V122A AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-07
49.	1.60E-10	QnE21V051B AND QnE21V066B FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-05
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1HHCVE11V028-
		CHECK VALVE QnE21V122C FAILS TO CLOSE	1.00E-03	1HHCVE21V122C
50.	1.60E-10	QnE21V051B AND QnE21V066B FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-05
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE21V122C FAILS TO CLOSE	1.00E-03	1HHCVE21V122C
51.	1.60E-10	QnE21V051B AND QnE21V066B FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-05
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1HHCVE11V028-
		CHECK VALVE QnE21V122B FAILS TO CLOSE	1.00E-03	1HHCVE21V122B
52.	1.60E-10	QnE21V051B AND QnE21V066B FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-05
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE21V122B FAILS TO CLOSE	1.00E-03	1HHCVE21V122B
53.	1.60E-10	QnE21V051B AND QnE21V066B FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-05
		CHECK VALVE QnE21V122A FAILS TO CLOSE	1.00E-03	1HHCVE21V122A
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1HHCVE11V028-
54.	1.60E-10	QnE21V051B AND QnE21V066B FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-05
		CHECK VALVE QnE21V122A FAILS TO CLOSE	1.00E-03	1HHCVE21V122A
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
55.	1.60E-10	CHECK VALVE QnE21V051B FAILS TO CLOSE	1.00E-03	1HHCVE21V051B
		CHECK VALVE QnE21V066B FAILS TO CLOSE	1.00E-03	1HHCVE21V066B
		QnE21V122C AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-12
56.	1.60E-10	CHECK VALVE QnE21V051B FAILS TO CLOSE	1.00E-03	1HHCVE21V051B
		CHECK VALVE QnE21V066B FAILS TO CLOSE	1.00E-03	1HHCVE21V066B
		QnE21V122C AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-11
57.	1.60E-10	CHECK VALVE QnE21V051B FAILS TO CLOSE	1.00E-03	1HHCVE21V051B
		CHECK VALVE QnE21V066B FAILS TO CLOSE	1.00E-03	1HHCVE21V066B
		QnE21V122B AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-10

TABLE A-18 (CONT.)

CHGCI.DES FILE

PAGE 5

TREE NAME: CHGCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: CHGCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-15 (page 5)
 GATE G0001 IS: CONT. BYPASS THROUGH PENE. 19 OR 20

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
58.	1.60E-10	CHECK VALVE QnE21V051B FAILS TO CLOSE CHECK VALVE QnE21V066B FAILS TO CLOSE QnE21V122B AND QnE21V026 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051B 1HHCVE21V066B 1HHCVCHGCI-09
59.	1.60E-10	CHECK VALVE QnE21V051B FAILS TO CLOSE CHECK VALVE QnE21V066B FAILS TO CLOSE QnE21V122A AND QnE11V028 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051B 1HHCVE21V066B 1HHCVCHGCI-08
60.	1.60E-10	CHECK VALVE QnE21V051B FAILS TO CLOSE CHECK VALVE QnE21V066B FAILS TO CLOSE QnE21V122A AND QnE21V026 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051B 1HHCVE21V066B 1HHCVCHGCI-07
61.	1.60E-10	QnE21V051C AND QnE21V066C FAIL TO CLOSE, CC CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE21V122C FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-04 1HHCVE11V028- 1HHCVE21V122C
62.	1.60E-10	QnE21V051C AND QnE21V066C FAIL TO CLOSE, CC CHECK VALVE QnE21V026 FAILS TO CLOSE CHECK VALVE QnE21V122C FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-04 1HHCVE21V026- 1HHCVE21V122C
63.	1.60E-10	QnE21V051C AND QnE21V066C FAIL TO CLOSE, CC CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE21V122B FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-04 1HHCVE11V028- 1HHCVE21V122B
64.	1.60E-10	QnE21V051C AND QnE21V066C FAIL TO CLOSE, CC CHECK VALVE QnE21V026 FAILS TO CLOSE CHECK VALVE QnE21V122B FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-04 1HHCVE21V026- 1HHCVE21V122B
65.	1.60E-10	QnE21V051C AND QnE21V066C FAIL TO CLOSE, CC CHECK VALVE QnE21V122A FAILS TO CLOSE CHECK VALVE QnE11V028 FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-04 1HHCVE21V122A 1HHCVE11V028-
66.	1.60E-10	QnE21V051C AND QnE21V066C FAIL TO CLOSE, CC CHECK VALVE QnE21V122A FAILS TO CLOSE CHECK VALVE QnE21V026 FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-04 1HHCVE21V122A 1HHCVE21V026-
67.	1.60E-10	CHECK VALVE QnE21V051C FAILS TO CLOSE CHECK VALVE QnE21V066C FAILS TO CLOSE QnE21V122C AND QnE11V028 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051C 1HHCVE21V066C 1HHCVCHGCI-12
68.	1.60E-10	CHECK VALVE QnE21V051C FAILS TO CLOSE CHECK VALVE QnE21V066C FAILS TO CLOSE QnE21V122C AND QnE21V026 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051C 1HHCVE21V066C 1HHCVCHGCI-11
69.	1.60E-10	CHECK VALVE QnE21V051C FAILS TO CLOSE CHECK VALVE QnE21V066C FAILS TO CLOSE QnE21V122B AND QnE11V028 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051C 1HHCVE21V066C 1HHCVCHGCI-10

TABLE A-18 (CONT.)

CHGCI.DES FILE

PAGE 6 TREE NAME: CHGCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: CHGCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-15 (page 6)
 GATE G0001 IS: CONT. BYPASS THROUGH-PENE. 19 OR 20

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVEAT PROB.	IDENTIFIER
70.	1.60E-10	CHECK VALVE QnE21V051C FAILS TO CLOSE	1.00E-03	1HHCVE21V051C
		CHECK VALVE QnE21V066C FAILS TO CLOSE	1.00E-03	1HHCVE21V066C
		QnE21V122B AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-09
71.	1.60E-10	CHECK VALVE QnE21V051C FAILS TO CLOSE	1.00E-03	1HHCVE21V051C
		CHECK VALVE QnE21V066C FAILS TO CLOSE	1.00E-03	1HHCVE21V066C
		QnE21V122A AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-08
72.	1.60E-10	CHECK VALVE QnE21V051C FAILS TO CLOSE	1.00E-03	1HHCVE21V051C
		CHECK VALVE QnE21V066C FAILS TO CLOSE	1.00E-03	1HHCVE21V066C
		QnE21V122A AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-07
73.	1.60E-10	QnE21V051A AND QnE21V062A FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-03
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1HHCVE11V028-
		CHECK VALVE QnE21V122C FAILS TO CLOSE	1.00E-03	1HHCVE21V122C
74.	1.60E-10	QnE21V051A AND QnE21V062A FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-03
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE21V122C FAILS TO CLOSE	1.00E-03	1HHCVE21V122C
75.	1.60E-10	QnE21V051A AND QnE21V062A FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-03
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1HHCVE11V028-
		CHECK VALVE QnE21V122B FAILS TO CLOSE	1.00E-03	1HHCVE21V122B
76.	1.60E-10	QnE21V051A AND QnE21V062A FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-03
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE21V122B FAILS TO CLOSE	1.00E-03	1HHCVE21V122B
77.	1.60E-10	QnE21V051A AND QnE21V062A FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-03
		CHECK VALVE QnE21V122A FAILS TO CLOSE	1.00E-03	1HHCVE21V122A
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1HHCVE11V028-
78.	1.60E-10	QnE21V051A AND QnE21V062A FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-03
		CHECK VALVE QnE21V122A FAILS TO CLOSE	1.00E-03	1HHCVE21V122A
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
79.	1.60E-10	CHECK VALVE QnE21V051A FAILS TO CLOSE	1.00E-03	1HHCVE21V051A
		CHECK VALVE QnE21V062A FAILS TO CLOSE	1.00E-03	1HHCVE21V062A
		QnE21V122C AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-12
80.	1.60E-10	CHECK VALVE QnE21V051A FAILS TO CLOSE	1.00E-03	1HHCVE21V051A
		CHECK VALVE QnE21V062A FAILS TO CLOSE	1.00E-03	1HHCVE21V062A
		QnE21V122C AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-11
81.	1.60E-10	CHECK VALVE QnE21V051A FAILS TO CLOSE	1.00E-03	1HHCVE21V051A
		CHECK VALVE QnE21V062A FAILS TO CLOSE	1.00E-03	1HHCVE21V062A
		QnE21V122B AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04	1HHCVCHGCI-10

TABLE A-18 (CONT.)

CHGCI.DES FILE

PAGE 7

TREE NAME: CHGCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: CHGCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-15 (page 7)
 GATE G0001 IS: CONT. BYPASS THROUGH PENE. 19 OR 20

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
82.	1.60E-10	CHECK VALVE QnE21V051A FAILS TO CLOSE CHECK VALVE QnE21V062A FAILS TO CLOSE QnE21V122B AND QnE21V026 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051A 1HHCVE21V062A 1HHCVCHGCI-09
83.	1.60E-10	CHECK VALVE QnE21V051A FAILS TO CLOSE CHECK VALVE QnE21V062A FAILS TO CLOSE QnE21V122A AND QnE11V028 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051A 1HHCVE21V062A 1HHCVCHGCI-08
84.	1.60E-10	CHECK VALVE QnE21V051A FAILS TO CLOSE CHECK VALVE QnE21V062A FAILS TO CLOSE QnE21V122A AND QnE21V026 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051A 1HHCVE21V062A 1HHCVCHGCI-07
85.	1.60E-10	QnE21V051B AND QnE21V062B FAIL TO CLOSE, CC CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE21V122C FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-02 1HHCVE11V028- 1HHCVE21V122C
86.	1.60E-10	QnE21V051B AND QnE21V062B FAIL TO CLOSE, CC CHECK VALVE QnE21V026 FAILS TO CLOSE CHECK VALVE QnE21V122C FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-02 1HHCVE21V026- 1HHCVE21V122C
87.	1.60E-10	QnE21V051B AND QnE21V062B FAIL TO CLOSE, CC CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE21V122B FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-02 1HHCVE11V028- 1HHCVE21V122B
88.	1.60E-10	QnE21V051B AND QnE21V062B FAIL TO CLOSE, CC CHECK VALVE QnE21V026 FAILS TO CLOSE CHECK VALVE QnE21V122B FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-02 1HHCVE21V026- 1HHCVE21V122B
89.	1.60E-10	QnE21V051B AND QnE21V062B FAIL TO CLOSE, CC CHECK VALVE QnE21V122A FAILS TO CLOSE CHECK VALVE QnE11V028 FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-02 1HHCVE21V122A 1HHCVE11V028-
90.	1.60E-10	QnE21V051B AND QnE21V062B FAIL TO CLOSE, CC CHECK VALVE QnE21V122A FAILS TO CLOSE CHECK VALVE QnE21V026 FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-02 1HHCVE21V122A 1HHCVE21V026-
91.	1.60E-10	CHECK VALVE QnE21V051B FAILS TO CLOSE CHECK VALVE QnE21V062B FAILS TO CLOSE QnE21V122C AND QnE11V028 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051B 1HHCVE21V062B 1HHCVCHGCI-12
92.	1.60E-10	CHECK VALVE QnE21V051B FAILS TO CLOSE CHECK VALVE QnE21V062B FAILS TO CLOSE QnE21V122C AND QnE21V026 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051B 1HHCVE21V062B 1HHCVCHGCI-11
93.	1.60E-10	CHECK VALVE QnE21V051B FAILS TO CLOSE CHECK VALVE QnE21V062B FAILS TO CLOSE QnE21V122B AND QnE11V028 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051B 1HHCVE21V062B 1HHCVCHGCI-10

TABLE A-18 (CONT.)

CHGCI.DES FILE

PAGE 8 TREE NAME: CHGCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: CHGCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-15 (page 8)
 GATE G0001 IS: CONT. BYPASS THROUGH PENE. 19 OR 20

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
94.	1.60E-10	CHECK VALVE QnE21V051B FAILS TO CLOSE CHECK VALVE QnE21V062B FAILS TO CLOSE QnE21V122B AND QnE21V026 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051B 1HHCVE21V062B 1HHCVCHGCI-09
95.	1.60E-10	CHECK VALVE QnE21V051B FAILS TO CLOSE CHECK VALVE QnE21V062B FAILS TO CLOSE QnE21V122A AND QnE11V02B FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051B 1HHCVE21V062B 1HHCVCHGCI-08
96.	1.60E-10	CHECK VALVE QnE21V051B FAILS TO CLOSE CHECK VALVE QnE21V062B FAILS TO CLOSE QnE21V122A AND QnE21V026 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051B 1HHCVE21V062B 1HHCVCHGCI-07
97.	1.60E-10	QnE21V051C AND QnE21V062C FAIL TO CLOSE, CC CHECK VALVE QnE11V02B FAILS TO CLOSE CHECK VALVE QnE21V122C FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-01 1HHCVE11V02B- 1HHCVE21V122C
98.	1.60E-10	QnE21V051C AND QnE21V062C FAIL TO CLOSE, CC CHECK VALVE QnE21V026 FAILS TO CLOSE CHECK VALVE QnE21V122C FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-01 1HHCVE21V026- 1HHCVE21V122C
99.	1.60E-10	QnE21V051C AND QnE21V062C FAIL TO CLOSE, CC CHECK VALVE QnE11V02B FAILS TO CLOSE CHECK VALVE QnE21V122B FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-01 1HHCVE11V02B- 1HHCVE21V122B
100.	1.60E-10	QnE21V051C AND QnE21V062C FAIL TO CLOSE, CC CHECK VALVE QnE21V026 FAILS TO CLOSE CHECK VALVE QnE21V122B FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-01 1HHCVE21V026- 1HHCVE21V122B
101.	1.60E-10	QnE21V051C AND QnE21V062C FAIL TO CLOSE, CC CHECK VALVE QnE21V122A FAILS TO CLOSE CHECK VALVE QnE11V02B FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-01 1HHCVE21V122A 1HHCVE11V02B-
102.	1.60E-10	QnE21V051C AND QnE21V062C FAIL TO CLOSE, CC CHECK VALVE QnE21V122A FAILS TO CLOSE CHECK VALVE QnE21V026 FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVCHGCI-01 1HHCVE21V122A 1HHCVE21V026-
103.	1.60E-10	CHECK VALVE QnE21V051C FAILS TO CLOSE CHECK VALVE QnE21V062C FAILS TO CLOSE QnE21V122C AND QnE11V02B FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051C 1HHCVE21V062C 1HHCVCHGCI-12
104.	1.60E-10	CHECK VALVE QnE21V051C FAILS TO CLOSE CHECK VALVE QnE21V062C FAILS TO CLOSE QnE21V122C AND QnE21V026 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051C 1HHCVE21V062C 1HHCVCHGCI-11
105.	1.60E-10	CHECK VALVE QnE21V051C FAILS TO CLOSE CHECK VALVE QnE21V062C FAILS TO CLOSE QnE21V122B AND QnE11V02B FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051C 1HHCVE21V062C 1HHCVCHGCI-10

TABLE A-18 (CONT.)

CHGCI.DES FILE

PAGE 9

TREE NAME: CHGCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: CHGCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-15 (page 9)
 GATE G0001 IS: CONT. BYPASS THROUGH PENE. 19 OR 20

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
106.	1.60E-10	CHECK VALVE QnE21V051C FAILS TO CLOSE CHECK VALVE QnE21V062C FAILS TO CLOSE QnE21V122B AND QnE21V026 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051C 1HHCVE21V062C 1HHCVCHGCI-09
107.	1.60E-10	CHECK VALVE QnE21V051C FAILS TO CLOSE CHECK VALVE QnE21V062C FAILS TO CLOSE QnE21V122A AND QnE11V028 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051C 1HHCVE21V062C 1HHCVCHGCI-08
108.	1.60E-10	CHECK VALVE QnE21V051C FAILS TO CLOSE CHECK VALVE QnE21V062C FAILS TO CLOSE QnE21V122A AND QnE21V026 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V051C 1HHCVE21V062C 1HHCVCHGCI-07
109.	1.00E-12	CHECK VALVE QnE21V051A FAILS TO CLOSE CHECK VALVE QnE21V066A FAILS TO CLOSE CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE21V122C FAILS TO CLOSE	1.00E-03 1.00E-03 1.00E-03 1.00E-03	1HHCVE21V051A 1HHCVE21V066A 1HHCVE11V028- 1HHCVE21V122C
110.	1.00E-12	CHECK VALVE QnE21V051A FAILS TO CLOSE CHECK VALVE QnE21V066A FAILS TO CLOSE CHECK VALVE QnE21V026 FAILS TO CLOSE CHECK VALVE QnE21V122C FAILS TO CLOSE	1.00E-03 1.00E-03 1.00E-03 1.00E-03	1HHCVE21V051A 1HHCVE21V066A 1HHCVE21V026- 1HHCVE21V122C
111.	1.00E-12	CHECK VALVE QnE21V051A FAILS TO CLOSE CHECK VALVE QnE21V066A FAILS TO CLOSE CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE21V122B FAILS TO CLOSE	1.00E-03 1.00E-03 1.00E-03 1.00E-03	1HHCVE21V051A 1HHCVE21V066A 1HHCVE11V028- 1HHCVE21V122B
112.	1.00E-12	CHECK VALVE QnE21V051A FAILS TO CLOSE CHECK VALVE QnE21V066A FAILS TO CLOSE CHECK VALVE QnE21V026 FAILS TO CLOSE CHECK VALVE QnE21V122B FAILS TO CLOSE	1.00E-03 1.00E-03 1.00E-03 1.00E-03	1HHCVE21V051A 1HHCVE21V066A 1HHCVE21V026- 1HHCVE21V122B
113.	1.00E-12	CHECK VALVE QnE21V051A FAILS TO CLOSE CHECK VALVE QnE21V066A FAILS TO CLOSE CHECK VALVE QnE21V122A FAILS TO CLOSE CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03 1.00E-03 1.00E-03 1.00E-03	1HHCVE21V051A 1HHCVE21V066A 1HHCVE21V122A 1HHCVE11V028-
114.	1.00E-12	CHECK VALVE QnE21V051A FAILS TO CLOSE CHECK VALVE QnE21V066A FAILS TO CLOSE CHECK VALVE QnE21V122A FAILS TO CLOSE CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03 1.00E-03 1.00E-03 1.00E-03	1HHCVE21V051A 1HHCVE21V066A 1HHCVE21V122A 1HHCVE21V026-
115.	1.00E-12	CHECK VALVE QnE21V051B FAILS TO CLOSE CHECK VALVE QnE21V066B FAILS TO CLOSE CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE21V122C FAILS TO CLOSE	1.00E-03 1.00E-03 1.00E-03 1.00E-03	1HHCVE21V051B 1HHCVE21V066B 1HHCVE11V028- 1HHCVE21V122C

TABLE A-18 (CONT.)

CHGCI.DES FILE

PAGE 10

TREE NAME: CHGCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: CHGCI.CDS

CUT SETS FOR GAT: G0001 WITH CUTOFF PROBABILITY OF 1.00E-15 (page 10)
 GATE G0001 IS: CONT. BYPASS THROUGH PENE. 19 OR 20

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
116.	1.00E-12	CHECK VALVE QnE21V051B FAILS TO CLOSE	1.00E-03	1HHCVE21V051B
		CHECK VALVE QnE21V066B FAILS TO CLOSE	1.00E-03	1HHCVE21V066B
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE21V122C FAILS TO CLOSE	1.00E-03	1HHCVE21V122C
117.	1.00E-12	CHECK VALVE QnE21V051B FAILS TO CLOSE	1.00E-03	1HHCVE21V051B
		CHECK VALVE QnE21V066B FAILS TO CLOSE	1.00E-03	1HHCVE21V066B
		CHECK VALVE QnE11V02B FAILS TO CLOSE	1.00E-03	1HHCVE11V02B-
		CHECK VALVE QnE21V122B FAILS TO CLOSE	1.00E-03	1HHCVE21V122B
118.	1.00E-12	CHECK VALVE QnE21V051B FAILS TO CLOSE	1.00E-03	1HHCVE21V051B
		CHECK VALVE QnE21V066B FAILS TO CLOSE	1.00E-03	1HHCVE21V066B
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE21V122B FAILS TO CLOSE	1.00E-03	1HHCVE21V122B
119.	1.00E-12	CHECK VALVE QnE21V051B FAILS TO CLOSE	1.00E-03	1HHCVE21V051B
		CHECK VALVE QnE21V066B FAILS TO CLOSE	1.00E-03	1HHCVE21V066B
		CHECK VALVE QnE21V122A FAILS TO CLOSE	1.00E-03	1HHCVE21V122A
		CHECK VALVE QnE11V02B FAILS TO CLOSE	1.00E-03	1HHCVE11V02B-
120.	1.00E-12	CHECK VALVE QnE21V051B FAILS TO CLOSE	1.00E-03	1HHCVE21V051B
		CHECK VALVE QnE21V066B FAILS TO CLOSE	1.00E-03	1HHCVE21V066B
		CHECK VALVE QnE21V122A FAILS TO CLOSE	1.00E-03	1HHCVE21V122A
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
121.	1.00E-12	CHECK VALVE QnE21V051C FAILS TO CLOSE	1.00E-03	1HHCVE21V051C
		CHECK VALVE QnE21V066C FAILS TO CLOSE	1.00E-03	1HHCVE21V066C
		CHECK VALVE QnE11V02B FAILS TO CLOSE	1.00E-03	1HHCVE11V02B-
		CHECK VALVE QnE21V122C FAILS TO CLOSE	1.00E-03	1HHCVE21V122C
122.	1.00E-12	CHECK VALVE QnE21V051C FAILS TO CLOSE	1.00E-03	1HHCVE21V051C
		CHECK VALVE QnE21V066C FAILS TO CLOSE	1.00E-03	1HHCVE21V066C
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE21V122C FAILS TO CLOSE	1.00E-03	1HHCVE21V122C
123.	1.00E-12	CHECK VALVE QnE21V051C FAILS TO CLOSE	1.00E-03	1HHCVE21V051C
		CHECK VALVE QnE21V066C FAILS TO CLOSE	1.00E-03	1HHCVE21V066C
		CHECK VALVE QnE11V02B FAILS TO CLOSE	1.00E-03	1HHCVE11V02B-
		CHECK VALVE QnE21V122B FAILS TO CLOSE	1.00E-03	1HHCVE21V122B
124.	1.00E-12	CHECK VALVE QnE21V051C FAILS TO CLOSE	1.00E-03	1HHCVE21V051C
		CHECK VALVE QnE21V066C FAILS TO CLOSE	1.00E-03	1HHCVE21V066C
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE21V122B FAILS TO CLOSE	1.00E-03	1HHCVE21V122B
125.	1.00E-12	CHECK VALVE QnE21V051C FAILS TO CLOSE	1.00E-03	1HHCVE21V051C
		CHECK VALVE QnE21V066C FAILS TO CLOSE	1.00E-03	1HHCVE21V066C
		CHECK VALVE QnE21V122A FAILS TO CLOSE	1.00E-03	1HHCVE21V122A
		CHECK VALVE QnE11V02B FAILS TO CLOSE	1.00E-03	1HHCVE11V02B-

TABLE A-18 (CONT.)

CHGCI.DES FILE

PAGE 11 TREE NAME: CHGCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: CHGCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-15 (page 11)
 GATE G0001 IS: CONT. BYPASS THROUGH PENE. 19 OR 20

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
126.	1.00E-12	CHECK VALVE QnE21V051C FAILS TO CLOSE	1.00E-03	1HHCVE21V051C
		CHECK VALVE QnE21V066C FAILS TO CLOSE	1.00E-03	1HHCVE21V066C
		CHECK VALVE QnE21V122A FAILS TO CLOSE	1.00E-03	1HHCVE21V122A
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
127.	1.00E-12	CHECK VALVE QnE21V051A FAILS TO CLOSE	1.00E-03	1HHCVE21V051A
		CHECK VALVE QnE21V062A FAILS TO CLOSE	1.00E-03	1HHCVE21V062A
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1HHCVE11V028-
		CHECK VALVE QnE21V122C FAILS TO CLOSE	1.00E-03	1HHCVE21V122C
128.	1.00E-12	CHECK VALVE QnE21V051A FAILS TO CLOSE	1.00E-03	1HHCVE21V051A
		CHECK VALVE QnE21V062A FAILS TO CLOSE	1.00E-03	1HHCVE21V062A
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE21V122C FAILS TO CLOSE	1.00E-03	1HHCVE21V122C
129.	1.00E-12	CHECK VALVE QnE21V051A FAILS TO CLOSE	1.00E-03	1HHCVE21V051A
		CHECK VALVE QnE21V062A FAILS TO CLOSE	1.00E-03	1HHCVE21V062A
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1HHCVE11V028-
		CHECK VALVE QnE21V122B FAILS TO CLOSE	1.00E-03	1HHCVE21V122B
130.	1.00E-12	CHECK VALVE QnE21V051A FAILS TO CLOSE	1.00E-03	1HHCVE21V051A
		CHECK VALVE QnE21V062A FAILS TO CLOSE	1.00E-03	1HHCVE21V062A
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE21V122B FAILS TO CLOSE	1.00E-03	1HHCVE21V122B
131.	1.00E-12	CHECK VALVE QnE21V051A FAILS TO CLOSE	1.00E-03	1HHCVE21V051A
		CHECK VALVE QnE21V062A FAILS TO CLOSE	1.00E-03	1HHCVE21V062A
		CHECK VALVE QnE21V122A FAILS TO CLOSE	1.00E-03	1HHCVE21V122A
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1HHCVE11V028-
132.	1.00E-12	CHECK VALVE QnE21V051A FAILS TO CLOSE	1.00E-03	1HHCVE21V051A
		CHECK VALVE QnE21V062A FAILS TO CLOSE	1.00E-03	1HHCVE21V062A
		CHECK VALVE QnE21V122A FAILS TO CLOSE	1.00E-03	1HHCVE21V122A
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
133.	1.00E-12	CHECK VALVE QnE21V051B FAILS TO CLOSE	1.00E-03	1HHCVE21V051B
		CHECK VALVE QnE21V062B FAILS TO CLOSE	1.00E-03	1HHCVE21V062B
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1HHCVE11V028-
		CHECK VALVE QnE21V122C FAILS TO CLOSE	1.00E-03	1HHCVE21V122C
134.	1.00E-12	CHECK VALVE QnE21V051B FAILS TO CLOSE	1.00E-03	1HHCVE21V051B
		CHECK VALVE QnE21V062B FAILS TO CLOSE	1.00E-03	1HHCVE21V062B
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE21V122C FAILS TO CLOSE	1.00E-03	1HHCVE21V122C
135.	1.00E-12	CHECK VALVE QnE21V051B FAILS TO CLOSE	1.00E-03	1HHCVE21V051B
		CHECK VALVE QnE21V062B FAILS TO CLOSE	1.00E-03	1HHCVE21V062B
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1HHCVE11V028-
		CHECK VALVE QnE21V122B FAILS TO CLOSE	1.00E-03	1HHCVE21V122B

TABLE A-18 (CONT.)

CHGCI.DES FILE

PAGE 12

TREE NAME: CHGCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: CHGCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-15 (page 12)
 GATE G0001 IS: CONT. BYPASS THROUGH PENE. 19 OR 20

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
136.	1.00E-12	CHECK VALVE QnE21V051B FAILS TO CLOSE	1.00E-03	1HHCVE21V051B
		CHECK VALVE QnE21V062B FAILS TO CLOSE	1.00E-03	1HHCVE21V062B
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE21V122B FAILS TO CLOSE	1.00E-03	1HHCVE21V122B
137.	1.00E-12	CHECK VALVE QnE21V051B FAILS TO CLOSE	1.00E-03	1HHCVE21V051B
		CHECK VALVE QnE21V062B FAILS TO CLOSE	1.00E-03	1HHCVE21V062B
		CHECK VALVE QnE21V122A FAILS TO CLOSE	1.00E-03	1HHCVE21V122A
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1HHCVE11V028-
138.	1.00E-12	CHECK VALVE QnE21V051B FAILS TO CLOSE	1.00E-03	1HHCVE21V051B
		CHECK VALVE QnE21V062B FAILS TO CLOSE	1.00E-03	1HHCVE21V062B
		CHECK VALVE QnE21V122A FAILS TO CLOSE	1.00E-03	1HHCVE21V122A
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
139.	1.00E-12	CHECK VALVE QnE21V051C FAILS TO	1.00E-03	1HHCVE21V051C
		CHECK VALVE QnE21V062C FAILS TO	1.00E-03	1HHCVE21V062C
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1HHCVE11V028-
		CHECK VALVE QnE21V122C FAILS TO CLOSE	1.00E-03	1HHCVE21V122C
140.	1.00E-12	CHECK VALVE QnE21V051C FAILS TO CLOSE	1.00E-03	1HHCVE21V051C
		CHECK VALVE QnE21V062C FAILS TO CLOSE	1.00E-03	1HHCVE21V062C
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE21V122C FAILS TO CLOSE	1.00E-03	1HHCVE21V122C
141.	1.00E-12	CHECK VALVE QnE21V051C FAILS TO CLOSE	1.00E-03	1HHCVE21V051C
		CHECK VALVE QnE21V062C FAILS TO CLOSE	1.00E-03	1HHCVE21V062C
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1HHCVE11V028-
		CHECK VALVE QnE21V122B FAILS TO CLOSE	1.00E-03	1HHCVE21V122B
142.	1.00E-12	CHECK VALVE QnE21V051C FAILS TO CLOSE	1.00E-03	1HHCVE21V051C
		CHECK VALVE QnE21V062C FAILS TO CLOSE	1.00E-03	1HHCVE21V062C
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE21V122B FAILS TO CLOSE	1.00E-03	1HHCVE21V122B
143.	1.00E-12	CHECK VALVE QnE21V051C FAILS TO CLOSE	1.00E-03	1HHCVE21V051C
		CHECK VALVE QnE21V062C FAILS TO CLOSE	1.00E-03	1HHCVE21V062C
		CHECK VALVE QnE21V122A FAILS TO CLOSE	1.00E-03	1HHCVE21V122A
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1HHCVE11V028-
144.	1.00E-12	CHECK VALVE QnE21V051C FAILS TO CLOSE	1.00E-03	1HHCVE21V051C
		CHECK VALVE QnE21V062C FAILS TO CLOSE	1.00E-03	1HHCVE21V062C
		CHECK VALVE QnE21V122A FAILS TO CLOSE	1.00E-03	1HHCVE21V122A
		CHECK VALVE QnE21V026 FAILS TO CLOSE	1.00E-03	1HHCVE21V026-

REDUCED SUM OF PROBABILITY OF FAILURE = 9.332E-07

TABLE A-18 (CONT.)

CHGCI.DES FILE

CONFIGURATION CONTROL

CODE NAME : CUTDES
VERSION NO. : 1.70
DATE OF CONFIGURATION : NOVEMBER 21, 1989
DATE OF ISSUANCE : NOVEMBER 21, 1989
DATE : FEBRUARY 28, 1992
TIME : 15:48:20: 0
CONFIGURATION NO. : 5201662274887

TABLE A-19

CHECK VALVE GROUPS USED IN COMMON CAUSE FAILURE
CALCULATION OF THE RHRCI FAULT TREE

Index No.	Component Numbers	Function	Group Size
1	QnE11V051A QnE11V021A QnE11V042A	Check Valves between the Loop 3 Cold Leg and PWR Pump Discharge	3
2	QnE11V051A QnE11V021A QnE11V042B	Check Valves between the Loop 3 Cold Leg and RHR Pump Discharge	3
3	QnE11V051B QnE11V021B QnE11V042A	Check Valves between the Loop 2 Cold Leg and RHR Pump Discharge	3
4	QnE11V051B QnE11V021B QnE11V042B	Check Valves between the Loop 2 Cold Leg and RHR Pump Discharge	3
5	QnE11V051C QnE11V021C QnE11V042A	Check Valves between the Loop 1 Cold Leg and RHR Pump Discharge	3
6	QnE11V051C QnE11V021C QnE11V042B	Check Valves between the Loop 1 Cold Leg and RHR Pump Discharge	3
7	QnE21V077A QnE21V076A	Check Valves between the Loop 1 Hot Leg and RHR Pump Discharge	2
8	QnE21V077B QnE21V076B	Check Valves between the Loop 2 Hot Leg and RHR Pump Discharge	2
9	QnE11V038A QnE11V028	Check Valves between the RHR Pump Discharge and the RWST through RHR Pump A Discharge and RHR Pump Suction Piping	2
10	QnE11V038A QnE21V026	Check Valves between the RHR Pump Discharge and the RWST through RHR Pump A Discharge and CCP Suction Piping	2
11	QnE11V038B QnE11V028	Check Valves between the RHR Pump Discharge and the RWST through RHR Pump B Discharge and RHR Pump Suction Piping	2
12	QnE11V038B QnE21V026	Check Valves between the RHR Pump Discharge and the RWST through RHR Pump B Discharge and CCP Suction Piping	2

TABLE A-20
RHRCI.SIM FILE

VER 1.6

'SIMON Case file for Tree: RHRCI; Created: 12/06/91 17:22'

'1LHCVE11V051AK	'	01	062	0.000000	0.0
'1LHCVE11V021AK	'	01	062	0.000000	0.0
'1LHCVE11V042AK	'	01	062	0.000000	0.0
'1LHCVE11V042BK	'	01	062	0.000000	0.0
'1LHCVRHRCI-01KCC'	'	01	623	0.000000	0.0
'1LHCVRHRCI-02KCC'	'	01	623	0.000000	0.0
'1LHCVE11V051BK	'	01	062	0.000000	0.0
'1LHCVE11V021BK	'	01	062	0.000000	0.0
'1LHCVRHRCI-03KCC'	'	01	623	0.000000	0.0
'1LHCVRHRCI-04KCC'	'	01	623	0.000000	0.0
'1LHCVE11V051CK	'	01	062	0.000000	0.0
'1LHCVE11V021CK	'	01	062	0.000000	0.0
'1LHCVRHRCI-05KCC'	'	01	623	0.000000	0.0
'1LHCVRHRCI-06KCC'	'	01	623	0.000000	0.0
'1HHCVE21V077AK	'	01	062	0.000000	0.0
'1HHCVE21V076AK	'	01	062	0.000000	0.0
'1HHCVRHRCI-07KCC'	'	01	621	0.000000	0.0
'1HHCVE21V077BK	'	01	062	0.000000	0.0
'1HHCVE21V076BK	'	01	062	0.000000	0.0
'1LHCVRHRCI-08KCC'	'	01	621	0.000000	0.0
'1LHCVE11V038AK	'	01	062	0.000000	0.0
'1LHCVE11V028-K	'	01	062	0.000000	0.0
'1LHCVRHRCI-09KCC'	'	01	621	0.000000	0.0
'1HHCVE21V026-K	'	01	062	0.000000	0.0
'1LHCVRHRCI-10KCC'	'	01	621	0.000000	0.0
'1LHCVE11V038BK	'	01	062	0.000000	0.0
'1LHCVRHRCI-11KCC'	'	01	621	0.000000	0.0
'1LHCVRHRCI-12KCC'	'	01	621	0.000000	0.0

TABLE A-21
RHRCI.TAB FILE

Simon5, VER 1.6 Table Output File
SIMON Case file for Tree: RHRCI; Created: 12/06/91 17:22

02/28/92 15:49

FT IDENT	COMP	FAILURE MODE	FAIL RATE	VARIANCE	SOURCE	TIME	PROBABILITY	VARIANCE
1LHCVE11V051AK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1LHCVE11V021AK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1LHCVE11V042AK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1LHCVE11V042BK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1LHCVRHRCI-01KCC	CV	CC/MGL; FAC(3/3 FAIL) 1.3E-01 CV T, CV FAILS TO CLOSE; EF=3	1.300E-04	9.500E-09	4550	0.000E+00	1.30E-04	9.50E-09
1LHCVRHRCI-02KCC	CV	CC/MGL; FAC(3/3 FAIL) 1.3E-01 CV T, CV FAILS TO CLOSE; EF=3	1.300E-04	9.500E-09	4550	0.000E+00	1.30E-04	9.50E-09
1LHCVE11V051BK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1LHCVE11V021BK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1LHCVRHRCI-03KCC	CV	CC/MGL; FAC(3/3 FAIL) 1.3E-01 CV T, CV FAILS TO CLOSE; EF=3	1.300E-04	9.500E-09	4550	0.000E+00	1.30E-04	9.50E-09
1LHCVRHRCI-04KCC	CV	CC/MGL; FAC(3/3 FAIL) 1.3E-01 CV T, CV FAILS TO CLOSE; EF=3	1.300E-04	9.500E-09	4550	0.000E+00	1.30E-04	9.50E-09
1LHCVE11V051CK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1LHCVE11V021CK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1LHCVRHRCI-05KCC	CV	CC/MGL; FAC(3/3 FAIL) 1.3E-01 CV T, CV FAILS TO CLOSE; EF=3	1.300E-04	9.500E-09	4550	0.000E+00	1.30E-04	9.50E-09
1LHCVRHRCI-06KCC	CV	CC/MGL; FAC(3/3 FAIL) 1.3E-01 CV T, CV FAILS TO CLOSE; EF=3	1.300E-04	9.500E-09	4550	0.000E+00	1.30E-04	9.50E-09
1HHCVE21V077AK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1HHCVE21V076AK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1HHCVRHRCI-07KCC	CV	CC/MGL; FAC(2/2 FAIL) 1.6E-01 CV T, CV FAILS TO CLOSE; EF=3	1.600E-04	1.440E-08	4550	0.000E+00	1.60E-04	1.44E-08
1HHCVE21V077BK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1HHCVE21V076BK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1LHCVRHRCI-08KCC	CV	CC/MGL; FAC(2/2 FAIL) 1.6E-01 CV T, CV FAILS TO CLOSE; EF=3	1.600E-04	1.440E-08	4550	0.000E+00	1.60E-04	1.44E-08
1LHCVE11V038AK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1LHCVE11V028-K	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1LHCVRHRCI-09KCC	CV	CC/MGL; FAC(2/2 FAIL) 1.6E-01 CV T, CV FAILS TO CLOSE; EF=3	1.600E-04	1.440E-08	4550	0.000E+00	1.60E-04	1.44E-08
1HHCVE21V026-K	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1LHCVRHRCI-10KCC	CV	CC/MGL; FAC(2/2 FAIL) 1.6E-01 CV T, CV FAILS TO CLOSE; EF=3	1.600E-04	1.440E-08	4550	0.000E+00	1.60E-04	1.44E-08
1LHCVE11V038BK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1LHCVRHRCI-11KCC	CV	CC/MGL; FAC(2/2 FAIL) 1.6E-01 CV T, CV FAILS TO CLOSE; EF=3	1.600E-04	1.440E-08	4550	0.000E+00	1.60E-04	1.44E-08
1LHCVRHRCI-12KCC	CV	CC/MGL; FAC(2/2 FAIL) 1.6E-01 CV T, CV FAILS TO CLOSE; EF=3	1.600E-04	1.440E-08	4550	0.000E+00	1.60E-04	1.44E-08

TABLE A-21 (CONT.)

RHRCI.TAB FILE

CONFIGURATION CONTROL

CODE NAME : SIMONS
VERSION NO. : 1.60
DATE OF CONFIGURATION : NOVEMBER 21, 1989
DATE OF ISSUANCE : NOVEMBER 21, 1989
DATE : FEBRUARY 28, 1992
TIME : 15:49: 4:33
CONFIGURATION NO. : 5079573203720

TABLE A-22
RHRCI.OUT FILE

RHRCI.CUT
FAULT TREE DESCRIPTION

Ver. 1.61 2/28/92 15:49:32

- (1) NUMBER OF GATES INPUT
- (2) NUMBER OF COMPONENTS INPUT
- (3) NUMBER OF EVENTS IN COM GATE TO BE CONSIDERED AT ONE TIME

GATE NAME	TYPE	(1)	(2)	(3)	NAMES OF THE INPUTS					
1. G0001	AND	2	0	0	G0002	G0014				
2. G0002	OR	5	0	0	G0003	G0014	G0023	G0032	G0037	
3. G0003	OR	2	0	0	G0004	G0011				
4. G0004	AND	2	0	0	G0005	G0008				
5. G0005	AND	0	2	0	1LHCVE11V04AK	1LHCVE11V021AK				
6. G0008	OR	0	2	0	1LHCVE11V042AK	1LHCVE11V042BK				
7. G0011	OR	0	2	0	1LHCVRHRCI-01KCC	1LHCVRHRCI-02KCC				
8. G0014	OR	2	0	0	G0015	G0020				
9. G0015	AND	2	0	0	G0016	G0008				
10. G0016	AND	0	2	0	1LHCVE11V051BK	1LHCVE11V021BK				
11. G0020	OR	0	2	0	1LHCVRHRCI-03KCC	1LHCVRHRCI-04KCC				
12. G0023	OR	2	0	0	G0024	G0029				
13. G0024	AND	2	0	0	G0025	G0008				
14. G0025	AND	0	2	0	1LHCVE11V051CK	1LHCVE11V021CK				
15. G0029	OR	0	2	0	1LHCVRHRCI-05KCC	1LHCVRHRCI-06KCC				
16. G0032	OR	1	1	0	G0033	1HHCVRHRCI-07KCC				
17. G0033	AND	0	2	0	1HHCVE21V077AK	1HHCVE21V076AK				
18. G0037	OR	1	1	0	G0038	1LHCVRHRCI-08KCC				
19. G0038	AND	0	2	0	1HHCVE21V077BK	1HHCVE21V076BK				
20. G0042	OR	4	0	0	G0043	G0048	G0053	G0058		
21. G0043	OR	1	1	0	G0044	1LHCVRHRCI-09KCC				
22. G0044	AND	0	2	0	1LHCVE11V038AK	1LHCVE11V028-K				
23. G0048	OR	1	1	0	G0049	1LHCVRHRCI-10KCC				
24. G0049	AND	0	2	0	1LHCVE11V038BK	1HHCVE21V026-K				
25. G0053	OR	1	1	0	G0054	1LHCVRHRCI-11KCC				
26. G0054	AND	0	2	0	1LHCVE11V038BK	1LHCVE11V028-K				
27. G0058	OR	1	1	0	G0059	1LHCVRHRCI-12KCC				
28. G0059	AND	0	2	0	1LHCVE11V038BK	1HHCVE21V026-K				

TABLE A-22 (CONT.)

RHRCI.OUT FILE

RHRCI.CUT
BASIC EVENT LIST

Ver. 1.61 2/28/92 15:49:32

COMPONENT, NAME	PROBABILITY	VARIANCE	GATES INPUT TO...
1. 1LHCVE11V051AK	1.0000E-03	5.6200E-07	G0005
2. 1LHCVE11V021AK	1.0000E-03	5.6200E-07	G0005
3. 1LHCVE11V042AK	1.0000E-03	5.6200E-07	G0008
4. 1LHCVE11V042BK	1.0000E-03	5.6200E-07	G0008
5. 1LHCVRHRCI-01KCC	1.3000E-04	9.5000E-09	G0011
6. 1LHCVRHRCI-02KCC	1.3000E-04	9.5000E-09	G0011
7. 1LHCVE11V051BK	1.0000E-03	5.6200E-07	G0016
8. 1LHCVE11V021BK	1.0000E-03	5.6200E-07	G0016
9. 1LHCVRHRCI-03KCC	1.3000E-04	9.5000E-09	G0020
10. 1LHCVRHRCI-04KCC	1.3000E-04	9.5000E-09	G0020
11. 1LHCVE11V051CK	1.0000E-03	5.6200E-07	G0025
12. 1LHCVE11V021CK	1.0000E-03	5.6200E-07	G0025
13. 1LHCVRHRCI-05KCC	1.3000E-04	9.5000E-09	G0029
14. 1LHCVRHRCI-06KCC	1.3000E-04	9.5000E-09	G0029
15. 1HHCVE21V077AK	1.0000E-03	5.6200E-07	G0033
16. 1HHCVE21V076AK	1.0000E-03	5.6200E-07	G0033
17. 1HHCVRHRCI-07KCC	1.6000E-04	1.4400E-08	G0032
18. 1HHCVE21V077BK	1.0000E-03	5.6200E-07	G0038
19. 1HHCVE21V076BK	1.0000E-03	5.6200E-07	G0038
20. 1LHCVRHRCI-08KCC	1.6000E-04	1.4400E-08	G0037
21. 1LHCVE11V038AK	1.0000E-03	5.6200E-07	G0044
22. 1LHCVE11V028-K	1.0000E-03	5.6200E-07	G0044
23. 1LHCVRHRCI-09KCC	1.6000E-04	1.4400E-08	G0043
24. 1HHCVE21V026-K	1.0000E-03	5.6200E-07	G0049
25. 1LHCVRHRCI-10KCC	1.6000E-04	1.4400E-08	G0048
26. 1LHCVE11V038BK	1.0000E-03	5.6200E-07	G0054
27. 1LHCVRHRCI-11KCC	1.6000E-04	1.4400E-08	G0053
28. 1LHCVRHRCI-12KCC	1.6000E-04	1.4400E-08	G0058

TABLE A-22 (CONT.)

RHRCI.OUT FILE

RHRCI.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 15:49:32

Cutsets for GATE G0001 with a cutoff probability of 1.00E-18

1.	2.56E-08	1LHCVRHRCI-08KCC	1LHCVRHRCI-12KCC	
2.	2.56E-08	1LHCVRHRCI-08KCC	1LHCVRHRCI-11KCC	
3.	2.56E-08	1LHCVRHRCI-08KCC	1LHCVRHRCI-10KCC	
4.	2.56E-08	1LHCVRHRCI-08KCC	1LHCVRHRCI-09KCC	
5.	2.56E-08	1HHCVRHRCI-07KCC	1LHCVRHRCI-12KCC	
6.	2.56E-08	1HHCVRHRCI-07KCC	1LHCVRHRCI-11KCC	
7.	2.56E-08	1HHCVRHRCI-07KCC	1LHCVRHRCI-10KCC	
8.	2.56E-08	1HHCVRHRCI-07KCC	1LHCVRHRCI-09KCC	
9.	2.08E-08	1LHCVRHRCI-06KCC	1LHCVRHRCI-12KCC	
10.	2.08E-08	1LHCVRHRCI-06KCC	1LHCVRHRCI-11KCC	
11.	2.08E-08	1LHCVRHRCI-06KCC	1LHCVRHRCI-10KCC	
12.	2.08E-08	1LHCVRHRCI-06KCC	1LHCVRHRCI-09KCC	
13.	2.08E-08	1LHCVRHRCI-05KCC	1LHCVRHRCI-12KCC	
14.	2.08E-08	1LHCVRHRCI-05KCC	1LHCVRHRCI-11KCC	
15.	2.08E-08	1LHCVRHRCI-05KCC	1LHCVRHRCI-10KCC	
16.	2.08E-08	1LHCVRHRCI-05KCC	1LHCVRHRCI-09KCC	
17.	2.08E-08	1LHCVRHRCI-04KCC	1LHCVRHRCI-12KCC	
18.	2.08E-08	1LHCVRHRCI-04KCC	1LHCVRHRCI-11KCC	
19.	2.08E-08	1LHCVRHRCI-04KCC	1LHCVRHRCI-10KCC	
20.	2.08E-08	1LHCVRHRCI-04KCC	1LHCVRHRCI-09KCC	
21.	2.08E-08	1LHCVRHRCI-03KCC	1LHCVRHRCI-12KCC	
22.	2.08E-08	1LHCVRHRCI-03KCC	1LHCVRHRCI-11KCC	
23.	2.08E-08	1LHCVRHRCI-03KCC	1LHCVRHRCI-10KCC	
24.	2.08E-08	1LHCVRHRCI-03KCC	1LHCVRHRCI-09KCC	
25.	2.08E-08	1LHCVRHRCI-02KCC	1LHCVRHRCI-12KCC	
26.	2.08E-08	1LHCVRHRCI-02KCC	1LHCVRHRCI-11KCC	
27.	2.08E-08	1LHCVRHRCI-02KCC	1LHCVRHRCI-10KCC	
28.	2.08E-08	1LHCVRHRCI-02KCC	1LHCVRHRCI-09KCC	
29.	2.08E-08	1LHCVRHRCI-01KCC	1LHCVRHRCI-12KCC	
30.	2.08E-08	1LHCVRHRCI-01KCC	1LHCVRHRCI-11KCC	
31.	2.08E-08	1LHCVRHRCI-01KCC	1LHCVRHRCI-10KCC	
32.	2.08E-08	1LHCVRHRCI-01KCC	1LHCVRHRCI-09KCC	
33.	1.60E-10	1LHCVRHRCI-08KCC	1HHCVE21V026-K	1LHCVE11V038BK
34.	1.60E-10	1LHCVRHRCI-08KCC	1LHCVE11V028-K	1LHCVE11V038BK
35.	1.60E-10	1LHCVRHRCI-08KCC	1LHCVE11V038AK	1HHCVE21V026-K
36.	1.60E-10	1LHCVRHRCI-08KCC	1LHCVE11V038AK	1LHCVE11V028-K
37.	1.60E-10	1HHCVE21V077BK	1HHCVE21V076BK	1LHCVRHRCI-12KCC
38.	1.60E-10	1HHCVE21V077BK	1HHCVE21V076BK	1LHCVRHRCI-11KCC
39.	1.60E-10	1HHCVE21V077BK	1HHCVE21V076BK	1LHCVRHRCI-10KCC
40.	1.60E-10	1HHCVE21V077BK	1HHCVE21V076BK	1LHCVRHRCI-09KCC
41.	1.60E-10	1HHCVRHRCI-07KCC	1HHCVE21V026-K	1LHCVE11V038BK
42.	1.60E-10	1HHCVRHRCI-07KCC	1LHCVE11V028-K	1LHCVE11V038BK
43.	1.60E-10	1HHCVRHRCI-07KCC	1LHCVE11V038AK	1HHCVE21V026-K
44.	1.60E-10	1HHCVRHRCI-07KCC	1LHCVE11V038AK	1LHCVE11V028-K
45.	1.60E-10	1HHCVE21V077AK	1HHCVE21V076AK	1LHCVRHRCI-12KCC
46.	1.60E-10	1HHCVE21V077AK	1HHCVE21V076AK	1LHCVRHRCI-11KCC
47.	1.60E-10	1HHCVE21V077AK	1HHCVE21V076AK	1LHCVRHRCI-10KCC
48.	1.60E-10	1HHCVE21V077AK	1HHCVE21V076AK	1LHCVRHRCI-09KCC
49.	1.30E-10	1LHCVRHRCI-06KCC	1HHCVE21V026-K	1LHCVE11V038BK
50.	1.30E-10	1LHCVRHRCI-06KCC	1LHCVE11V028-K	1LHCVE11V038BK
51.	1.30E-10	1LHCVRHRCI-06KCC	1LHCVE11V038AK	1HHCVE21V026-K
52.	1.30E-10	1LHCVRHRCI-06KCC	1LHCVE11V038AK	1LHCVE11V028-K
53.	1.30E-10	1LHCVRHRCI-05KCC	1HHCVE21V026-K	1LHCVE11V038BK
54.	1.30E-10	1LHCVRHRCI-05KCC	1LHCVE11V028-K	1LHCVE11V038BK
55.	1.30E-10	1LHCVRHRCI-05KCC	1LHCVE11V038AK	1HHCVE21V026-K
56.	1.30E-10	1LHCVRHRCI-05KCC	1LHCVE11V038AK	1LHCVE11V028-K
57.	1.30E-10	1LHCVRHRCI-04KCC	1HHCVE21V026-K	1LHCVE11V038BK
58.	1.30E-10	1LHCVRHRCI-04KCC	1LHCVE11V028-K	1LHCVE11V038BK
59.	1.30E-10	1LHCVRHRCI-04KCC	1LHCVE11V038AK	1HHCVE21V026-K
60.	1.30E-10	1LHCVRHRCI-04KCC	1LHCVE11V038AK	1LHCVE11V028-K

TABLE A-22 (CONT.)

RHRCI.OUT FILE

RHRCI.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 15:49:32

Cutsets for GATE G0001 with a cutoff probability of 1.00E-18

61.	1.30E-10	1LHCVRHRCI-03KCC	1HHCVE21V026-K	1LHCVE11V038BK	
62.	1.30E-10	1LHCVRHRCI-03KCC	1LHCVE11V028-K	1LHCVE11V038BK	
63.	1.30E-10	1LHCVRHRCI-03KCC	1LHCVE11V038AK	1HHCVE21V026-K	
64.	1.30E-10	1LHCVRHRCI-03KCC	1LHCVE11V038AK	1LHCVE11V028-K	
65.	1.30E-10	1LHCVRHRCI-02KCC	1HHCVE21V026-K	1LHCVE11V038BK	
66.	1.30E-10	1LHCVRHRCI-02KCC	1LHCVE11V028-K	1LHCVE11V038BK	
67.	1.30E-10	1LHCVRHRCI-02KCC	1LHCVE11V038AK	1HHCVE21V026-K	
68.	1.30E-10	1LHCVRHRCI-02KCC	1LHCVE11V038AK	1LHCVE11V028-K	
69.	1.30E-10	1LHCVRHRCI-01KCC	1HHCVE21V026-K	1LHCVE11V038BK	
70.	1.30E-10	1LHCVRHRCI-01KCC	1LHCVE11V028-K	1LHCVE11V038BK	
71.	1.30E-10	1LHCVRHRCI-01KCC	1LHCVE11V038AK	1HHCVE21V026-K	
72.	1.30E-10	1LHCVRHRCI-01KCC	1LHCVE11V038AK	1LHCVE11V028-K	
73.	1.00E-12	1HHCVE21V077BK	1HHCVE21V076BK	1HHCVE21V026-K	1LHCVE11V038BK
74.	1.00E-12	1HHCVE21V077BK	1HHCVE21V076BK	1LHCVE11V028-K	1LHCVE11V038BK
75.	1.00E-12	1HHCVE21V077BK	1HHCVE21V076BK	1LHCVE11V038AK	1HHCVE21V026-K
76.	1.00E-12	1HHCVE21V077BK	1HHCVE21V076BK	1LHCVE11V038AK	1LHCVE11V028-K
77.	1.00E-12	1HHCVE21V077AK	1HHCVE21V076AK	1HHCVE21V026-K	1LHCVE11V038BK
78.	1.00E-12	1HHCVE21V077AK	1HHCVE21V076AK	1LHCVE11V028-K	1LHCVE11V038BK
79.	1.00E-12	1HHCVE21V077AK	1HHCVE21V076AK	1LHCVE11V038AK	1HHCVE21V026-K
80.	1.00E-12	1HHCVE21V077AK	1HHCVE21V076AK	1LHCVE11V038AK	1LHCVE11V028-K
81.	1.60E-13	1LHCVE11V042BK	1LHCVE11V051CK	1LHCVE11V021CK	1LHCVRHRCI-12KCC
82.	1.60E-13	1LHCVE11V042BK	1LHCVE11V051CK	1LHCVE11V021CK	1LHCVRHRCI-11KCC
83.	1.60E-13	1LHCVE11V042BK	1LHCVE11V051CK	1LHCVE11V021CK	1LHCVRHRCI-10KCC
84.	1.60E-13	1LHCVE11V042BK	1LHCVE11V051CK	1LHCVE11V021CK	1LHCVRHRCI-09KCC
85.	1.60E-13	1LHCVE11V042AK	1LHCVE11V051CK	1LHCVE11V021CK	1LHCVRHRCI-12KCC
86.	1.60E-13	1LHCVE11V042AK	1LHCVE11V051CK	1LHCVE11V021CK	1LHCVRHRCI-11KCC
87.	1.60E-13	1LHCVE11V042AK	1LHCVE11V051CK	1LHCVE11V021CK	1LHCVRHRCI-10KCC
88.	1.60E-13	1LHCVE11V042AK	1LHCVE11V051CK	1LHCVE11V021CK	1LHCVRHRCI-09KCC
89.	1.60E-13	1LHCVE11V042BK	1LHCVE11V051BK	1LHCVE11V021BK	1LHCVRHRCI-12KCC
90.	1.60E-13	1LHCVE11V042BK	1LHCVE11V051BK	1LHCVE11V021BK	1LHCVRHRCI-11KCC
91.	1.60E-13	1LHCVE11V042BK	1LHCVE11V051BK	1LHCVE11V021BK	1LHCVRHRCI-10KCC
92.	1.60E-13	1LHCVE11V042BK	1LHCVE11V051BK	1LHCVE11V021BK	1LHCVRHRCI-09KCC
93.	1.60E-13	1LHCVE11V042AK	1LHCVE11V051BK	1LHCVE11V021BK	1LHCVRHRCI-12KCC
94.	1.60E-13	1LHCVE11V042AK	1LHCVE11V051BK	1LHCVE11V021BK	1LHCVRHRCI-11KCC
95.	1.60E-13	1LHCVE11V042AK	1LHCVE11V051BK	1LHCVE11V021BK	1LHCVRHRCI-10KCC
96.	1.60E-13	1LHCVE11V042AK	1LHCVE11V051BK	1LHCVE11V021BK	1LHCVRHRCI-09KCC
97.	1.60E-13	1LHCVE11V051AK	1LHCVE11V021AK	1LHCVE11V042BK	1LHCVRHRCI-12KCC
98.	1.60E-13	1LHCVE11V051AK	1LHCVE11V021AK	1LHCVE11V042BK	1LHCVRHRCI-11KCC
99.	1.60E-13	1LHCVE11V051AK	1LHCVE11V021AK	1LHCVE11V042BK	1LHCVRHRCI-10KCC
100.	1.60E-13	1LHCVE11V051AK	1LHCVE11V021AK	1LHCVE11V042BK	1LHCVRHRCI-09KCC
101.	1.60E-13	1LHCVE11V051AK	1LHCVE11V021AK	1LHCVE11V042AK	1LHCVRHRCI-12KCC
102.	1.60E-13	1LHCVE11V051AK	1LHCVE11V021AK	1LHCVE11V042AK	1LHCVRHRCI-11KCC
103.	1.60E-13	1LHCVE11V051AK	1LHCVE11V021AK	1LHCVE11V042AK	1LHCVRHRCI-10KCC
104.	1.60E-13	1LHCVE11V051AK	1LHCVE11V021AK	1LHCVE11V042AK	1LHCVRHRCI-09KCC
105.	1.00E-15	1LHCVE11V042BK	1LHCVE11V051CK	1LHCVE11V021CK	1HHCVE21V026-K
106.	1.00E-15	1LHCVE11V042BK	1LHCVE11V051CK	1LHCVE11V021CK	1LHCVE11V028-K
107.	1.00E-15	1LHCVE11V042BK	1LHCVE11V051CK	1LHCVE11V021CK	1LHCVE11V038AK
108.	1.00E-15	1LHCVE11V042BK	1LHCVE11V051CK	1LHCVE11V021CK	1LHCVE11V028-K
109.	1.00E-15	1LHCVE11V042AK	1LHCVE11V051CK	1LHCVE11V021CK	1HHCVE21V026-K
110.	1.00E-15	1LHCVE11V042AK	1LHCVE11V051CK	1LHCVE11V021CK	1LHCVE11V028-K
111.	1.00E-15	1LHCVE11V042AK	1LHCVE11V051CK	1LHCVE11V021CK	1LHCVE11V038AK
112.	1.00E-15	1LHCVE11V042AK	1LHCVE11V051CK	1LHCVE11V021CK	1LHCVE11V028-K
113.	1.00E-15	1LHCVE11V042BK	1LHCVE11V051BK	1LHCVE11V021BK	1HHCVE21V026-K
114.	1.00E-15	1LHCVE11V042BK	1LHCVE11V051BK	1LHCVE11V021BK	1LHCVE11V028-K
115.	1.00E-15	1LHCVE11V042BK	1LHCVE11V051BK	1LHCVE11V021BK	1LHCVE11V038AK
116.	1.00E-15	1LHCVE11V042BK	1LHCVE11V051BK	1LHCVE11V021BK	1LHCVE11V028-K
117.	1.00E-15	1LHCVE11V042AK	1LHCVE11V051BK	1LHCVE11V021BK	1HHCVE21V026-K
118.	1.00E-15	1LHCVE11V042AK	1LHCVE11V051BK	1LHCVE11V021BK	1LHCVE11V028-K
119.	1.00E-15	1LHCVE11V042AK	1LHCVE11V051BK	1LHCVE11V021BK	1LHCVE11V038AK
120.	1.00E-15	1LHCVE11V042AK	1LHCVE11V051BK	1LHCVE11V021BK	1HHCVE21V026-K
121.	1.00E-15	1LHCVE11V051AK	1LHCVE11V021AK	1LHCVE11V042BK	1LHCVE11V028-K
					1LHCVE11V038BK

TABLE A-22 (CONT.)

RHRCI.OUT FILE

RHRCI.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 15:49:32

Cutsets for GATE G0001 with a cutoff probability of 1.00E-18

122.	1.00E-15	1LHCVE11V051AK	1LHCVE11V021AK	1LHCVE11V042BK	1LHCVE11V028-K	1LHCVE11V038BK
123.	1.00E-15	1LHCVE11V051AK	1LHCVE11V021AK	1LHCVE11V042BK	1LHCVE11V038AK	1HHCVE21V026-K
124.	1.00E-15	1LHCVE11V051AK	1LHCVE11V021AK	1LHCVE11V042BK	1LHCVE11V038AK	1LHCVE11V028-K
125.	1.00E-15	1LHCVE11V051AK	1LHCVE11V021AK	1LHCVE11V042AK	1HHCVE21V026-K	1LHCVE11V038BK
126.	1.00E-15	1LHCVE11V051AK	1LHCVE11V021AK	1LHCVE11V042AK	1LHCVE11V028-K	1LHCVE11V038BK
127.	1.00E-15	1LHCVE11V051AK	1LHCVE11V021AK	1LHCVE11V042AK	1LHCVE11V038AK	1HHCVE21V026-K
128.	1.00E-15	1LHCVE11V051AK	1LHCVE11V021AK	1LHCVE11V042AK	1LHCVE11V038AK	1LHCVE11V028-K

Reduced sum of cutset probabilities= 7.097E-07

Moments Results

Mean Probability of Failure= 7.092E-07

Run ended at 15:49:51

TABLE A-22 (CONT.)

RHRCI.OUT FILE

CONFIGURATION CONTROL

CODE NAME : WESCUT
VERSION NO. : 1.61
DATE OF CONFIGURATION : September 13, 1990
DATE OF ISSUANCE : September 13, 1990
DATE : FEBRUARY 28, 1992
TIME : 15:49:52:61
CONFIGURATION NO. : 5393361263323

TABLE A-23
RHRCI.DES FILE

PAGE 1

TREE NAME: RHRCI
CUTDES VER.1.7, 11-17-89
INPUT FILE: RHRCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-18
GATE G0001 IS: CONTAINMENT BYPASS THROUGH LHS1/RHR PUMP DISCHARGE LINES

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
1.	2.56E-08	QnE21V077B AND QnE21V076B FAIL TO CLOSE, CC QnE11V038B AND QnE21V026 FAIL TP CLOSE, CC	1.60E-04 1.60E-04	1LHCVRHRCI-08 1LHCVRHRCI-12
2.	2.56E-08	QnE21V077B AND QnE21V076B FAIL TO CLOSE, CC QnE11V038B AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1LHCVRHRCI-08 1LHCVRHRCI-11
3.	2.56E-08	QnE21V077B AND QnE21V076B FAIL TO CLOSE, CC QnE11V038A AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1LHCVRHRCI-08 1LHCVRHRCI-10
4.	2.56E-08	QnE21V077B AND QnE21V076B FAIL TO CLOSE, CC QnE11V038A AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1LHCVRHRCI-08 1LHCVRHRCI-09
5.	2.56E-08	QnE21V077A AND QnE21V076A FAIL TO CLOSE, CC QnE11V038B AND QnE21V026 FAIL TP CLOSE, CC	1.60E-04 1.60E-04	1HHCVRHRCI-07 1LHCVRHRCI-12
6.	2.56E-08	QnE21V077A AND QnE21V076A FAIL TO CLOSE, CC QnE11V038B AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVRHRCI-07 1LHCVRHRCI-11
7.	2.56E-08	QnE21V077A AND QnE21V076A FAIL TO CLOSE, CC QnE11V038A AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVRHRCI-07 1LHCVRHRCI-10
8.	2.56E-08	QnE21V077A AND QnE21V076A FAIL TO CLOSE, CC QnE11V038A AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04 1.60E-04	1HHCVRHRCI-07 1LHCVRHRCI-09
9.	2.08E-08	QnE11V051C, QnE11V021C, AND QnE11V042B FAIL TO CLOSE, CC QnE11V038B AND QnE21V026 FAIL TP CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-06 1LHCVRHRCI-12
10.	2.08E-08	QnE11V051C, QnE11V021C, AND QnE11V042B FAIL TO CLOSE, CC QnE11V038B AND QnE11V028 FAIL TO CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-06 1LHCVRHRCI-11
11.	2.08E-08	QnE11V051C, QnE11V021C, AND QnE11V042B FAIL TO CLOSE, CC QnE11V038A AND QnE21V026 FAIL TO CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-06 1LHCVRHRCI-10
12.	2.08E-08	QnE11V051C, QnE11V021C, AND QnE11V042B FAIL TO CLOSE, CC QnE11V038A AND QnE11V028 FAIL TO CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-06 1LHCVRHRCI-09
13.	2.08E-08	QnE11V051C, QnE11V021C, AND QnE11V042A FAIL TO CLOSE, CC QnE11V038B AND QnE21V026 FAIL TP CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-05 1LHCVRHRCI-12
14.	2.08E-08	QnE11V051C, QnE11V021C, AND QnE11V042A FAIL TO CLOSE, CC QnE11V038B AND QnE11V028 FAIL TO CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-05 1LHCVRHRCI-11
15.	2.08E-08	QnE11V051C, QnE11V021C, AND QnE11V042A FAIL TO CLOSE, CC QnE11V038A AND QnE21V026 FAIL TO CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-05 1LHCVRHRCI-10
16.	2.08E-08	QnE11V051C, QnE11V021C, AND QnE11V042A FAIL TO CLOSE, CC QnE11V038A AND QnE11V028 FAIL TO CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-05 1LHCVRHRCI-09

TABLE A-23 (CONT.)

RHRCI.DES FILE

PAGE 2

TREE NAME: RHRCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: RHRCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-18 (page 2)
 GATE G0001 IS: CONTAINMENT BYPASS THROUGH LHSI/RHR PUMP DISCHARGE LINES

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
17.	2.08E-08	QnE11V051B, QnE11V021B, AND QnE11V042B FAIL TO CLOSE, CC QnE11V038B AND QnE21V026 FAIL TP CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-04 1LHCVRHRCI-12
18.	2.08E-08	QnE11V051B, QnE11V021B, AND QnE11V042B FAIL TO CLOSE, CC QnE11V038B AND QnE11V028 FAIL TO CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-04 1LHCVRHRCI-11
19.	2.08E-08	QnE11V051B, QnE11V021B, AND QnE11V042B FAIL TO CLOSE, CC QnE11V038A AND QnE21V026 FAIL TO CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-04 1LHCVRHRCI-10
20.	2.08E-08	QnE11V051B, QnE11V021B, AND QnE11V042B FAIL TO CLOSE, CC QnE11V038A AND QnE11V028 FAIL TO CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-04 1LHCVRHRCI-09
21.	2.08E-08	QnE11V051B, QnE11V021B, AND QnE11V042A FAIL TO CLOSE, CC QnE11V038B AND QnE21V026 FAIL TP CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-03 1LHCVRHRCI-12
22.	2.08E-08	QnE11V051B, QnE11V021B, AND QnE11V042A FAIL TO CLOSE, CC QnE11V038B AND QnE11V028 FAIL TO CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-03 1LHCVRHRCI-11
23.	2.08E-08	QnE11V051B, QnE11V021B, AND QnE11V042A FAIL TO CLOSE, CC QnE11V038A AND QnE21V026 FAIL TO CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-03 1LHCVRHRCI-10
24.	2.08E-08	QnE11V051B, QnE11V021B, AND QnE11V042A FAIL TO CLOSE, CC QnE11V038A AND QnE11V028 FAIL TO CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-03 1LHCVRHRCI-09
25.	2.08E-08	QnE11V051A, QnE11V021A, AND QnE11V042B FAIL TO CLOSE, CC QnE11V038B AND QnE21V026 FAIL TP CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-02 1LHCVRHRCI-12
26.	2.08E-08	QnE11V051A, QnE11V021A, AND QnE11V042B FAIL TO CLOSE, CC QnE11V038B AND QnE11V028 FAIL TO CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-02 1LHCVRHRCI-11
27.	2.08E-08	QnE11V051A, QnE11V021A, AND QnE11V042B FAIL TO CLOSE, CC QnE11V038A AND QnE21V026 FAIL TO CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-02 1LHCVRHRCI-10
28.	2.08E-08	QnE11V051A, QnE11V021A, AND QnE11V042B FAIL TO CLOSE, CC QnE11V038A AND QnE11V028 FAIL TO CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-02 1LHCVRHRCI-09
29.	2.08E-08	QnE11V051A, QnE11V021A, AND QnE11V042A FAIL TO CLOSE, CC QnE11V038B AND QnE21V026 FAIL TP CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-01 1LHCVRHRCI-12
30.	2.08E-08	QnE11V051A, QnE11V021A, AND QnE11V042A FAIL TO CLOSE, CC QnE11V038B AND QnE11V028 FAIL TO CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-01 1LHCVRHRCI-11
31.	2.08E-08	QnE11V051A, QnE11V021A, AND QnE11V042A FAIL TO CLOSE, CC QnE11V038A AND QnE21V026 FAIL TO CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-01 1LHCVRHRCI-10
32.	2.08E-08	QnE11V051A, QnE11V021A, AND QnE11V042A FAIL TO CLOSE, CC QnE11V038A AND QnE11V028 FAIL TO CLOSE, CC	1.30E-04 1.60E-04	1LHCVRHRCI-01 1LHCVRHRCI-09

TABLE A-23 (CONT.)

RHRCI.DES FILE

PAGE 3 TREE NAME: RHRCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: RHRCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-18 (page 3)
 GATE G0001 IS: CONTAINMENT BYPASS THROUGH LHS1/RHR PUMP DISCHARGE LINES

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
33.	1.60E-10	QnE21V077B AND QnE21V076B FAIL TO CLOSE, CC CHECK VALVE QnE21V026 FAIL TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1LHCVRHRCI-08 1HHCVE21V026- 1LHCVE11V038B
34.	1.60E-10	QnE21V077B AND QnE21V076B FAIL TO CLOSE, CC CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1LHCVRHRCI-08 1LHCVE11V028- 1LHCVE11V038B
35.	1.60E-10	QnE21V077B AND QnE21V076B FAIL TO CLOSE, CC CHECK VALVE QnE11V038A FAILS TO CLOSE CHECK VALVE QnE21V026 FAIL TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1LHCVRHRCI-08 1LHCVE11V038A 1HHCVE21V026-
36.	1.60E-10	QnE21V077B AND QnE21V076B FAIL TO CLOSE, CC CHECK VALVE QnE11V038A FAILS TO CLOSE CHECK VALVE QnE11V028 FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1LHCVRHRCI-08 1LHCVE11V038A 1LHCVE11V028-
37.	1.60E-10	CHECK VALVE QnE21V077B FAILS TO CLOSE CHECK VALVE QnE21V076B FAILS TO CLOSE QnE11V038B AND QnE21V026 FAIL TP CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V077B 1HHCVE21V076B 1LHCVRHRCI-12
38.	1.60E-10	CHECK VALVE QnE21V077B FAILS TO CLOSE CHECK VALVE QnE21V076B FAILS TO CLOSE QnE11V038B AND QnE11V028 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V077B 1HHCVE21V076B 1LHCVRHRCI-11
39.	1.60E-10	CHECK VALVE QnE21V077B FAILS TO CLOSE CHECK VALVE QnE21V076B FAILS TO CLOSE QnE11V038A AND QnE21V026 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V077B 1HHCVE21V076B 1LHCVRHRCI-10
40.	1.60E-10	CHECK VALVE QnE21V077B FAILS TO CLOSE CHECK VALVE QnE21V076B FAILS TO CLOSE QnE11V038A AND QnE11V028 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V077B 1HHCVE21V076B 1LHCVRHRCI-09
41.	1.60E-10	QnE21V077A AND QnE21V076A FAIL TO CLOSE, CC CHECK VALVE QnE21V026 FAIL TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVRHRCI-07 1HHCVE21V026- 1LHCVE11V038B
42.	1.60E-10	QnE21V077A AND QnE21V076A FAIL TO CLOSE, CC CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVRHRCI-07 1LHCVE11V028- 1LHCVE11V038B
43.	1.60E-10	QnE21V077A AND QnE21V076A FAIL TO CLOSE, CC CHECK VALVE QnE11V038A FAILS TO CLOSE CHECK VALVE QnE21V026 FAIL TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVRHRCI-07 1LHCVE11V038A 1HHCVE21V026-
44.	1.60E-10	QnE21V077A AND QnE21V076A FAIL TO CLOSE, CC CHECK VALVE QnE11V038A FAILS TO CLOSE CHECK VALVE QnE11V028 FAILS TO CLOSE	1.60E-04 1.00E-03 1.00E-03	1HHCVRHRCI-07 1LHCVE11V038A 1LHCVE11V028-

TABLE A-23 (CONT.)

RHRCI.DES FILE

PAGE 4

TREE NAME: RHRCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: RHRCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-18 (page 4)
 GATE G0001 IS: CONTAINMENT BYPASS THROUGH LHSI/RHR PUMP DISCHARGE LINES

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
45.	1.60E-10	CHECK VALVE QnE21V077A FAILS TO CLOSE CHECK VALVE QnE21V076A FAILS TO CLOSE QnE11V038B AND QnE21V026 FAIL TP CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V077A 1HHCVE21V076A 1LHCVRHRCI-12
46.	1.60E-10	CHECK VALVE QnE21V077A FAILS TO CLOSE CHECK VALVE QnE21V076A FAILS TO CLOSE QnE11V038B AND QnE11V028 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V077A 1HHCVE21V076A 1LHCVRHRCI-11
47.	1.60E-10	CHECK VALVE QnE21V077A FAILS TO CLOSE CHECK VALVE QnE21V076A FAILS TO CLOSE QnE11V038A AND QnE21V026 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V077A 1HHCVE21V076A 1LHCVRHRCI-10
48.	1.60E-10	CHECK VALVE QnE21V077A FAILS TO CLOSE CHECK VALVE QnE21V076A FAILS TO CLOSE QnE11V038A AND QnE11V028 FAIL TO CLOSE, CC	1.00E-03 1.00E-03 1.60E-04	1HHCVE21V077A 1HHCVE21V076A 1LHCVRHRCI-09
49.	1.30E-10	QnE11V051C, QnE11V021C, AND QnE11V042B FAIL TO CLOSE, CC CHECK VALVE QnE21V026 FAIL TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-06 1HHCVE21V026- 1LHCVE11V038B
50.	1.30E-10	QnE11V051C, QnE11V021C, AND QnE11V042B FAIL TO CLOSE, CC CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-06 1LHCVE11V028- 1LHCVRHRCI-11
51.	1.30E-10	QnE11V051C, QnE11V021C, AND QnE11V042B FAIL TO CLOSE, CC CHECK VALVE QnE11V038A FAILS TO CLOSE CHECK VALVE QnE21V026 FAIL TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-06 1LHCVE11V038A 1HHCVE21V026-
52.	1.30E-10	QnE11V051C, QnE11V021C, AND QnE11V042B FAIL TO CLOSE, CC CHECK VALVE QnE11V038A FAILS TO CLOSE CHECK VALVE QnE11V028 FAILS TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-06 1LHCVE11V038A 1LHCVE11V028-
53.	1.30E-10	QnE11V051C, QnE11V021C, AND QnE11V042A FAIL TO CLOSE, CC CHECK VALVE QnE21V026 FAIL TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-05 1HHCVE21V026- 1LHCVE11V038B
54.	1.30E-10	QnE11V051C, QnE11V021C, AND QnE11V042A FAIL TO CLOSE, CC CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-05 1LHCVE11V028- 1LHCVE11V038B
55.	1.30E-10	QnE11V051C, QnE11V021C, AND QnE11V042A FAIL TO CLOSE, CC CHECK VALVE QnE11V038A FAILS TO CLOSE CHECK VALVE QnE21V026 FAIL TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-05 1LHCVE11V038A 1HHCVE21V026-
56.	1.30E-10	QnE11V051C, QnE11V021C, AND QnE11V042A FAIL TO CLOSE, CC CHECK VALVE QnE11V038A FAILS TO CLOSE CHECK VALVE QnE11V028 FAILS TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-05 1LHCVE11V038A 1LHCVE11V028-

TABLE A-23 (CONT.)

RHRCI.DES FILE

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TREE NAME: RHRCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: RHRCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-18 (page 5)
 GATE G0001 IS: CONTAINMENT BYPASS THROUGH LHSI/RHR PUMP DISCHARGE LINES

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
57.	1.30E-10	QnE11V051B, QnE11V021B, AND QnE11V042B FAIL TO CLOSE, CC CHECK VALVE QnE21V026 FAIL TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-04 1HHCVE21V026- 1LHCVE11V038B
58.	1.30E-10	QnE11V051B, QnE11V021B, AND QnE11V042B FAIL TO CLOSE, CC CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-04 1LHCVE11V028- 1LHCVE11V038B
59.	1.30E-10	QnE11V051B, QnE11V021B, AND QnE11V042B FAIL TO CLOSE, CC CHECK VALVE QnE11V038A FAILS TO CLOSE CHECK VALVE QnE21V026 FAIL TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-04 1LHCVE11V038A 1HHCVE21V026-
60.	1.30E-10	QnE11V051B, QnE11V021B, AND QnE11V042B FAIL TO CLOSE, CC CHECK VALVE QnE11V038A FAILS TO CLOSE CHECK VALVE QnE11V028 FAILS TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-04 1LHCVE11V038A 1LHCVE11V028-
61.	1.30E-10	QnE11V051B, QnE11V021B, AND QnE11V042A FAIL TO CLOSE, CC CHECK VALVE QnE21V026 FAIL TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-03 1HHCVE21V026- 1LHCVE11V038B
62.	1.30E-10	QnE11V051B, QnE11V021B, AND QnE11V042A FAIL TO CLOSE, CC CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-03 1LHCVE11V028- 1LHCVE11V038B
63.	1.30E-10	QnE11V051B, QnE11V021B, AND QnE11V042A FAIL TO CLOSE, CC CHECK VALVE QnE11V038A FAILS TO CLOSE CHECK VALVE QnE21V026 FAIL TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-03 1LHCVE11V038A 1HHCVE21V026-
64.	1.30E-10	QnE11V051B, QnE11V021B, AND QnE11V042A FAIL TO CLOSE, CC CHECK VALVE QnE11V038A FAILS TO CLOSE CHECK VALVE QnE11V028 FAILS TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-03 1LHCVE11V038A 1LHCVE11V028-
65.	1.30E-10	QnE11V051A, QnE11V021A, AND QnE11V042B FAIL TO CLOSE, CC CHECK VALVE QnE21V026 FAIL TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-02 1HHCVE21V026- 1LHCVE11V038B
66.	1.30E-10	QnE11V051A, QnE11V021A, AND QnE11V042B FAIL TO CLOSE, CC CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-02 1LHCVE11V028- 1LHCVE11V038B
67.	1.30E-10	QnE11V051A, QnE11V021A, AND QnE11V042B FAIL TO CLOSE, CC CHECK VALVE QnE11V038A FAILS TO CLOSE CHECK VALVE QnE21V026 FAIL TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-02 1LHCVE11V038A 1HHCVE21V026-
68.	1.30E-10	QnE11V051A, QnE11V021A, AND QnE11V042B FAIL TO CLOSE, CC CHECK VALVE QnE11V038A FAILS TO CLOSE CHECK VALVE QnE11V028 FAILS TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-02 1LHCVE11V038A 1LHCVE11V028-

TABLE A-23 (CONT.)

RHRCI.DES FILE

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TREE NAME: RHRCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: RHRCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-18 (page 6)
 GATE G0001 IS: CONTAINMENT BYPASS THROUGH LHS1/RHR PUMP DISCHARGE LINES

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
69.	1.30E-10	QnE11V051A, QnE11V021A, AND QnE11V042A FAIL TO CLOSE, CC CHECK VALVE QnE21V026 FAIL TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-01 1HHCVE21V026- 1LHCVE11V038B
70.	1.30E-10	QnE11V051A, QnE11V021A, AND QnE11V042A FAIL TO CLOSE, CC CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-01 1LHCVE11V028- 1LHCVE11V038B
71.	1.30E-10	QnE11V051A, QnE11V021A, AND QnE11V042A FAIL TO CLOSE, CC CHECK VALVE QnE11V038A FAILS TO CLOSE CHECK VALVE QnE21V026 FAIL TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-01 1LHCVE11V038A 1HHCVE21V026-
72.	1.30E-10	QnE11V051A, QnE11V021A, AND QnE11V042A FAIL TO CLOSE, CC CHECK VALVE QnE11V038A FAILS TO CLOSE CHECK VALVE QnE11V028 FAILS TO CLOSE	1.30E-04 1.00E-03 1.00E-03	1LHCVRHRCI-01 1LHCVE11V038A 1LHCVE11V028-
73.	1.00E-12	CHECK VALVE QnE21V077B FAILS TO CLOSE CHECK VALVE QnE21V076B FAILS TO CLOSE CHECK VALVE QnE21V026 FAIL TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.00E-03 1.00E-03 1.00E-03 1.00E-03	1HHCVE21V077B 1HHCVE21V076B 1HHCVE21V026- 1LHCVE11V038B
74.	1.00E-12	CHECK VALVE QnE21V077B FAILS TO CLOSE CHECK VALVE QnE21V076B FAILS TO CLOSE CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.00E-03 1.00E-03 1.00E-03 1.00E-03	1HHCVE21V077B 1HHCVE21V076B 1LHCVE11V028- 1LHCVE11V038B
75.	1.00E-12	CHECK VALVE QnE21V077B FAILS TO CLOSE CHECK VALVE QnE21V076B FAILS TO CLOSE CHECK VALVE QnE11V038A FAILS TO CLOSE CHECK VALVE QnE21V026 FAIL TO CLOSE	1.00E-03 1.00E-03 1.00E-03 1.00E-03	1HHCVE21V077B 1HHCVE21V076B 1LHCVE11V038A 1HHCVE21V026-
76.	1.00E-12	CHECK VALVE QnE21V077B FAILS TO CLOSE CHECK VALVE QnE21V076B FAILS TO CLOSE CHECK VALVE QnE11V038A FAILS TO CLOSE CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03 1.00E-03 1.00E-03 1.00E-03	1HHCVE21V077B 1HHCVE21V076B 1LHCVE11V038A 1LHCVE11V028-
77.	1.00E-12	CHECK VALVE QnE21V077A FAILS TO CLOSE CHECK VALVE QnE21V076A FAILS TO CLOSE CHECK VALVE QnE21V026 FAIL TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.00E-03 1.00E-03 1.00E-03 1.00E-03	1HHCVE21V077A 1HHCVE21V076A 1HHCVE21V026- 1LHCVE11V038B
78.	1.00E-12	CHECK VALVE QnE21V077A FAILS TO CLOSE CHECK VALVE QnE21V076A FAILS TO CLOSE CHECK VALVE QnE11V028 FAILS TO CLOSE CHECK VALVE QnE11V038B FAILS TO CLOSE	1.00E-03 1.00E-03 1.00E-03 1.00E-03	1HHCVE21V077A 1HHCVE21V076A 1LHCVE11V028- 1LHCVE11V038B

TABLE A-23 (CONT.)

RHRCI.DES FILE

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TREE NAME: RHRCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: RHRCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-18 (page 7)
 GATE G0001 IS: CONTAINMENT BYPASS THROUGH LHSI/RHR PUMP DISCHARGE LINES

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
79.	1.00E-12	CHECK VALVE QnE21V077A FAILS TO CLOSE	1.00E-03	1HHCVE21V077A
		CHECK VALVE QnE21V076A FAILS TO CLOSE	1.00E-03	1HHCVE21V076A
		CHECK VALVE QnE11V038A FAILS TO CLOSE	1.00E-03	1LHCVE11V038A
		CHECK VALVE QnE21V026 FAIL TO CLOSE	1.00E-03	1HHCVE21V026-
80.	1.00E-12	CHECK VALVE QnE21V077A FAILS TO CLOSE	1.00E-03	1HHCVE21V077A
		CHECK VALVE QnE21V076A FAILS TO CLOSE	1.00E-03	1HHCVE21V076A
		CHECK VALVE QnE11V038A FAILS TO CLOSE	1.00E-03	1LHCVE11V038A
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1LHCVE11V028-
81.	1.60E-13	CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V051C FAILS TO CLOSE	1.00E-03	1LHCVE11V051C
		CHECK VALVE QnE11VP21C FAILS TO CLOSE	1.00E-03	1LHCVE11V021C
		QnE11V038B AND QnE21V026 FAIL TP CLOSE, CC	1.60E-04	1LHCVRHRCI-12
82.	1.60E-13	CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V051C FAILS TO CLOSE	1.00E-03	1LHCVE11V051C
		CHECK VALVE QnE11VP21C FAILS TO CLOSE	1.00E-03	1LHCVE11V021C
		QnE11V038B AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04	1LHCVRHRCI-11
83.	1.60E-13	CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V051C FAILS TO CLOSE	1.00E-03	1LHCVE11V051C
		CHECK VALVE QnE11VP21C FAILS TO CLOSE	1.00E-03	1LHCVE11V021C
		QnE11V038A AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04	1LHCVRHRCI-10
84.	1.60E-13	CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V051C FAILS TO CLOSE	1.00E-03	1LHCVE11V051C
		CHECK VALVE QnE11VP21C FAILS TO CLOSE	1.00E-03	1LHCVE11V021C
		QnE11V038A AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04	1LHCVRHRCI-09
85.	1.60E-13	CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V051C FAILS TO CLOSE	1.00E-03	1LHCVE11V051C
		CHECK VALVE QnE11VP21C FAILS TO CLOSE	1.00E-03	1LHCVE11V021C
		QnE11V038B AND QnE21V026 FAIL TP CLOSE, CC	1.60E-04	1LHCVRHRCI-12
86.	1.60E-13	CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V051C FAILS TO CLOSE	1.00E-03	1LHCVE11V051C
		CHECK VALVE QnE11VP21C FAILS TO CLOSE	1.00E-03	1LHCVE11V021C
		QnE11V038B AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04	1LHCVRHRCI-11
87.	1.60E-13	CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V051C FAILS TO CLOSE	1.00E-03	1LHCVE11V051C
		CHECK VALVE QnE11VP21C FAILS TO CLOSE	1.00E-03	1LHCVE11V021C
		QnE11V038A AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04	1LHCVRHRCI-10
88.	1.60E-13	CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V051C FAILS TO CLOSE	1.00E-03	1LHCVE11V051C
		CHECK VALVE QnE11VP21C FAILS TO CLOSE	1.00E-03	1LHCVE11V021C
		QnE11V038A AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04	1LHCVRHRCI-09

TABLE A-23 (CONT.)

RHRCI.DES FILE

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TREE NAME: RHRCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: RHRCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-18 (page 8)
 GATE G0001 IS: CONTAINMENT BYPASS THROUGH LHSI/RHR PUMP DISCHARGE LINES

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
89.	1.60E-13	CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V051B FAILS TO CLOSE	1.00E-03	1LHCVE11V051B
		CHECK VALVE QnE11VP21B FAILS TO CLOSE	1.00E-03	1LHCVE11V021B
		QnE11V038B AND QnE21V026 FAIL TP CLOSE, CC	1.60E-04	1LHCVRHRCI-12
90.	1.60E-13	CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V051B FAILS TO CLOSE	1.00E-03	1LHCVE11V051B
		CHECK VALVE QnE11VP21B FAILS TO CLOSE	1.00E-03	1LHCVE11V021B
		QnE11V038B AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04	1LHCVRHRCI-11
91.	1.60E-13	CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V051B FAILS TO CLOSE	1.00E-03	1LHCVE11V051B
		CHECK VALVE QnE11VP21B FAILS TO CLOSE	1.00E-03	1LHCVE11V021B
		QnE11V038A AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04	1LHCVRHRCI-10
92.	1.60E-13	CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V051B FAILS TO CLOSE	1.00E-03	1LHCVE11V051B
		CHECK VALVE QnE11VP21B FAILS TO CLOSE	1.00E-03	1LHCVE11V021B
		QnE11V038A AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04	1LHCVRHRCI-09
93.	1.60E-13	CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V051B FAILS TO CLOSE	1.00E-03	1LHCVE11V051B
		CHECK VALVE QnE11VP21B FAILS TO CLOSE	1.00E-03	1LHCVE11V021B
		QnE11V038B AND QnE21V026 FAIL TP CLOSE, CC	1.60E-04	1LHCVRHRCI-12
94.	1.60E-13	CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V051B FAILS TO CLOSE	1.00E-03	1LHCVE11V051B
		CHECK VALVE QnE11VP21B FAILS TO CLOSE	1.00E-03	1LHCVE11V021B
		QnE11V038B AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04	1LHCVRHRCI-11
95.	1.60E-13	CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V051B FAILS TO CLOSE	1.00E-03	1LHCVE11V051B
		CHECK VALVE QnE11VP21B FAILS TO CLOSE	1.00E-03	1LHCVE11V021B
		QnE11V038A AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04	1LHCVRHRCI-10
96.	1.60E-13	CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V051B FAILS TO CLOSE	1.00E-03	1LHCVE11V051B
		CHECK VALVE QnE11VP21B FAILS TO CLOSE	1.00E-03	1LHCVE11V021B
		QnE11V038A AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04	1LHCVRHRCI-09
97.	1.60E-13	CHECK VALVE QnE11V051A FAILS TO CLOSE	1.00E-03	1LHCVE11V051A
		CHECK VALVE QnE11VP21A FAILS TO CLOSE	1.00E-03	1LHCVE11V021A
		CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		QnE11V038B AND QnE21V026 FAIL TP CLOSE, CC	1.60E-04	1LHCVRHRCI-12
98.	1.60E-13	CHECK VALVE QnE11V051A FAILS TO CLOSE	1.00E-03	1LHCVE11V051A
		CHECK VALVE QnE11VP21A FAILS TO CLOSE	1.00E-03	1LHCVE11V021A
		CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		QnE11V038B AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04	1LHCVRHRCI-11

TABLE A-23 (CONT.)

RHRCI.DES FILE

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TREE NAME: RHRCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: RHRCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-18 (page 9)
 GATE G0001 IS: CONTAINMENT BYPASS THROUGH LHS1/RHR PUMP DISCHARGE LINES

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
99.	1.60E-13	CHECK VALVE QnE11V051A FAILS TO CLOSE	1.00E-03	1LHCVE11V051A
		CHECK VALVE QnE11VP21A FAILS TO CLOSE	1.00E-03	1LHCVE11V021A
		CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		QnE11V038A AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04	1LHCVRHRCI-10
100.	1.60E-13	CHECK VALVE QnE11V051A FAILS TO CLOSE	1.00E-03	1LHCVE11V051A
		CHECK VALVE QnE11VP21A FAILS TO CLOSE	1.00E-03	1LHCVE11V021A
		CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		QnE11V038A AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04	1LHCVRHRCI-09
101.	1.60E-13	CHECK VALVE QnE11V051A FAILS TO CLOSE	1.00E-03	1LHCVE11V051A
		CHECK VALVE QnE11VP21A FAILS TO CLOSE	1.00E-03	1LHCVE11V021A
		CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		QnE11V038B AND QnE21V026 FAIL TP CLOSE, CC	1.60E-04	1LHCVRHRCI-12
102.	1.60E-13	CHECK VALVE QnE11V051A FAILS TO CLOSE	1.00E-03	1LHCVE11V051A
		CHECK VALVE QnE11VP21A FAILS TO CLOSE	1.00E-03	1LHCVE11V021A
		CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		QnE11V038B AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04	1LHCVRHRCI-11
103.	1.60E-13	CHECK VALVE QnE11V051A FAILS TO CLOSE	1.00E-03	1LHCVE11V051A
		CHECK VALVE QnE11VP21A FAILS TO CLOSE	1.00E-03	1LHCVE11V021A
		CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		QnE11V038A AND QnE21V026 FAIL TO CLOSE, CC	1.60E-04	1LHCVRHRCI-10
104.	1.60E-13	CHECK VALVE QnE11V051A FAILS TO CLOSE	1.00E-03	1LHCVE11V051A
		CHECK VALVE QnE11VP21A FAILS TO CLOSE	1.00E-03	1LHCVE11V021A
		CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		QnE11V038A AND QnE11V028 FAIL TO CLOSE, CC	1.60E-04	1LHCVRHRCI-09
105.	1.00E-15	CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V051C FAILS TO CLOSE	1.00E-03	1LHCVE11V051C
		CHECK VALVE QnE11VP21C FAILS TO CLOSE	1.00E-03	1LHCVE11V021C
		CHECK VALVE QnE21V026 FAIL TO CLOSE	1.00E-03	1LHCVE21V026-
		CHECK VALVE QnE11V038B FAILS TO CLOSE	1.00E-03	1LHCVE11V038B
106.	1.00E-15	CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V051C FAILS TO CLOSE	1.00E-03	1LHCVE11V051C
		CHECK VALVE QnE11VP21C FAILS TO CLOSE	1.00E-03	1LHCVE11V021C
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1LHCVE11V028-
		CHECK VALVE QnE11V038B FAILS TO CLOSE	1.00E-03	1LHCVE11V038B
107.	1.00E-15	CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V051C FAILS TO CLOSE	1.00E-03	1LHCVE11V051C
		CHECK VALVE QnE11VP21C FAILS TO CLOSE	1.00E-03	1LHCVE11V021C
		CHECK VALVE QnE11V038A FAILS TO CLOSE	1.00E-03	1LHCVE11V038A
		CHECK VALVE QnE21V026 FAIL TO CLOSE	1.00E-03	1LHCVE21V026-

TABLE A-23 (CONT.)

RHRCI.DES FILE

PAGE 10

TREE NAME: RHRCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: RHRCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-18 (page 10)
 GATE G0001 IS: CONTAINMENT BYPASS THROUGH LHSI/RHR PUMP DISCHARGE LINES

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
108.	1.00E-15	CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V051C FAILS TO CLOSE	1.00E-03	1LHCVE11V051C
		CHECK VALVE QnE11VP21C FAILS TO CLOSE	1.00E-03	1LHCVE11V021C
		CHECK VALVE QnE11V038A FAILS TO CLOSE	1.00E-03	1LHCVE11V038A
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1LHCVE11V028-
109.	1.00E-15	CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V051C FAILS TO CLOSE	1.00E-03	1LHCVE11V051C
		CHECK VALVE QnE11VP21C FAILS TO CLOSE	1.00E-03	1LHCVE11V021C
		CHECK VALVE QnE21V026 FAIL TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE11V038B FAILS TO CLOSE	1.00E-03	1LHCVE11V038B
110.	1.00E-15	CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V051C FAILS TO CLOSE	1.00E-03	1LHCVE11V051C
		CHECK VALVE QnE11VP21C FAILS TO CLOSE	1.00E-03	1LHCVE11V021C
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1LHCVE11V028-
		CHECK VALVE QnE11V038B FAILS TO CLOSE	1.00E-03	1LHCVE11V038B
111.	1.00E-15	CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V051C FAILS TO CLOSE	1.00E-03	1LHCVE11V051C
		CHECK VALVE QnE11VP21C FAILS TO CLOSE	1.00E-03	1LHCVE11V021C
		CHECK VALVE QnE11V038A FAILS TO CLOSE	1.00E-03	1LHCVE11V038A
		CHECK VALVE QnE21V026 FAIL TO CLOSE	1.00E-03	1HHCVE21V026-
112.	1.00E-15	CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V051C FAILS TO CLOSE	1.00E-03	1LHCVE11V051C
		CHECK VALVE QnE11VP21C FAILS TO CLOSE	1.00E-03	1LHCVE11V021C
		CHECK VALVE QnE11V038A FAILS TO CLOSE	1.00E-03	1LHCVE11V038A
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1LHCVE11V028-
113.	1.00E-15	CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V051B FAILS TO CLOSE	1.00E-03	1LHCVE11V051B
		CHECK VALVE QnE11VP21B FAILS TO CLOSE	1.00E-03	1LHCVE11V021B
		CHECK VALVE QnE21V026 FAIL TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE11V038B FAILS TO CLOSE	1.00E-03	1LHCVE11V038B
114.	1.00E-15	CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V051B FAILS TO CLOSE	1.00E-03	1LHCVE11V051B
		CHECK VALVE QnE11VP21B FAILS TO CLOSE	1.00E-03	1LHCVE11V021B
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1LHCVE11V028-
		CHECK VALVE QnE11V038B FAILS TO CLOSE	1.00E-03	1LHCVE11V038B
115.	1.00E-15	CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V051B FAILS TO CLOSE	1.00E-03	1LHCVE11V051B
		CHECK VALVE QnE11VP21B FAILS TO CLOSE	1.00E-03	1LHCVE11V021B
		CHECK VALVE QnE11V038A FAILS TO CLOSE	1.00E-03	1LHCVE11V038A
		CHECK VALVE QnE21V026 FAIL TO CLOSE	1.00E-03	1HHCVE21V026-

TABLE A-23 (CONT.)

RHRCI.DES FILE

PAGE 11

TREE NAME: RHRCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: RHRCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-18 (page 11)
 GATE G0001 IS: CONTAINMENT BYPASS THROUGH LHS1/RHR PUMP DISCHARGE LINES

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
116.	1.00E-15	CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V051B FAILS TO CLOSE	1.00E-03	1LHCVE11V051B
		CHECK VALVE QnE11VP21B FAILS TO CLOSE	1.00E-03	1LHCVE11V021B
		CHECK VALVE QnE11V038A FAILS TO CLOSE	1.00E-03	1LHCVE11V038A
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1LHCVE11V028-
117.	1.00E-15	CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V051B FAILS TO CLOSE	1.00E-03	1LHCVE11V051B
		CHECK VALVE QnE11VP21B FAILS TO CLOSE	1.00E-03	1LHCVE11V021B
		CHECK VALVE QnE21V026 FAIL TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE11V038B FAILS TO CLOSE	1.00E-03	1LHCVE11V038B
118.	1.00E-15	CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V051B FAILS TO CLOSE	1.00E-03	1LHCVE11V051B
		CHECK VALVE QnE11VP21B FAILS TO CLOSE	1.00E-03	1LHCVE11V021B
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1LHCVE11V028-
		CHECK VALVE QnE11V038B FAILS TO CLOSE	1.00E-03	1LHCVE11V038B
119.	1.00E-15	CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V051B FAILS TO CLOSE	1.00E-03	1LHCVE11V051B
		CHECK VALVE QnE11VP21B FAILS TO CLOSE	1.00E-03	1LHCVE11V021B
		CHECK VALVE QnE11V038A FAILS TO CLOSE	1.00E-03	1LHCVE11V038A
		CHECK VALVE QnE21V026 FAIL TO CLOSE	1.00E-03	1HHCVE21V026-
120.	1.00E-15	CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V051B FAILS TO CLOSE	1.00E-03	1LHCVE11V051B
		CHECK VALVE QnE11VP21B FAILS TO CLOSE	1.00E-03	1LHCVE11V021B
		CHECK VALVE QnE11V038A FAILS TO CLOSE	1.00E-03	1LHCVE11V038A
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1LHCVE11V028-
121.	1.00E-15	CHECK VALVE QnE11V051A FAILS TO CLOSE	1.00E-03	1LHCVE11V051A
		CHECK VALVE QnE11VP21A FAILS TO CLOSE	1.00E-03	1LHCVE11V021A
		CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE21V026 FAIL TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE11V038B FAILS TO CLOSE	1.00E-03	1LHCVE11V038B
122.	1.00E-15	CHECK VALVE QnE11V051A FAILS TO CLOSE	1.00E-03	1LHCVE11V051A
		CHECK VALVE QnE11VP21A FAILS TO CLOSE	1.00E-03	1LHCVE11V021A
		CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1LHCVE11V028-
		CHECK VALVE QnE11V038B FAILS TO CLOSE	1.00E-03	1LHCVE11V038B
123.	1.00E-15	CHECK VALVE QnE11V051A FAILS TO CLOSE	1.00E-03	1LHCVE11V051A
		CHECK VALVE QnE11VP21A FAILS TO CLOSE	1.00E-03	1LHCVE11V021A
		CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V038A FAILS TO CLOSE	1.00E-03	1LHCVE11V038A
		CHECK VALVE QnE21V026 FAIL TO CLOSE	1.00E-03	1HHCVE21V026-

TABLE A-23 (CONT.)

RHRCI.DES FILE

PAGE 12

TREE NAME: RHRCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: RHRCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-18 (page 12)
 GATE G0001 IS: CONTAINMENT BYPASS THROUGH LHS1/RHR PUMP DISCHARGE LINES

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
124.	1.00E-15	CHECK VALVE QnE11V051A FAILS TO CLOSE	1.00E-03	1LHCVE11V051A
		CHECK VALVE QnE11VP21A FAILS TO CLOSE	1.00E-03	1LHCVE11V021A
		CHECK VALVE QnE11V042B FAILS TO CLOSE	1.00E-03	1LHCVE11V042B
		CHECK VALVE QnE11V038A FAILS TO CLOSE	1.00E-03	1LHCVE11V038A
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1LHCVE11V028-
125.	1.00E-15	CHECK VALVE QnE11V051A FAILS TO CLOSE	1.00E-03	1LHCVE11V051A
		CHECK VALVE QnE11VP21A FAILS TO CLOSE	1.00E-03	1LHCVE11V021A
		CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE21V026 FAIL TO CLOSE	1.00E-03	1HHCVE21V026-
		CHECK VALVE QnE11V038B FAILS TO CLOSE	1.00E-03	1LHCVE11V038B
126.	1.00E-15	CHECK VALVE QnE11V051A FAILS TO CLOSE	1.00E-03	1LHCVE11V051A
		CHECK VALVE QnE11VP21A FAILS TO CLOSE	1.00E-03	1LHCVE11V021A
		CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1LHCVE11V028-
		CHECK VALVE QnE11V038B FAILS TO CLOSE	1.00E-03	1LHCVE11V038B
127.	1.00E-15	CHECK VALVE QnE11V051A FAILS TO CLOSE	1.00E-03	1LHCVE11V051A
		CHECK VALVE QnE11VP21A FAILS TO CLOSE	1.00E-03	1LHCVE11V021A
		CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V038A FAILS TO CLOSE	1.00E-03	1LHCVE11V038A
		CHECK VALVE QnE21V026 FAIL TO CLOSE	1.00E-03	1HHCVE21V026-
128.	1.00E-15	CHECK VALVE QnE11V051A FAILS TO CLOSE	1.00E-03	1LHCVE11V051A
		CHECK VALVE QnE11VP21A FAILS TO CLOSE	1.00E-03	1LHCVE11V021A
		CHECK VALVE QnE11V042A FAILS TO CLOSE	1.00E-03	1LHCVE11V042A
		CHECK VALVE QnE11V038A FAILS TO CLOSE	1.00E-03	1LHCVE11V038A
		CHECK VALVE QnE11V028 FAILS TO CLOSE	1.00E-03	1LHCVE11V028-

REDUCED SUM OF PROBABILITY OF FAILURE = 7.097E-07

TABLE A-23 (CONT.)

RHRCI.DES FILE

CONFIGURATION CONTROL

CODE NAME : CUTDES
VERSION NO. : 1.70
DATE OF CONFIGURATION : NOVEMBER 21, 1989
DATE OF ISSUANCE : NOVEMBER 21, 1989
DATE : FEBRUARY 28, 1992
TIME : 15:57:47:39
CONFIGURATION NO. : 5201662275753

TABLE A-24
CSSCI.SIM FILE

VER 1.6

'SIMON Case file for Tree: CSSCI; Created: 11/26/91 10:26'

'1CSCVE13V002AK	'	01	062	0.000000	0.0
'1CSCVE13V014-K	'	01	062	0.000000	0.0
'1CSCVE13V007AK	'	01	062	0.000000	0.0
'1CSCVE13V002BK	'	01	062	0.000000	0.0
'1CSCVE13V007BK	'	01	062	0.000000	0.0

TABLE A-25
 CSCI.TAB FILE

Simon5, VER 1.6 Table Output File
 SIMON Case file for Tree: CSCI; Created: 11/26/91 10:26

02/28/92 15:58

FT IDENT	COMP	FAILURE MODE	FAIL RATE	VARIANCE	SOURCE	TIME	PROBABILITY	VARIANCE
1CSCVE13V002AK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1CSCVE13V014-K	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1CSCVE13V007AK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1CSCVE13V002BK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1CSCVE13V007BK	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07

TABLE A-25 (CONT.)

CSSCI.TAB FILE

CONFIGURATION CONTROL

CODE NAME : SIMONS
VERSION NO. : 1.60
DATE OF CONFIGURATION : NOVEMBER 21, 1989
DATE OF ISSUANCE : NOVEMBER 21, 1989
DATE : FEBRUARY 28, 1992
TIME : 15:58:38:47
CONFIGURATION NO. : 5079573204668

TABLE A-26
CSSCI.OUT FILE

CSSCI.CUT
FAULT TREE DESCRIPTION

Ver. 1.61 2/28/92 16:01:21

- (1) NUMBER OF GATES INPUT
- (2) NUMBER OF COMPONENTS INPUT
- (3) NUMBER OF EVENTS IN COM GATE TO BE CONSIDERED AT ONE TIME

GATE NAME	TYPE	(1)	(2)	(3)	NAMES OF THE INPUTS	
1. G0001	OR	2	0	0	G0002	G0007
2. G0002	AND	1	1	0	G0004	1CSCVE13V002AK
3. G0004	OR	0	2	0	1CSCVE13V014-K	1CSCVE13V007AK
4. G0007	AND	1	1	0	G0009	1CSCVE13V002BK
5. G0009	OR	0	2	0	1CSCVE13V014-K	1CSCVE13V007BK

OUTPUT GATES REQUESTED

G0002 G0007

TABLE A-26 (CONT.)

CSSCI.OUT FILE

CSSCI.CUT
BASIC EVENT LIST

Ver. 1.61 2/28/92 16:01:21

COMPONENT. NAME	PROBABILITY	VARIANCE	GATES INPUT TO...
1. 1CSCVE13V002AK	1.0000E-03	5.6200E-07	G0002
2. 1CSCVE13V014-K	1.0000E-03	5.6200E-07	G0004 G0009
3. 1CSCVE13V007AK	1.0000E-03	5.6200E-07	G0004
4. 1CSCVE13V002BK	1.0000E-03	5.6200E-07	G0007
5. 1CSCVE13V007BK	1.0000E-03	5.6200E-07	G0009

TABLE A-26 (CONT.)

CSSCI.OUT FILE

CSSCI.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 16:01:21

Cutsets for GATE G0002 with a cutoff probability of 1.00E-09

1. 1.00E-06 1CSCVE13V002AK 1CSCVE13V007AK
2. 1.00E-06 1CSCVE13V002AK 1CSCVE13V014-K

Reduced sum of cutset probabilities= 2.000E-06

Moments Results

Mean Probability of Failure= 2.000E-06

TABLE A-26 (CONT.)

CSSCI.OUT FILE

CSSCI.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 16:01:21

Cutsets for GATE G0007 with a cutoff probability of 1.00E-09

1.	1.00E-06	1CSCVE13V002BK	1CSCVE13V007BK
2.	1.00E-06	1CSCVE13V014-K	1CSCVE13V002BK

Reduced sum of cutset probabilities= 2.000E-06

Moments Results

Mean Probability of Failure= 2.000E-06

TABLE A-26 (CONT.)

CSSCI.OUT FILE

CSSCI.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 16:01:21

Cutsets for GATE G0001 with a cutoff probability of 1.00E-09

1.	1.00E-06	1CSCVE13V002BK	1CSCVE13V007BK
2.	1.00E-06	1CSCVE13V014-K	1CSCVE13V002BK
3.	1.00E-06	1CSCVE13V002AK	1CSCVE13V007AK
4.	1.00E-06	1CSCVE13V002AK	1CSCVE13V014-K

Reduced sum of outset probabilities= 4.000E-06

Moments Results

Mean Probability of Failure= 4.000E-06

Run ended at 16:01:23

TABLE A-26 (CONT.)

CSSCI.OUT FILE

CONFIGURATION CONTROL

CODE NAME : WESCUT
VERSION NO. : 1.61
DATE OF CONFIGURATION : September 13, 1990
DATE OF ISSUANCE : September 13, 1990
DATE : FEBRUARY 28, 1992
TIME : 16:1:24:89
CONFIGURATION NO. : 5393361278623

TABLE A-27
 CSSCI.DES FILE

PAGE 1

TREE NAME: CSSCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: CSSCI.CDS

CUT SETS FOR GATE G0002 WITH CUTOFF PROBABILITY OF 1.00E-09
 GATE G0002 IS: CONT BYPASS THRU RB PENE. 21

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
1.	1.00E-06	CHECK VALVE QnE13V002A FAILS TO CLOSE	1.00E-03	1CSCVE13V002AK
		CHECK VALVE QnE13V007A FAILS TO CLOSE	1.00E-03	1CSCVE13V007AK
2.	1.00E-06	CHECK VALVE QnE13V002A FAILS TO CLOSE	1.00E-03	1CSCVE13V002AK
		CHECK VALVE QnE13V014 FAILS TO CLOSE	1.00E-03	1CSCVE13V014-K

REDUCED SUM OF PROBABILITY OF FAILURE = 2.000E-06

TABLE A-27 (CONT.)

CSSCI.DES FILE

PAGE 1 TREE NAME: CSSCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: CSSCI.CDS

CUT SETS FOR GATE G0007 WITH CUTOFF PROBABILITY OF 1.00E-09
 GATE G0007 IS: CONT BYPASS THRU RB PENE. 22

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
1.	1.00E-06	CHECK VALVE QnE13V002B FAILS TO CLOSE CHECK VALVE QnE13V007B FAILS TO CLOSE	1.00E-03 1.00E-03	1CSCVE13V002BK 1CSCVE13V007BK
2.	1.00E-06	CHECK VALVE QnE13V014 FAILS TO CLOSE CHECK VALVE QnE13V002B FAILS TO CLOSE	1.00E-03 1.00E-03	1CSCVE13V014-K 1CSCVE13V002BK

REDUCED SUM OF PROBABILITY OF FAILURE = 2.000E-06

TABLE A-27 (CONT.)

CSSCI.DES FILE

CONFIGURATION CONTROL

CODE NAME : CUTDES
VERSION NO. : 1.70
DATE OF CONFIGURATION : NOVEMBER 21, 1989
DATE OF ISSUANCE : NOVEMBER 21, 1989
DATE : DECEMBER 4, 1992
TIME : 12:48:28:35
CONFIGURATION NO. : 5201672234530

TABLE A-27 (CONT.)

CSSCI.DES FILE

PAGE 1

TREE NAME: CSSCI
 CUTDES VER.1.7, 11-17-89
 INPUT FILE: CSSCI.CDS

CUT SETS FOR GATE G0001 WITH CUTOFF PROBABILITY OF 1.00E-09
 GATE G0001 IS: CONT BYPASS THRU CSS GIVEN FAILURE OF ALL SUPPORT SYSTEMS

NUMBER	CUTSET PROB.	BASIC EVENT NAME	EVENT PROB.	IDENTIFIER
1.	1.00E-06	CHECK VALVE QnE13V002B FAILS TO CLOSE	1.00E-03	1CSCVE13V002BK
		CHECK VALVE QnE13V007B FAILS TO CLOSE	1.00E-03	1CSCVE13V007BK
2.	1.00E-06	CHECK VALVE QnE13V014 FAILS TO CLOSE	1.00E-03	1CSCVE13V014-K
		CHECK VALVE QnE13V002B FAILS TO CLOSE	1.00E-03	1CSCVE13V002BK
3.	1.00E-06	CHECK VALVE QnE13V002A FAILS TO CLOSE	1.00E-03	1CSCVE13V002AK
		CHECK VALVE QnE13V007A FAILS TO CLOSE	1.00E-03	1CSCVE13V007AK
4.	1.00E-06	CHECK VALVE QnE13V002A FAILS TO CLOSE	1.00E-03	1CSCVE13V002AK
		CHECK VALVE QnE13V014 FAILS TO CLOSE	1.00E-03	1CSCVE13V014-K

REDUCED SUM OF PROBABILITY OF FAILURE = 4.000E-06

TABLE A-28

NSCIWS.SIM FILE WITH OPERATOR ERROR PROBABILITY SET TO UNITY

VER 1.6

'SIMON Case file for Tree: NSCIWS; Created: 02/28/92 14:55'

41				
'1--CVG21V204-K	'	01	062	0.000000 0.0
'1--AVHV3380--K	'	01	051	0.000000 0.0
'SAASDA516-2FAE	'	01	272	744.0000 0.0
'SAARE--K522FAE	'	02	255	744.0000 0.0
			252	0.000000 0.0
'SAARE--K612FAE	'	02	255	13392.00 0.0
			252	0.000000 0.0
'SAASRPHASW1FAE	'	01	262	13392.00 0.0
'SABSRPHASW2FAE	'	01	262	13392.00 0.0
'1SASRPHASEASWFCC'	'	01	684	13392.00 0.0
'SAXOPMANPHA-AE	'	01	001	0.000000 0.0
'1--CVG21V291-K	'	01	062	0.000000 0.0
'1--AVHV3376--K	'	01	051	0.000000 0.0
'SABSDA516-2FAE	'	01	272	744.0000 0.0
'SABRE--K502FAE	'	02	255	744.0000 0.0
			252	0.000000 0.0
'SABRE--K613FAE	'	02	255	13392.00 0.0
			252	0.000000 0.0
'1--AVHV3377--K	'	01	051	0.000000 0.0
'SAARE--K502FAE	'	02	255	744.0000 0.0
			252	0.000000 0.0
'SAARE--K613FAE	'	02	255	13392.00 0.0
			252	0.000000 0.0
'1--AVHV3376/7KCC'	'	01	784	0.000000 0.0
'1SASDA5161A/BFCC'	'	01	740	744.0000 0.0
'1SAREK502TA/BFCC'	'	01	700	744.0000 0.0
'1SA--K613TA/BFCC'	'	01	700	13392.00 0.0
'1--CVB13V038-K	'	01	062	0.000000 0.0
'1--CVB13V040-K	'	01	062	0.000000 0.0
'SAARE--K606FAE	'	02	255	13392.00 0.0
			252	0.000000 0.0
'1--AVP13V302-K	'	01	051	0.000000 0.0
'SABDEA516-1FAE	'	01	273	744.0000 0.0
'SABSDA516-3FAE	'	01	272	744.0000 0.0
'SABRE--K503FAE	'	02	255	744.0000 0.0
			252	0.000000 0.0
'SABRE--K622FAE	'	03	255	13392.00 0.0
			252	0.000000 0.0
			252	0.000000 0.0
'1--AVB13V301-K	'	01	051	0.000000 0.0
'SAADEA516-1FAE	'	01	273	744.0000 0.0
'SAASDA516-3FAE	'	01	272	744.0000 0.0
'SAARE--K503FAE	'	02	255	744.0000 0.0
			252	0.000000 0.0
'SAARE--K622FAE	'	03	255	13392.00 0.0
			252	0.000000 0.0
			252	0.000000 0.0
'1--AV301/302-KCC'	'	01	784	0.000000 0.0
'1SASDA5162A/BFCC'	'	01	740	744.0000 0.0
'1SAREK503TA/BFCC'	'	01	700	744.0000 0.0
'1SAREK606TA/BFCC'	'	01	700	13392.00 0.0
'1--AVP13V304-K	'	01	051	0.000000 0.0
'1--AVP13V303-K	'	01	051	0.000000 0.0
'1--AV303/402-KCC'	'	01	784	0.000000 0.0

TABLE A-29

NSCIWS.TAB FILE WITH OPERATOR ERROR PROBABILITY SET TO UNITY

Simon5, VER 1.6

Table Output File

02/28/92 16:27

SIMON Case file for Tree: NSCIWS; Created: 02/28/92 14:55

FT IDENT	COMP	FAILURE MODE	FAIL RATE	VARIANCE	SOURCE	TIME	PROBABILITY	VARIANCE
1--CVG21V204-K	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1--AVHV3380--K	AV	AOV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
SAASDA516-2FAE	SD	SAFEGUARDS DRIVER CIRCUIT FAILS	3.960E-07	0.000E+00	POR1	7.440E+02	2.95E-04	0.00E+00
SAARE--K522FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	7.440E+02	3.79E-04	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CLOSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	3.88E-04	0.00E+00
SAARE--K612FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	1.339E+04	6.83E-03	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CLOSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	6.84E-03	0.00E+00
SAASRPHASW1FAE	SW	SWITCH (GENERAL TYPE) FAILS	1.700E-07	0.000E+00	TOP0	1.339E+04	2.28E-03	0.00E+00
SABSRPHASW2FAE	SW	SWITCH (GENERAL TYPE) FAILS	1.700E-07	0.000E+00	TOP0	1.339E+04	2.28E-03	0.00E+00
1SASRPHASEASWFCC	SW	CC/MGL; FAC(2/2 FAIL) 2.0E-02 ALL, SWITCH (GENERAL TYPE) FAILS	3.400E-09	0.000E+00	TOP0	1.339E+04	4.55E-05	0.00E+00
SAXOPMANPHA-AE	XX	LOGICAL ONE	1.000E+00	0.000E+00	NONE	0.000E+00	1.00E+00	0.00E+00
1--CVG21V291-K	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1--AVHV3376--K	AV	AOV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
SABSDA516-2FAE	SD	SAFEGUARDS DRIVER CIRCUIT FAILS	3.960E-07	0.000E+00	POR1	7.440E+02	2.95E-04	0.00E+00
SABRE--K502FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	7.440E+02	3.79E-04	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CLOSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	3.88E-04	0.00E+00
SABRE--K613FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	1.339E+04	6.83E-03	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CLOSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	6.84E-03	0.00E+00
1--AVHV3377--K	AV	AOV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
SAARE--K502FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	7.440E+02	3.79E-04	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CLOSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	3.88E-04	0.00E+00

TABLE A-29 (CONT.)

NSCIWS.TAB FILE WITH OPERATOR ERROR PROBABILITY SET TO UNITY

Simon5, VER 1.6
SIMON Case file for Tree: NSCIWS; Created: 02/28/92 14:55

02/28/92 16:27

FT IDENT	COMP	FAILURE MODE	FAIL RATE	VARIANCE	SOURCE	TIME	PROBABILITY	VARIANCE
SAARE--K613FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	1.339E+04	6.83E-03	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	6.84E-03	0.00E+00
1--AVHV3376/7KCC	AV	CC/MGL; FAC(2/2 FAIL) 2.0E-02 ALL, AOV FAILS TO OPERATE; EF=3	4.000E-05	8.990E-10	4550	0.000E+00	4.00E-05	8.99E-10
1SASDA5161A/BFCC	SD	CC/MGL; FAC(2/2 FAIL) 2.0E-02 ALL, SAFEGUARDS DRIVER CIRCUIT FAILS	7.920E-09	0.000E+00	POR1	7.440E+02	5.89E-06	0.00E+00
1SAREK502TA/BFCC	RE	CC/MGL; F(2/2) 2.0E-02 ALL, RE LAY FAILS DUR. OP. COMP. 251,2 53,254	1.020E-08	0.000E+00	TOP2	7.440E+02	7.59E-06	0.00E+00
1SAREK613TA/BFCC	RE	CC/MGL; F(2/2) 2.0E-02 ALL, RE LAY FAILS DUR. OP. COMP. 251,2 53,254	1.020E-08	0.000E+00	TOP2	1.339E+04	1.37E-04	0.00E+00
1--CVB13V038-K	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
1--CVB13V040-K	CV	CV FAILS TO CLOSE; EF=3	1.000E-03	5.620E-07	4550	0.000E+00	1.00E-03	5.62E-07
SAARE--K606FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	1.339E+04	6.83E-03	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	6.84E-03	0.00E+00
1--AVP13V302-K	AV	AOV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
S. 3DEA516-1FAE	SD	SAFEGUARDS DRIVER DIODE FAILS	7.560E-09	0.000E+00	POR1	7.440E+02	5.62E-06	0.00E+00
SABSDA516-3FAE	SD	SAFEGUARDS DRIVER CIRCUIT FAIL S	3.960E-07	0.000E+00	POR1	7.440E+02	2.95E-04	0.00E+00
SABRE--K503FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	7.440E+02	3.79E-04	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	3.88E-04	0.00E+00
SABRE--K622FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	1.339E+04	6.83E-03	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CL OSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	6.85E-03	0.00E+00
1--AVB13V301-K	AV	AOV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
SADEA516-1FAE	SD	SAFEGUARDS DRIVER DIODE FAILS	7.560E-09	0.000E+00	POR1	7.440E+02	5.62E-06	0.00E+00

TABLE A-29 (CONT.)

NSCIWS.TAB FILE WITH OPERATOR ERROR PROBABILITY SET TO UNITY

Simon5, VER 1.6

Table Output File

02/28/92 16:27

SIMON Case file for Tree: NSCIWS; Created: 02/28/92 14:55

FT IDENT	COMP	FAILURE MODE	FAIL RATE	VARIANCE	SOURCE	TIME	PROBABILITY	VARIANCE
SAASDA516-3FAE	SD	SAFEGUARDS DRIVER CIRCUIT FAILS	3.960E-07	0.000E+00	POR1	7.440E+02	2.95E-04	0.00E+00
SAARE--K503FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	7.440E+02	3.79E-04	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CLOSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	3.88E-04	0.00E+00
SAARE--K622FAE	RE	RELAY FAILS DURING OPERATION; COMPOSITE OF 251, 253, & 254	5.100E-07	0.000E+00	TOP2	1.339E+04	6.83E-03	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CLOSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
	CN	RELAY CONTACTS FAIL TO OPEN/CLOSE	8.500E-06	0.000E+00	TOP2	0.000E+00	8.50E-06	0.00E+00
						TOTAL	6.85E-03	0.00E+00
1--AV301/302-KCC	AV	CC/MGL; FAC(2/2 FAIL) 2.0E-02 ALL, AOV FAILS TO OPERATE; EF=3	4.000E-05	8.990E-10	4550	0.000E+00	4.00E-05	8.99E-10
1SASDA5162A/BFCC	SD	CC/MGL; FAC(2/2 FAIL) 2.0E-02 ALL, SAFEGUARDS DRIVER CIRCUIT FAILS	7.920E-09	0.000E+00	POR1	7.440E+02	5.89E-06	0.00E+00
1SAREK503TA/BFCC	RE	CC/MGL; F(2/2) 2.0E-02 ALL, RELAY FAILS DUR. OP. COMP. 251, 253, 254	1.020E-08	0.000E+00	TOP2	7.440E+02	7.59E-06	0.00E+00
1SAREK606TA/BFCC	RE	CC/MGL; F(2/2) 2.0E-02 ALL, RELAY FAILS DUR. OP. COMP. 251, 253, 254	1.020E-08	0.000E+00	TOP2	1.339E+04	1.37E-04	0.00E+00
1--AVP13V304-K	AV	AOV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
1--AVP13V303-K	AV	AOV FAILS TO OPERATE; EF=3	2.000E-03	2.250E-06	4550	0.000E+00	2.00E-03	2.25E-06
1--AV303/402-KCC	AV	CC/MGL; FAC(2/2 FAIL) 2.0E-02 ALL, AOV FAILS TO OPERATE; EF=3	4.000E-05	8.990E-10	4550	0.000E+00	4.00E-05	8.99E-10

TABLE A-29 (CONT.)

NSCIWS.TAB FILE WITH OPERATOR ERROR PROBABILITY SET TO UNITY

CONFIGURATION CONTROL

CODE NAME : SIMONS
VERSION NO. : 1.60
DATE OF CONFIGURATION : NOVEMBER 21, 1989
DATE OF ISSUANCE : NOVEMBER 21, 1989
DATE : FEBRUARY 28, 1992
TIME : 16:27:46:14
CONFIGURATION NO. : 5079573211643

TABLE A-30

NSCIWS.OUT FILE WITH OPERATOR ERROR PROBABILITY SET TO UNITY

NSCIWSOA.CUT
 FAULT TREE DESCRIPTION

Ver. 1.61 2/28/92 16:28:08

- (1) NUMBER OF GATES INPUT
- (2) NUMBER OF COMPONENTS INPUT
- (3) NUMBER OF EVENTS IN COM GATE TO BE CONSIDERED AT ONE TIME

GATE NAME	TYPE	(1)	(2)	(3)	NAMES OF THE INPUTS				
1. G0001	OR	5	0	0	G0002	G0021	G0054	G0067	G0100
2. G0002	AND	1	1	0	G0004	1--CVG21V204-K			
3. G0004	OR	1	1	0	G0006	1--AVHV3380--K			
4. G0006	AND	2	0	0	G0007	G0011			
5. G0007	OR	0	3	0	SAASDA516-2FAE	SAARE--K522FAE	SAARE--K612FAE		
6. G0011	OR	1	2	0	G0012	SAARE--K522FAE	SAARE--K612FAE		
7. G0012	OR	1	1	0	G0013	SAXOPMANPHA-AE			
8. G0013	OR	1	1	0	G0014	1SASRPHASEASWFCC			
9. G0014	AND	0	2	0	SAASRPHASW1FAE	SASRPHASW2FAE			
10. G0021	OR	2	0	0	G0022	G0047			
11. G0022	AND	2	0	0	G0023	G0036			
12. G0023	OR	1	1	0	G0025	1--CVG21V291-K			
13. G0025	OR	1	1	0	G0027	1--AVHV3376--K			
14. G0027	AND	2	0	0	G0028	G0032			
15. G0028	OR	0	3	0	SABSDA516-2FAE	SABRE--K502FAE	SABRE--K613FAE		
16. G0032	OR	1	2	0	G0012	SABRE--K502FAE	SABRE--K613FAE		
17. G0036	OR	1	1	0	G0038	1--AVHV3377--K			
18. G0038	AND	2	0	0	G0039	G0043			
19. G0039	OR	0	3	0	SAASDA516-2FAE	SAARE--K502FAE	SAARE--K613FAE		
20. G0043	OR	1	2	0	G0012	SAARE--K502FAE	SAARE--K613FAE		
21. G0047	OR	1	3	0	G0049	1--AVHV3376/7KCC	1SAREK502TA/BFCC	1SAREK613TA/BFCC	
22. G0049	AND	1	1	0	G0012	1SASDA5161A/BFCC			
23. G0054	AND	1	1	0	G0056	1--CVB13V038-K			
24. G0056	OR	1	1	0	G0058	1--CVB13V040-K			
25. G0058	AND	2	0	0	G0059	G0063			
26. G0059	OR	0	3	0	SAASDA516-2FAE	SAARE--K522FAE	SAARE--K606FAE		
27. G0063	OR	1	2	0	G0012	SAARE--K522FAE	SAARE--K606FAE		
28. G0067	OR	2	0	0	G0068	G0093			
29. G0068	AND	2	0	0	G0069	G0081			
30. G0069	OR	1	1	0	G0071	1--AVP13V302-K			
31. G0071	AND	2	0	0	G0072	G0077			
32. G0072	OR	0	4	0	SABDEA516-1FAE	SABSDA516-3FAE	SABRE--K503FAE	SABRE--K622FAE	
33. G0077	OR	1	2	0	G0012	SABRE--K503FAE	SABRE--K622FAE		
34. G0081	OR	1	1	0	G0083	1--AVB13V301-K			
35. G0083	AND	2	0	0	G0084	G0089			
36. G0084	OR	0	4	0	SAADEA516-1FAE	SAASDA516-3FAE	SAARE--K503FAE	SAARE--K622FAE	

TABLE A-30 (CONT.)

NSCIWS.OUT FILE WITH OPERATOR ERROR PROBABILITY SET TO UNITY

NSCIWSOA.CUT
 FAULT TREE DESCRIPTION (CONT.)

Ver. 1.61 2/28/92 16:28:08

GATE NAME	TYPE	(1)	(2)	(3)	NAMES OF THE INPUTS		
37. G0089	OR	1	2	0	G0012	SAARE--K503FAE	SAARE--K622FAE
38. G0093	OR	1	3	0	G0095	1--AV301/302-KCC	1SAREK503TA/BFCC 1SAREK606TA/BFCC
39. G0095	AND	1	1	0	G0012	1SASDA5162A/BFCC	
40. G0100	OR	2	0	0	G0101	G0112	
41. G0101	AND	2	0	0	G0102	G0107	
42. G0102	OR	1	1	0	G0104	1--AVP13/304-K	
43. G0104	AND	2	0	0	G0072	G0077	
44. G0107	OR	1	1	0	G0109	1--AVP13V303-K	
45. G0109	AND	2	0	0	G0084	G0089	
46. G0112	OR	1	3	0	G0095	1--AV303/402-KCC	1SAREK503TA/BFCC 1SAREK606TA/BFCC

TABLE A-30 (CONT.)

NSCIWS.OUT FILE WITH OPERATOR ERROR PROBABILITY SET TO UNITY

NSCIWSOA.CUT
BASIC EVENT LIST

Ver. 1.61 2/28/92 16:28:08

COMPONENT NAME	PROBABILITY	VARIANCE	GATES INPUT TO...
1. 1--CVG21V204-K	1.0000E-03	5.6200E-07	G0002
2. 1--AVHV3380--K	2.0000E-03	2.2500E-06	G0004
3. SAASDA516-2FAE	2.9500E-04	0.0000E+00	G0007
4. SAARE--K522FAE	3.8800E-04	0.0000E+00	G0007
5. SAARE--K612FAE	6.8400E-03	0.0000E+00	G0007
6. SAASRPHASW1FAE	2.2800E-03	0.0000E+00	G0014
7. SABS RPHASW2FAE	2.2800E-03	0.0000E+00	G0014
8. 1SASRPHASEASWFCC	4.5500E-05	0.0000E+00	G0013
9. SAXOPMANPHA-AE	1.0000E+00	0.0000E+00	G0012
10. 1--CVG21V291-K	1.0000E-03	5.6200E-07	G0023
11. 1--AVHV3376--K	2.0000E-03	2.2500E-06	G0025
12. SABSDA516-2FAE	2.9500E-04	0.0000E+00	G0028
13. SABRE--K502FAE	3.8800E-04	0.0000E+00	G0028
14. SABRE--K613FAE	6.8400E-03	0.0000E+00	G0028
15. 1--AVHV3377--K	2.0000E-03	2.2500E-06	G0036
16. SAARE--K502FAE	3.8800E-04	0.0000E+00	G0039
17. SAARE--K613FAE	6.8400E-03	0.0000E+00	G0039
18. 1--AVHV3376/7KCC	4.0000E-05	8.9900E-10	G0047
19. 1SASDA5161A/BFCC	5.8900E-06	0.0000E+00	G0049
20. 1SAREK502TA/BFCC	7.5900E-06	0.0000E+00	G0047
21. 1SAREK613TA/BFCC	1.3700E-04	0.0000E+00	G0047
22. 1--CVB13V038-K	1.0000E-03	5.6200E-07	G0054
23. 1--CVB13V040-K	1.0000E-03	5.6200E-07	G0056
24. SAARE--K606FAE	6.8400E-03	0.0000E+00	G0059
25. 1--AVP13V302-K	2.0000E-03	2.2500E-06	G0069
26. SABDEA516-1FAE	5.6200E-06	0.0000E+00	G0072
27. SABSDA516-3FAE	2.9500E-04	0.0000E+00	G0072
28. SABRE--K503FAE	3.8800E-04	0.0000E+00	G0072
29. SABRE--K622FAE	6.8500E-03	0.0000E+00	G0072
30. 1--AVB13V301-K	2.0000E-03	2.2500E-06	G0081
31. SADEA516-1FAE	5.6200E-06	0.0000E+00	G0084
32. SAASDA516-3FAE	2.9500E-04	0.0000E+00	G0084
33. SAARE--K503FAE	3.8800E-04	0.0000E+00	G0084
34. SAARE--K622FAE	6.8500E-03	0.0000E+00	G0084
35. 1--AV301/302-KCC	4.0000E-05	8.9900E-10	G0093
36. 1SASDA5162A/BFCC	5.8900E-06	0.0000E+00	G0095
37. 1SAREK503TA/BFCC	7.5900E-06	0.0000E+00	G0093
38. 1SAREK606TA/BFCC	1.3700E-04	0.0000E+00	G0093
39. 1--AVP13V304-K	2.0000E-03	2.2500E-06	G0102
40. 1--AVP13V303-K	2.0000E-03	2.2500E-06	G0107
41. 1--AV303/402-KCC	4.0000E-05	8.9900E-10	G0112

TABLE A-30 (CONT.)

NSCIWS.OUT FILE WITH OPERATOR ERROR PROBABILITY SET TO UNITY

NSCIWSOA.CUT
QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 16:28:08

Cutsets for GATE G0001 with a cutoff probability of 1.00E-09

1.	1.37E-04	1SAREK606TA/BFCC		
2.	1.37E-04	1SAREK613TA/BFCC		
3.	4.69E-05	SABRE--K622FAE	SAARE--K622FAE	
4.	4.68E-05	SABRE--K613FAE	SAARE--K613FAE	
5.	4.00E-05	1--AV303/402-KCC		
6.	4.00E-05	1--AV301/302-KCC		
7.	4.00E-05	1--AVHV3376/7KCC		
8.	1.37E-05	SAARE--K622FAE	1--AVP13V304-K	
9.	1.37E-05	SABRE--K622FAE	1--AVP13V303-K	
10.	1.37E-05	1--AVP13V302-K	SAARE--K622FAE	
11.	1.37E-05	SABRE--K622FAE	1--AVB13V301-K	
12.	1.37E-05	1--AVHV3376--K	SAARE--K613FAE	
13.	1.37E-05	SABRE--K613FAE	1--AVHV3377--K	
14.	7.59E-06	1SAREK503TA/BFCC		
15.	7.59E-06	1SAREK502TA/BFCC		
16.	6.84E-06	1--CVB13V038-K	SAARE--K606FAE	
17.	6.84E-06	1--CVG21V291-K	SAARE--K613FAE	
18.	6.84E-06	1--CVG21V204-K	SAARE--K612FAE	
19.	5.89E-06	SAXOPMANPHA-AE	1SASDA5162A/BFCC	
20.	5.89E-06	SAXOPMANPHA-AE	1SASDA5161A/BFCC	
21.	4.00E-06	1--AVP13V304-K	1--AVP13V303-K	
22.	4.00E-06	1--AVP13V302-K	1--AVB13V301-K	
23.	4.00E-06	1--AVHV3376--K	1--AVHV3377--K	
24.	2.66E-06	SABRE--K622FAE	SAARE--K503FAE	
25.	2.66E-06	SABRE--K503FAE	SAARE--K622FAE	
26.	2.65E-06	SABRE--K613FAE	SAARE--K502FAE	
27.	2.65E-06	SABRE--K502FAE	SAARE--K613FAE	
28.	2.02E-06	SAXOPMANPHA-AE	SABRE--K622FAE	SAASDA516-3FAE
29.	2.02E-06	SAXOPMANPHA-AE	SABSDA516-3FAE	SAARE--K622FAE
30.	2.02E-06	SAASDA516-2FAE	SAXOPMANPHA-AE	SABRE--K613FAE
31.	2.02E-06	SAXOPMANPHA-AE	SABSDA516-2FAE	SAARE--K613FAE
32.	2.00E-06	1--CVG21V291-K	1--AVHV3377--K	
33.	2.00E-06	1--CVG21V204-K	1--AVHV3380--K	
34.	1.00E-06	1--CVB13V038-K	1--CVB13V040-K	
35.	7.76E-07	SAARE--K503FAE	1--AVP13V304-K	
36.	7.76E-07	SABRE--K503FAE	1--AVP13V303-K	
37.	7.76E-07	1--AVP13V302-K	SAARE--K503FAE	
38.	7.76E-07	SABRE--K503FAE	1--AVB13V301-K	
39.	7.76E-07	1--AVHV3376--K	SAARE--K502FAE	
40.	7.76E-07	SABRE--K502FAE	1--AVHV3377--K	
41.	5.90E-07	SAXOPMANPHA-AE	SAASDA516-3FAE	1--AVP13V304-K
42.	5.90E-07	SAXOPMANPHA-AE	SABSDA516-3FAE	1--AVP13V303-K
43.	5.90E-07	SAXOPMANPHA-AE	1--AVP13V302-K	SAASDA516-3FAE
44.	5.90E-07	SAXOPMANPHA-AE	SABSDA516-3FAE	1--AVB13V301-K
45.	5.90E-07	SAASDA516-2FAE	SAXOPMANPHA-AE	1--AVHV3376--K
46.	5.90E-07	SAXOPMANPHA-AE	SABSDA516-2FAE	1--AVHV3377--K
47.	3.88E-07	SAARE--K522FAE	1--CVB13V038-K	
48.	3.88E-07	1--CVG21V291-K	SAARE--K502FAE	
49.	3.88E-07	1--CVG21V204-K	SAARE--K522FAE	
50.	2.95E-07	SAASDA516-2FAE	SAXOPMANPHA-AE	1--CVB13V038-K
51.	2.95E-07	SAASDA516-2FAE	SAXOPMANPHA-AE	1--CVG21V291-K
52.	2.95E-07	1--CVG21V204-K	SAASDA516-2FAE	SAXOPMANPHA-AE
53.	1.51E-07	SABRE--K503FAE	SAARE--K503FAE	
54.	1.51E-07	SABRE--K502FAE	SAARE--K502FAE	
55.	1.14E-07	SAXOPMANPHA-AE	SABRE--K503FAE	SAASDA516-3FAE
56.	1.14E-07	SAXOPMANPHA-AE	SABSDA516-3FAE	SAARE--K503FAE
57.	1.14E-07	SAASDA516-2FAE	SAXOPMANPHA-AE	SABRE--K502FAE
58.	1.14E-07	SAXOPMANPHA-AE	SABSDA516-2FAE	SAARE--K502FAE
59.	8.70E-08	SAXOPMANPHA-AE	SABSDA516-3FAE	SAASDA516-3FAE
60.	8.70E-08	SAASDA516-2FAE	SAXOPMANPHA-AE	SABSDA516-2FAE

TABLE A-30 (CONT.)

NSCIWS.OUT FILE WITH OPERATOR ERROR PROBABILITY SET TO UNITY

NSCIWSOA.CUT
 QUANTIFICATION RESULTS

Ver. 1.61 2/28/92 16:28:08

Cutsets for GATE G0001 with cutoff probability of 1.00E-09

61.	3.85E-08	SAXOPMANPHA-AE	SABRE--K622FAE	SAADEA516-1FAE
62.	3.85E-08	SAXOPMANPHA-AE	SABDEA516-1FAE	SAARE--K622FAE
63.	1.12E-08	SAXOPMANPHA-AE	SAADEA516-1FAE	1--AVP13V304-K
64.	1.12E-08	SAXOPMANPHA-AE	SABDEA516-1FAE	1--AVP13V303-K
65.	1.12E-08	SAXOPMANPHA-AE	1--AVP13V302-K	SAADEA516-1FAE
66.	1.12E-08	SAXOPMANPHA-AE	SABDEA516-1FAE	1--AVB13V301-K
67.	2.18E-09	SAXOPMANPHA-AE	SABRE--K503FAE	SAADEA516-1FAE
68.	2.18E-09	SAXOPMANPHA-AE	SABDEA516-1FAE	SAARE--K503FAE
69.	1.66E-09	SAXOPMANPHA-AE	SABSDA516-3FAE	SAADEA516-1FAE
70.	1.66E-09	SAXOPMANPHA-AE	SABDEA516-1FAE	SAASDA516-3FAE

Reduced sum of cutset probabilities= 6.642E-04

Moments Results

Mean Probability of Failure= 6.630E-04

Run ended at 16:28:20

TABLE A-30 (CONT.)

NSCIWS.OUT FILE WITH OPERATOR ERROR PROBABILITY SET TO UNITY

CONFIGURATION CONTROL

CODE NAME : WESCUT
VERSION NO. : 1.61
DATE OF CONFIGURATION : September 13, 1990
DATE OF ISSUANCE : September 13, 1990
DATE : FEBRUARY 28, 1992
TIME : 16:28:21:57
CONFIGURATION NO. : 5393361271365

OVERSIZE DOCUMENT PAGE PULLED

SEE APERTURE CARDS

NUMBER OF OVERSIZE PAGES FILMED ON APERTURE CARDS

4

9411280302

303

304

305

APERTURE CARD/HARD COPY AVAILABLE FROM

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**JOSEPH M. FARLEY NUCLEAR PLANT
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
ON
INDIVIDUAL PLANT EXAMINATION SUBMITTAL**

ENCLOSURE 4

Farley Nuclear Plant
Source Term Notebook
Submitted to Southern Nuclear Operating Company



FAI 92-61

Fauske & Associates, Inc.

FARLEY NUCLEAR PLANT
SOURCE TERM NOTEBOOK

VOLUME II

FNP SOURCE TERM NOTEBOOK

APPENDIX A

PHENOMENOLOGICAL EVALUATION SUMMARIES

CALCULATION NOTE COVER SHEET

SECTION TO BE COMPLETED BY AUTHOR(S):

	Page <u>1</u>	
Calc-Note Number <u>FAI/91-44</u>	Revision Number <u>1</u>	
Title <u>PHENOMENOLOGICAL EVALUATION SUMMARY ON STEAM EXPLOSIONS</u>		
Project <u>FARLEY NUCLEAR PLANT IPE</u>	Shop Order <u>IPEC 19</u>	
Purpose: <u>EVALUATE THE POTENTIAL FOR CONTAINMENT FAILURE DUE TO STEAM EXPLOSIONS.</u>		
Results Summary: <u>STEAM EXPLOSIONS ARE NOT A CREDIBLE CONTAINMENT FAILURE MECHANISM. (REF. § 4.2 OF ATTACHED)</u>		
Author(s): Name (Print or Type)	Signature	Completion Date
<u>W. LUANGDILCK</u>	<u>William Luangdilck</u>	<u>6/92</u>

SECTION TO BE COMPLETED BY VERIFIER(S):

Verifier(s): Name (Print or Type)	Signature	Completion Date
<u>C.D. HENRY</u>	<u>C.D. Henry</u>	<u>26 Aug 92</u>

SECTION TO BE COMPLETED BY MANAGER:

Responsible Manager: Name (Print or Type)	Signature	Approval Date
<u>W.E. BERGER</u>	<u>W.E. Berger</u>	<u>9/3/92</u>