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Evaluation of Potential Severe Accidents During Low Power and Shutdown Operations at Grand Gulf, Unit 1

Analysis of Core Damage Frequency from Internal Events for Plant Operational State 5 During a Refueling Outage

Main Report (Sections 11-14)

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Abstract

During 1989 the Nuclear Regulatory Commission (NRC) initiated an extensive program to carefully examine the potential risks during low power and shutdown operations. Two plants, Surry (pressurized water reactor) and Grand Gulf (boiling water reactor), were selected as the plants to be studied. The program consists of two parallel projects being performed by Brookhaven National Laboratory (Surry) and Sandia National Laboratories (Grand Gulf).

The program objectives include assessing the risks of severe accidents initiated during plant operational states other than full power operation and comparing the estimated core damage frequencies, important accident sequences, and other qualitative and quantitative results with those accidents initiated during full power operation as assessed in NUREG-1150. The scope of the program includes that of a Level-3 PRA.

A phased approach was used in the Level-1 program. In Phase 1 the concept of plant operational states (POSSs) was developed to allow the analysts to better represent the plant as it transitions from power operation to non power operation than was possible with the traditional Technical Specification divisions of Modes of Operation. This phase consisted of a coarse screening analysis performed for all POSSs. The objective of the Phase 1 study was to identify potential vulnerable plant configurations, to characterize (on a high, medium, or low basis) the potential core damage accident scenario frequencies, and to provide a foundation for a detailed Phase 2 analysis.

In Phase 2 POS 5 (approximately Cold Shutdown as defined by Grand Gulf Technical Specifications) during a refueling outage was selected as the plant configuration to be analyzed based on the results of the Phase 1 study. The scope of the Level-1 study includes plant damage state analysis and uncertainty analysis and is documented in a multi-volume NUREG/CR report (i.e., NUREG/CR-6143). The internal events analysis is documented in Volume 2. Internal fire and internal flood analyses are documented in Volumes 3 and 4, respectively. A separate study on seismic analysis, documented in Volume 5, was performed for the NRC by Future Resources Associates, Inc. The Level-2/3 study is documented in Volume 6, and a summary of the results for all analyses is documented in Volume 1.

In the Phase 2 study, system models applicable for POS 5 conditions, comprised of POS 5 on the way down to refueling and POS 5 on the way back up from refueling, were developed and supporting thermal hydraulic analyses were performed to determine both the timing of the accidents and success criteria for systems. Initiating events that may occur during POS 5 were identified and accident sequence event trees were developed and quantified. Surviving sequences were examined for recovery potential, appropriate human recovery actions were incorporated into the sequence cut sets, and the sequences were then requantified. Those sequences surviving this preliminary recovery analysis were then reexamined during a "time window" analysis. This time window analysis allows for a more detailed representation (i.e., a more realistic incorporation of the affects of the decrease in decay heat throughout the POS and a more time-specific incorporation of equipment unavailabilities as the plant transitions from the beginning to the end of POS 5) of the potential accident sequences that could occur while the plant is in POS 5.

The mean core damage frequency of the Grand Gulf plant due to internal events for POS 5 during a refueling outage is $2.0\text{E-}06$ per year, and the 5th and 95th percentiles are $4.1\text{E-}07$ and $5.4\text{E-}06$ per year, respectively. This compares to the total core damage frequency of $4.0\text{E-}06$ per year estimated in the NUREG-1150 study of full power operations.

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List of Acronyms

ADHR	Auxiliary Decay Heat Removal
ADS	Automatic Depressurization System
ATWS	Anticipated Transient Without Scram
BNL	Brookhaven National Laboratory
BWR	Boiling Water Reactor
CCW	Component Cooling Water
CDS	Condensate
CI	Containment Isolation
CRD	Control Rod Drive
CRWST	Condensate and Refueling Water Storage Transfer System
CS	Containment Spray
CST	Condensate Storage Tank
CV	Check Valves
CVS	Containment Venting System
DBA	Design Basis Accident
DG	Diesel Generator
ECCS	Emergency Core Cooling Systems
EHC	Electro-Hydraulic Controller
EHV	Emergency Ventilation System
ENSDC	Enhanced Shutdown Cooling
EPS	Emergency Power System
FCV	Flow Control Valve
FDW	Feed Water System
FW	Fire Water
HCU	Hydraulic Control Unit
HPCS	High Pressure Core Spray
IAS	Instrument Air System
IRRAS	Integrated Reliability and Risk Analysis System
LCO	Limiting Condition of Operation
LOCA	Loss of Coolant Accident
LPCI	Low Pressure Coolant Injection
LPCS	Low Pressure Core Spray
MSIV	Main Steam Isolation Valve
MSL	Mean Sea Level
MSR	Moisture Separator Reheater
NPSHA	Net Positive Suction Head Available
NPSHR	Net Positive Suction Head Required
NRC	Nuclear Regulatory Commission
OC	Operating Condition
POS	Plant Operating State
PRA	Probabilistic Risk Assessment
PSW	Plant Service Water
PWR	Pressurized Water Reactor
RCIC	Reactor Core Isolation Cooling
RES	Research (Office of NRC)
RFPT	Reactor Feedwater Pump Turbine
RHR	Residual Heat removal
RPV	Reactor Pressure Vessel
RRS	Reactor Recirculation System
RWCU	Reactor Water Cleanup System
SDC	Shutdown Cooling System(s)
SGTS	Standby Gas Treatment System

List of Acronyms (Continued)

SL	Safety Limit
SLC	Standby Liquid Control
SP	Suppression Pool
SPC	Suppression Pool Cooling
SPMU	Suppression Pool Makeup
SPMU	Suppression Pool Makeup
SR	Surveillance Requirement
SRV	Safety Relief Valve
SSWXT	Standby Service Water Crosstie
TBCW	Turbine Building Cooling Water
TBV	Turbine Bypass Valve(s)
UFSAR	Updated Final Safety Analysis Report

Foreword

(NUREG/CR-6143 and 6144) Low Power and Shutdown Probabilistic Risk Assessment Program

Traditionally, probabilistic risk assessments (PRA) of severe accidents in nuclear power plants have considered initiating events potentially occurring only during full power operation. Some previous screening analyses that were performed for other modes of operation suggested that risks during those modes were small relative to full power operation. However, more recent studies and operational experience have implied that accidents during low power and shutdown could be significant contributors to risk.

During 1989, the Nuclear Regulatory Commission (NRC) initiated an extensive program to carefully examine the potential risks during low power and shutdown operations. The program includes two parallel projects performed by Brookhaven National Laboratory (BNL) and Sandia National Laboratories (SNL), with the seismic analysis performed by Future Resources Associates. Two plants, Surry (pressurized water reactor) and Grand Gulf (boiling water reactor), were selected as the plants to be studied.

The objectives of the program are to assess the risks of severe accidents due to internal events, internal fires, internal floods, and seismic events initiated during plant operational states other than full power operation and to compare the estimated core damage frequencies, important accident sequences and other qualitative and quantitative results with those accidents initiated during full power operation as assessed in NUREG-1150. The scope of the program includes that of a level-3 PRA.

The results of the program are documented in two reports, NUREG/CR-6143 and 6144. The reports are organized as follows:

For Grand Gulf:

NUREG/CR-6143 - Evaluation of Potential Severe Accidents During Low Power and Shutdown Operations at Grand Gulf, Unit 1

- Volume 1: Summary of Results
- Volume 2: Analysis of Core Damage Frequency from Internal Events for Plant Operational State 5 During a Refueling Outage
 - Part 1: Main Report
 - Part 1A: Sections 1 - 9
 - Part 1B: Section 10
 - Part 1C: Sections 11 - 14
 - Part 2: Internal Events Appendices A to H
 - Part 3: Internal Events Appendices I and J
 - Part 4: Internal Events Appendices K to M
- Volume 3: Analysis of Core Damage Frequency from Internal Fire Events for Plant Operational State 5 During a Refueling Outage
- Volume 4: Analysis of Core Damage Frequency from Internal Flooding Events for Plant Operational State 5 During a Refueling Outage
- Volume 5: Analysis of Core Damage Frequency from Seismic Events for Plant Operational State 5 During a Refueling Outage
- Volume 6: Evaluation of Severe Accident Risks for Plant Operational State 5 During a Refueling Outage
 - Part 1: Main Report
 - Part 2: Supporting MELCOR Calculations

Foreword (Continued)

For Surry:

NUREG/CR-6144 - Evaluation of Potential Severe Accidents During Low Power and Shutdown Operations at Surry Unit-1

- Volume 1: Summary of Results
- Volume 2: Analysis of Core Damage Frequency from Internal Events During Mid-loop Operations
 - Part 1: Main Report
 - Part 1A: Chapters 1 - 6
 - Part 1B: Chapters 7 - 12
 - Part 2: Internal Events Appendices A to D
 - Part 3: Internal Events Appendix E
 - Part 3A: Sections E.1 - E.8
 - Part 3B: Sections E.9 - E.16
 - Part 4: Internal Events Appendices F to H
 - Part 5: Internal Events Appendix I
- Volume 3: Analysis of Core Damage Frequency from Internal Fires During Mid-loop Operations
 - Part 1: Main Report
 - Part 2: Appendices
- Volume 4: Analysis of Core Damage Frequency from Internal Floods During Mid-loop Operations
- Volume 5: Analysis of Core Damage Frequency from Seismic Events During Mid-loop Operations
- Volume 6: Evaluation of Severe Accident Risks During Mid-loop Operations
 - Part 1: Main Report
 - Part 2: Appendices

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11 Data Base Development

This section discusses the data that were used during this project. Portions of the data are the same as those used during the NUREG-1150 analysis of Grand Gulf.

11.1 Sources of Information for the Data Base

The major source of information used in this study came from the NUREG/CR-4450 study of Grand Gulf [Drouin, et al., 1989]. Much of the component specific data came directly from this analysis. Plant specific and generic data were used in determining estimates for plant operational state (POS) change initiators, initiating event frequencies, and fractions of time spent in each POS.

11.2 Data from NUREG-1150 Analysis of Grand Gulf

Table 11.2.1 lists all the basic events used in this analysis except for the human error events. All component failure mode probabilities used in this analysis were the same as those used in Reference 1, the analysis of Grand Gulf, except for test and maintenance events. Section 11.3.4 describes how test and maintenance events were estimated for this study.

Section 10 describes how human reliability estimates used during Reference 1 were incorporated into this analysis and also provides a listing of the human errors used in this analysis.

11.3 Plant Specific and Generic Data

This section describes plant specific and generic data used during this study.

11.3.1 Initiating Events

Generic data were used for many of the initiating events identified in this study. One exception was the loss of offsite power as initiating events. Plant specific data were used to determine the frequency of this initiating event. Section 4 describes how the frequencies of each initiating event were estimated.

11.3.2 POS Change Initiating Events

The effects of the POS Change Initiating Event (i.e., Refueling) for this analysis were directly incorporated into the estimate of the fraction of time spent in POS 5

during a refueling outage. How this estimate was produced and the information used to obtain the estimate is described in detail in Section 11.3.3.

11.3.3 Frequency of POSs

11.3.3.1 Introduction

The data analysis described in this section summarizes the experience at Grand Gulf Unit 1 with respect to: a) operating modes and plant configurations; b) transitions between modes; and c) reconfigurations of plant safety systems. Table 11.3.3-1 defines the seven POSs in terms of the transitions among them.

In Table 11.3.3-1, a distinction was made between "coming down" and "going up," resulting in eleven different plant operating states. The reactor is going down when power is being reduced, pressure is being reduced, or plant safety is depending on one or more systems, structures or components that require maintenance action before the plant returns to full power. Maintenance action may be diagnosis, repair, or scheduled maintenance.

Otherwise, the plant is coming up. It was assumed neither power nor pressure is ever increased while maintenance is pending on equipment that is required for adequate plant safety.

Quantification of risk in low-power and shutdown states required estimates of the fractions of plant life that the unit will spend in each plant state. The data analysis derived estimates that were based on plant-specific experience, taking into consideration that that experience extended relatively few years, that the early experience may not have been typical of plant life, and that there were gaps in the available records.

The approach used here was to perform a step-wise decomposition of total plant time, choosing, at each step, whichever methods seemed appropriate for estimating the plant life fractions. As shown in Figure 11.3.3-1, the plant life was first broken down into time spent during refueling outages (RFOs); and the fuel cycle time between RFOs.

The RFO time is subdivided one more time, directly into POSs, but the fuel cycle operating time goes through two more decomposition steps. First, the time between RFOs is allocated among full power (> 15%), controlled

Table 11.2.1 Basic Events Used in LP&S Analysis

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
ACP-BAC-HW-11B12	2	9.60e-05	4.00e-06	0.00	BOP MCC 11B12 HARDWARE FAILURE
ACP-BAC-HW-11B13	2	9.60e-05	4.00e-06	0.00	BOP MCC 11B13 HARDWARE FAILURE
ACP-BAC-HW-11B51	2	9.60e-05	4.00e-06	0.00	BOP MCC 11B51 HARDWARE FAILURE
ACP-BAC-HW-11BD1	2	9.60e-05	4.00e-06	0.00	BOP LCC 11BD1 HARDWARE FAILURE
ACP-BAC-HW-11BD3	2	9.60e-05	4.00e-06	0.00	BOP LCC 11BD3 HARDWARE FAILURE
ACP-BAC-HW-11BD5	2	9.60e-05	4.00e-06	0.00	BOP LCC 11BD5 HARDWARE FAILURE
ACP-BAC-HW-11HD	2	9.60e-05	4.00e-06	0.00	BOP BUS 11HD HARDWARE FAILURE
ACP-BAC-HW-12B22	2	9.60e-05	4.00e-06	0.00	BOP MCC 12B22 HARDWARE FAILURE
ACP-BAC-HW-12B51	2	9.60e-05	4.00e-06	0.00	BOP MCC 12B51 HARDWARE FAILURE
ACP-BAC-HW-12BE2	2	9.60e-05	4.00e-06	0.00	BOP LCC 12BE2 HARDWARE FAILURE
ACP-BAC-HW-12BE5	2	9.60e-05	4.00e-06	0.00	BOP LCC 12BE5 HARDWARE FAILURE
ACP-BAC-HW-12HE	2	9.60e-05	4.00e-06	0.00	BOP BUS 12HE HARDWARE FAILURE
ACP-BAC-HW-13AD	2	9.60e-05	4.00e-06	0.00	BOP BUS 13AD HARDWARE FAILURE
ACP-BAC-HW-13B11	2	9.60e-05	4.00e-06	0.00	BOP MCC 13B11 HARDWARE FAILURE
ACP-BAC-HW-13B22	2	9.60e-05	4.00e-06	0.00	BOP MCC 13B22 HARDWARE FAILURE
ACP-BAC-HW-13DB1	2	9.60e-05	4.00e-06	0.00	BOP LCC 13DB1 HARDWARE FAILURE
ACP-BAC-HW-14AE	2	9.60e-05	4.00e-06	0.00	BOP BUS 14AE HARDWARE FAILURE
ACP-BAC-HW-14B11	2	9.60e-05	4.00e-06	0.00	BOP MCC 14B11 HARDWARE FAILURE
ACP-BAC-HW-14B12	2	9.60e-05	4.00e-06	0.00	BOP MCC 14B12 HARDWARE FAILURE
ACP-BAC-HW-14B22	2	9.60e-05	4.00e-06	0.00	BOP MCC 14B22 HARDWARE FAILURE
ACP-BAC-HW-14BE1	2	9.60e-05	4.00e-06	0.00	BOP LCC 14BE1 HARDWARE FAILURE
ACP-BAC-HW-14BE2	2	9.60e-05	4.00e-06	0.00	BOP LCC 14BE2 HARDWARE FAILURE
ACP-BAC-HW-15AA	2	9.60e-05	4.00e-06	0.00	4160V BUS 15AA HARDWARE FAILURES
ACP-BAC-HW-15B11	2	9.60e-05	4.00e-06	0.00	DIVISION I MCC 15B11 HARDWARE FAILURE
ACP-BAC-HW-15B21	2	9.60e-05	4.00e-06	0.00	DIVISION I MCC 15B21 HARDWARE FAILURE
ACP-BAC-HW-15B31	2	9.60e-05	4.00e-06	0.00	DIVISION I MCC 15B31 HARDWARE FAILURE
ACP-BAC-HW-15B41	2	9.60e-05	4.00e-06	0.00	DIVISION I MCC 15B41 HARDWARE FAILURE
ACP-BAC-HW-15B42	2	9.60e-05	4.00e-06	0.00	DIVISION I MCC 15B42 HARDWARE FAILURE
ACP-BAC-HW-15B51	2	9.60e-05	4.00e-06	0.00	DIVISION I MCC 15B51 HARDWARE FAILURE
ACP-BAC-HW-15BA1	2	9.60e-05	4.00e-06	0.00	DIVISION I LCC 15BA1 HARDWARE FAILURE
ACP-BAC-HW-15BA2	2	9.60e-05	4.00e-06	0.00	DIVISION I LCC 15BA2 HARDWARE FAILURE

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
ACP-BAC-HW-15BA3	2	9.60e-05	4.00e-06	0.00	DIVISION I LCC 15BA3 HARDWARE FAILURE
ACP-BAC-HW-15BA4	2	9.60e-05	4.00e-06	0.00	DIVISION I LCC 15BA4 HARDWARE FAILURE
ACP-BAC-HW-15BA5	2	9.60e-05	4.00e-06	0.00	DIVISION I LCC 15BA5 HARDWARE FAILURE
ACP-BAC-HW-15BA6	2	9.60e-05	4.00e-06	0.00	DIVISION I LCC 15BA6 HAREWARE FAILURE
ACP-BAC-HW-16AB	2	9.60e-05	4.00e-06	0.00	4160V AC BUS 16AB HARDWARE FAILURES
ACP-BAC-HW-16B11	2	9.60e-05	4.00e-06	0.00	DIVISION II MCC 16B11 HARDWARE FAILURE
ACP-BAC-HW-16B31	2	9.60e-05	4.00e-06	0.00	DIVISION II MCC 16B31 HARDWARE FAILURE
ACP-BAC-HW-16B41	2	9.60e-05	4.00e-06	0.00	DIVISION II MCC 16B41 HARDWARE FAILURE
ACP-BAC-HW-16B42	2	9.60e-05	4.00e-06	0.00	DIVISION II MCC 16B42 HARDWARE FAILURE
ACP-BAC-HW-16B51	2	9.60e-05	4.00e-06	0.00	DIVISION II MCC 16B51 HARDWARE FAILURE
ACP-BAC-HW-16BB1	2	9.60e-05	4.00e-06	0.00	DIVISION II LCC 16BB1 HARDWARE FAILURE
ACP-BAC-HW-16BB3	2	9.60e-05	4.00e-06	0.00	DIVISION II LCC 16BB3 HARDWARE FAILURE
ACP-BAC-HW-16BB4	2	9.60e-05	4.00e-06	0.00	DIVISION II LCC 16BB4 HARDWARE FAILURE
ACP-BAC-HW-16BB5	2	9.60e-05	4.00e-06	0.00	DIVISION II LCC 16BB5 HARDWARE FAILURE
ACP-BAC-HW-16BB6	2	9.60e-05	4.00e-06	0.00	DIVISION II LCC 16BB6 HARDWARE FAILURE
ACP-BAC-HW-17AC	2	9.60e-05	4.00e-06	0.00	4160V AC BUS 17AC HARDWARE FAILURES
ACP-BAC-HW-17B01	2	9.60e-05	4.00e-06	0.00	DIVISION III LCC 17B01 HARDWARE FAILURE
ACP-BAC-HW-17B11	2	9.60e-05	4.00e-06	0.00	DIVISION III MCC 17B11 HARDWARE FAILURE
ACP-BAC-HW-18AG	2	9.60e-05	4.00e-06	0.00	4160 V AC BOP BUS 18AG HARDWARE FAILURE
ACP-BAC-HW-28AG	2	9.60e-05	4.00e-06	0.00	4160 V AC BOP BUS 28AG HARDWARE FAILURE
ACP-DGN-FR-DG11	2	4.80e-02	2.00e-03	0.00	DIESEL GENERATOR 11 FAILS TO RUN
ACP-DGN-FR-DG12	2	4.80e-02	2.00e-03	0.00	GENERATOR 12 FAILS TO RUN DIESEL
ACP-DGN-FR-DG13	2	4.80e-02	2.00e-03	0.00	DIESEL GENERATOR 13 FAILS TO RUN
ACP-DGN-FS-DG11	1	3.00e-02	0.00	0.00	DIESEL GENERATOR 11 FAILS TO START
ACP-DGN-FS-DG12	1	3.00e-02	0.00	0.00	DIESEL GENERATOR 12 FAILS TO START
ACP-DGN-FS-DG13	1	3.00e-02	0.00	0.00	DIESEL GENERATOR 13 FAILS TO START
ACP-DGN-MA-DG11	1	6.00e-03	0.00	0.00	DG A (11) MAINTENANCE OUTAGE
ACP-DGN-MA-DG12	1	6.00e-03	0.00	0.00	DG B (12) MAINTENANCE OUTAGE
ACP-DGN-MA-DG13	1	6.00e-03	0.00	0.00	DG C (13) MAINTENANCE OUTAGE
ACP-DGS-FS-CM	1	3.00e-02	0.00	0.00	DGS FAIL TO START DUE TO COMMON MODE FAILURE
ACP-LOG-FA-DG11	1	1.61e-03	0.00	0.00	FAILURE OF DGA(11) AUTOMATIC ACTUATION LOGIC

Data Base

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
ACP-LOG-FA-DG12	1	1.61e-03	0.00	0.00	FAILURE OF DGB (12) AUTOMATIC ACTUATION LOGIC
ACP-LOG-FA-DG13	1	1.61e-03	0.00	0.00	FAILURE OF DG C (13) AUTOMATIC ACTUATION LOGIC
ADR-CKV-HW-C412A	1	1.00e-04	0.00	0.00	CKV CV412A FAILS TO OPEN
ADR-CKV-HW-C412B	1	1.00e-04	0.00	0.00	CKV CV412B FAILS TO OPEN
ADR-CKV-HW-CV416	1	1.00e-04	0.00	0.00	CKV CV416 FAILS TO OPEN
ADR-CKV-OO-CV416	1	1.00e-03	0.00	0.00	FAILURE OF ADHRS CHECK VALVE CV416 TO CLOSE ON DEMAND
ADR-FAN-FR-ADRFN	2	2.40e-04	1.00e-05	0.00	ADHRS PUMP ROOM FAN FAILS TO RUN
ADR-FAN-FS-ADRFN	1	3.00e-04	0.00	0.00	ADHRS PUMP ROOM FAN FAILS TO START
ADR-FAN-MA-ADRFN	1	2.00e-03	0.00	0.00	ADHRS PUMP ROOM FAN UNAVAILABLE ON MAINTENANCE
ADR-HTX-MA-HX3A	2	7.20e-04	3.00e-05	7.00e+00	HTX BOO3A UNAVAILABLE ON MAINTENANCE
ADR-HTX-MA-HX3B	2	7.20e-04	3.00e-05	7.00e+00	HTX BOO3B UNAVAILABLE ON MAINTENANCE
ADR-HTX-PG-HX3A	2	1.37e-04	5.70e-06	0.00	HTX BOO3A PLUGS
ADR-HTX-PG-HX3B	2	1.37e-04	5.70e-06	0.00	HTX BOO3B PLUGS
ADR-HTX-RP-HX3A	2	7.20e-05	3.00e-06	0.00	HEAT EXCHANGER B003A FAILS DUE TO RUPTURE
ADR-HTX-RP-HX3B	2	7.20e-05	3.00e-06	0.00	HEAT EXCHANGER B003B FAILS DUE TO RUPTURE
ADR-MDP-CM-C005	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF ADHRS PUMPS TO START
ADR-MDP-FR-C005A	2	7.20e-04	3.00e-05	0.00	MDP C005A FAILS TO RUN
ADR-MDP-FR-C005B	2	7.20e-04	3.00e-05	0.00	MDP C005B FAILS TO RUN
ADR-MDP-FR-CCF	2	7.20e-04	3.00e-05	0.00	ADHRS MOTOR-DRIVEN PUMPS COMMON MODE FAILURE TO RUN
ADR-MDP-FS-C005A	1	3.00e-03	0.00	0.00	MDP C005A FAILS TO START
ADR-MDP-FS-C005B	1	3.00e-03	0.00	0.00	MDP C005B FAILS TO START
ADR-MDP-MA-C005A	1	2.00e-03	0.00	0.00	MDP C005A UNAVAILABLE ON MAINTENANCE
ADR-MDP-MA-C005B	1	2.00e-03	0.00	0.00	MDP C005B UNAVAILABLE ON MAINTENANCE
ADR-MOV-CC-MV424	1	3.00e-03	0.00	0.00	MOV MV424 FAILS TO OPEN
ADR-MOV-MA-MV424	1	8.00e-04	0.00	0.00	MOV MV 424 UNAVAILABLE ON MAINTENANCE
ADR-MOV-OO-MV424	1	3.00e-03	0.00	0.00	ADHRS MOTOR-OPERATED VALVE MV424 FAILS TO CLOSE ON DEMAND
ADR-MOV-PG-MV424	2	2.40e-06	1.00e-07	0.00	ADHRS MOV MV424 FAILS TO REMAIN OPEN
ADR-XVM-MA-V411A	1	8.00e-04	0.00	0.00	MANUAL VALVE MV411A UNAVAIL- ABLE ON MAINT.
ADR-XVM-MA-V411B	1	8.00e-04	0.00	0.00	MANUAL VALVE MV411B UNAVAIL- ABLE ON MAINT.
ADR-XVM-MA-V415A	1	8.00e-04	0.00	0.00	MANUAL VALVE XV415A UNAVAIL- ABLE ON MAINT.
ADR-XVM-MA-V415B	1	8.00e-04	0.00	0.00	MANUAL VALVE XV415B UNAVAIL- ABLE ON MAINT.

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
ADR-XVM-MA-XV226	1	8.00e-04	0.00	0.00	BUTTERFLY VALVE XV226 UNAVAILABLE ON MAINTENANCE
ADR-XVM-MA-XV348	1	8.00e-04	0.00	0.00	BUTTERFLY VALVE XV348 UNAVAILABLE ON MAINTENANCE
ADR-XVM-MA-XV410	1	8.00e-04	0.00	0.00	MANUAL VALVE XV410 UNAVAILABLE ON MAINTENANCE
ADR-XVM-PG-V411A	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV411A PLUGS
ADR-XVM-PG-V411B	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE MV411B PLUGS
ADR-XVM-PG-V415A	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV415A PLUGS
ADR-XVM-PG-V415B	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV415B PLUGS
ADR-XVM-PG-XV226	2	2.40e-06	1.00e-07	0.00	BUTTERFLY VALVE XV226 PLUGS
ADR-XVM-PG-XV348	2	2.40e-06	1.00e-07	0.00	BUTTERFLY VALVE XV348 PLUGS
ADR-XVM-PG-XV410	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV410 PLUGS
CCW-ACT-FA-C001B	1	1.60e-03	0.00	0.00	CCW PUMP B ACTUATION FAILURE
CCW-ACT-FA-F105	1	1.60e-03	0.00	0.00	LOW CCW FLOW ACTUATION FAILURE
CCW-AOV-CC-AV103	1	2.00e-03	0.00	0.00	CCW AIR-OPERATED VALVE AV103 FAILS TO OPEN ON DEMAND
CCW-AOV-OO-F103	1	2.00e-03	0.00	0.00	CCW AOV F103 AT RWSC HX INLET FAILS TO CLOSE UPON LOSP
CCW-CKV-HW-CV14B	1	1.00e-04	0.00	0.00	CHECK VALVE CV14B FAILS TO OPEN
CCW-CKV-HW-CV52	1	1.00e-04	0.00	0.00	CHECK VALVE CV52 FAILS TO OPEN
CCW-HTX-RP-CCWA	2	7.20e-05	3.00e-06	0.00	CCW HEAT EXCHANGER A RUPTURES
CCW-HTX-RP-CCWC	2	7.20e-05	3.00e-06	0.00	CCW HEAT EXCHANGER C RUPTURES
CCW-MDP-CM-1A/C	2	7.20e-04	3.00e-05	0.00	COMMON CAUSE FAILURE OF NORMALLY OP. CCW PUMPS 1A & 1C
CCW-MDP-FR-C001A	2	7.20e-04	3.00e-05	0.00	CCW PUMP C001A FAILS TO CONTINUE TO RUN
CCW-MDP-FR-C001C	2	7.20e-04	3.00e-05	0.00	CCW PUMP C001C FAILS TO RUN
CCW-MDP-FR-MDPA	2	7.20e-04	3.00e-05	0.00	CCW PUMP MDPA FAILS TO CONTINUE TO RUN
CCW-MDP-FR-MDPB	2	7.20e-04	3.00e-05	0.00	CCW PUMP MDPB FAILS TO CONTINUE TO RUN
CCW-MDP-FR-MDPC	2	7.20e-04	3.00e-05	0.00	CCW PUMP MDPC FAILS TO RUN
CCW-MDP-FS-MDPB	1	3.00e-03	0.00	0.00	CCW PUMP B FAILS TO START
CCW-MDP-MA-C001A	1	2.00e-03	0.00	0.00	CCW PUMP A UNAVAILABLE DUE TO MAINTENANCE
CCW-MDP-MA-C001B	1	2.00e-03	0.00	0.00	CCW PUMP B UNAVAILABLE DUE TO MAINTENANCE
CCW-MOV-CC-MV105	1	3.00e-03	0.00	0.00	CCW MOV MV105 FAILS TO OPEN
CCW-MOV-CC-MV205	1	3.00e-03	0.00	0.00	CCW MOV MV205 FAILS TO OPEN
CCW-MOV-CC-MV42	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV42 FAILS TO OPEN
CCW-MOV-CC-MV54	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV54 FAILS TO OPEN

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
CCW-MOV-CC-MV67	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV67 FAILS TO OPEN
CCW-MOV-OO-F105	1	3.00e-03	0.00	0.00	CCW FUEL POOL HEAT EXCHNGeR ISOLATION VALVE F105 FAILS OPEN
CCW-MOV-PG-MV114	2	2.40e-06	1.00e-07	0.00	MOV MV114 PLUGS
CCW-MOV-PG-MV116	2	2.40e-06	1.00e-07	0.00	MOV MV116 PLUGS
CCW-MOV-PG-MV117	2	2.40e-06	1.00e-07	0.00	MOV MV117 PLUGS
CCW-MOV-PG-MV66	2	2.40e-06	1.00e-07	0.00	MOV MV66 PLUGS
CCW-MOV-PG-MV67	2	2.40e-06	1.00e-07	0.00	MOV MV67 PLUGS
CCW-MOV-PG-MV68	2	2.40e-06	1.00e-07	0.00	MOV MV68 PLUGS
CDS-AOV-CC-AV504	1	2.00e-03	0.00	0.00	FAILURE OF NORMALLY CLOSED AOV AV504 TO OPEN ON DEMAND
CDS-AOV-CC-AV513	1	2.00e-03	0.00	0.00	FAILURE OF NORMALLY CLOSED AOV AV513 TO OPEN ON DEMAND
CDS-MDP-CM-CDMDP	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF THE CONDENSATE PUMPS TO START
CDS-MOV-CC-MV1	1	3.00e-03	0.00	0.00	NORMALLY CLOSE MOV MV1 FAILS TO OPEN
CDS-SYS-MAINT	1	4.00e-01	0.00	0.00	CONDENSATE SYSTEM UNAVAILABLE DUE TO SYSTEM MAINTENANCE.
CIV-AOV-CC-AOV34	1	2.00e-03	0.00	0.00	AIR-OPERATED VALVE AV034 FAILS TO OPEN
CIV-AOV-CC-AOV35	1	2.00e-03	0.00	0.00	AIR-OPERATED VALVE AV035 FAILS TO OPEN
CIV-AOV-CC-AOV36	1	2.00e-03	0.00	0.00	AIR-OPERATED VALVE AV036 FAILS TO OPEN
CIV-AOV-CC-AOV37	1	2.00e-03	0.00	0.00	AIR-OPERATED VALVE AV037 FAILS TO OPEN
CIV-AOV-MA-AOV34	1	8.00e-04	0.00	0.00	AIR-OPERATED VALVE AV034 UNAVAILABLE BECAUSE OF MAINTENANCE
CIV-AOV-MA-AOV35	1	8.00e-04	0.00	0.00	AIR-OPERATED VALVE AV035 UNAVAILABLE BECAUSE OF MAINTENANCE
CIV-AOV-MA-AOV36	1	8.00e-04	0.00	0.00	AIR-OPERATED VALVE AV036 UNAVAILABLE BECAUSE OF MAINTENANCE
CIV-AOV-MA-AOV37	1	8.00e-04	0.00	0.00	AIR-OPERATED VALVE AV038 UNAVAILABLE BECAUSE OF MAINTENANCE
CONT-ISO-SIGNAL	F	1.00e+00	0.00	0.00	CONTAINMENT ISOLATION SIGNAL PRESENT
CONTAIN-PRESS-HI	F	1.00e+00	0.00	0.00	CONTAINMENT PRESSURE HIGH FOR CS ACTUATION
CONTAIN-PRESS-LO	F	1.00e+00	0.00	0.00	CONTAINMENT PRESSURE TO LOW FOR CS ACTUATION
CRD-AOV-CC-AV2A	1	2.00e-03	0.00	0.00	FLOW CONTROL VALVE AV2A FAILS TO FULLY OPEN
CRD-AOV-PG-AV2A	2	2.40e-06	1.00e-07	0.00	FLOW CONTROL VALVE AV2A FAILS TO REMAIN OPEN
CRD-ASP-LO-NOO1A	6	9.58e-04	2.66e-06	7.20e+02	CRD PUMP MDPA SUCTION PRESSURE SENSOR PS-NOO1A FAILS LOW
CRD-ASP-LO-NOO1B	6	9.58e-04	2.66e-06	7.20e+02	CRD PUMP MDPB SUCTION PRESSURE SENSOR PS-N001B FAILS LOW
CRD-CKV-HW-CV14A	1	1.00e-04	0.00	0.00	CHECK VALVE CV14A FAILS TO OPEN
CRD-CKV-HW-CV14B	1	1.00e-04	0.00	0.00	CHECK VALVE CV14B FAILS TO OPEN
CRD-FLT-PG-BW	2	7.20e-04	3.00e-05	0.00	CRD PUMP BACKWASH SUCTION FILTER PLUGS

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
CRD-FLT-PG-DWFA	2	7.20e-04	3.00e-05	0.00	CRD DRIVE WATER FILTER A PLUGS
CRD-FLT-PG-PSA	2	7.20e-04	3.00e-05	0.00	CRD PUMPS SUCTION FILTER A PLUGS
CRD-MDP-FR-MDPA	2	7.20e-04	3.00e-05	0.00	CRD PUMP MDPA FAILS TO CONTINUE TO RUN
CRD-MDP-FR-MDPB	2	7.20e-04	3.00e-05	0.00	CRD PUMP B FAILS TO RUN
CRD-MDP-FS-MDPA	1	3.00e-03	0.00	0.00	CRD PUMP MDPA FAILS TO START
CRD-MDP-FS-MDPB	1	3.00e-03	0.00	0.00	CRD WATER PUMP FAILS TO START
CRD-MDP-MA-MDPB	1	2.00e-03	0.00	0.00	CRD PUMP MDPB UNAVAILABLE DUE TO MAINTENANCE
CRD-MOV-CC-MV3	1	3.00e-03	0.00	0.00	CRD VALVE MV3 FAILS TO FULLY OPEN (NORMALLY THROTTLED)
CRD-MOV-PG-MV3	2	2.40e-06	1.00e-07	0.00	CRD PRESSURE CONTROL VALVE MV3 FAILS TO REMAIN OPEN
CRD-MOV-PG-MV322	2	2.40e-06	1.00e-07	0.00	CRD/CONDENSATE SUCTION VALVE MV322 FAILS TO REMAIN OPEN
CRD-MOV-PG-MV83A	2	2.40e-06	1.00e-07	0.00	CRD/CONTAINMENT ISOLATION VALVE MV83A FAILS TO REMAIN OPEN
CSS-HOUSE	F	0.00	0.00	0.00	LPCI TRAINS A&B FAIL BECAUSE OF AUTO-REALIGNMENT FROM CSS
CSS-LOD-OO-10TDA	1	3.00e-04	0.00	0.00	10 MINUTE TIME DELAY RELAY FAILURE TRAIN A
CSS-LOD-OO-10TCB	1	3.00e-04	0.00	0.00	10 MINUTE TIME DELAY RELAY FAILURE TRAIN B
CSS-LOD-OO-90TDB	1	3.00e-04	0.00	0.00	90 SEC TIME DELAY RELAY FAILURE (TRAIN B ONLY)
CSS-MOV-CC-MV28A	1	3.00e-03	0.00	0.00	CSS MOTOR-OPERATED VALVE MV28A FAILS TO OPEN
CSS-MOV-CC-MV28B	1	3.00e-03	0.00	0.00	CSS MOTOR-OPERATED VALVE MV28B FAILS TO OPEN
CSS-MOV-CM-MV28	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF CSS INJECTION VALVES MV28 TO OPEN
CSS-MOV-CO-MV28A	2	1.20e-05	5.00e-07	0.00	CSS TRAIN A INJECTION VALVE FAILS OPEN
CSS-MOV-CO-MV28B	2	1.20e-05	5.00e-07	0.00	CSS TRAIN B INJECTION VALVE FAILS OPEN
CSS-MOV-MA-MV28A	1	8.00e-04	0.00	0.00	CSS TRAIN INJECTION VALVE UNAVAILABLE DUE TO MAINTENANCE
CSS-MOV-MA-MV28B	1	8.00e-04	0.00	0.00	CSS TRAIN B INJECTION VALVE UNAVAILABLE DUE TO MAINTENANCE
CSS-MOV-OO-MV28A	1	3.00e-03	0.00	0.00	CSS TRAIN A INJECTION VALVE FAILS TO CLOSE ON DEMAND
CSS-MOV-OO-MV28B	1	3.00e-03	0.00	0.00	CSS TRAIN B INJECTION VALVE FAILS TO CLOSE ON DEMAND
DCP-BAT-LP-1A3	2	2.40e-05	1.00e-06	0.00	LOSS OF POWER FROM BATTERY 1A3
DCP-BAT-LP-1B3	2	2.40e-05	1.00e-06	0.00	LOSS OF POWER FROM BATTERY 1B3
DCP-BAT-LP-1C3	2	2.40e-05	1.00e-06	0.00	LOSS OF POWER FROM BATTERY 1C3
DCP-BAT-LP-CM	2	2.40e-05	1.00e-06	0.00	FAILURE OF A BATTERY TO PROVIDE POWER DUE TO CCF
DCP-BDC-HW-11DA	2	2.40e-06	1.00e-07	0.00	125V DC BUS 11DA HARDWARE FAILURE
DCP-BDC-HW-11DB	2	2.40e-06	1.00e-07	0.00	125V DC BUS 11DB HARDWARE FAILURE
DCP-BDC-HW-11DC	2	2.40e-06	1.00e-07	0.00	125V DC BUS 11DC HARDWARE FAILURE

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
DCP-BDC-MA-11DC	1	6.00e-05	0.00	0.00	125V DC BUS 11DC UNAVAILABLE DUE TO MAINTENANCE
DCP-REC-HW-1A4	2	2.40e-05	1.00e-06	0.00	CHARGER 1A4 HARDWARE FAILURE
DCP-REC-HW-1A5	2	2.40e-05	1.00e-06	0.00	CHARGER 1A HARDWARE FAILURE
DCP-REC-HW-1B4	2	2.40e-05	1.00e-06	0.00	CHARGER 1B4 HARDWARE FAILURE
DCP-REC-HW-1B5	2	2.40e-05	1.00e-06	0.00	CHARGER 1B5 HARDWARE FAILURE
DCP-REC-HW-1C4	2	2.40e-05	1.00e-06	0.00	CHARGER 1C4 HARDWARE FAILURES
DCP-REC-HW-1C5	2	2.40e-05	1.00e-06	0.00	CHARGER 1C5 HARDWARE FAILURE
DCP-REC-MA-1A4	1	3.00e-04	0.00	0.00	CHARGER 1A4 UNAVAILABLE DUE TO MAINTENANCE
DCP-REC-MA-1A5	1	3.00e-04	0.00	0.00	CHARGER 1A5 UNAVAILABLE DUE TO MAINTENANCE
DCP-REC-MA-1B4	1	3.00e-04	0.00	0.00	CHARGER 1B4 UNAVAILABLE DUE TO MAINTENANCE
DCP-REC-MA-1B5	1	3.00e-04	0.00	0.00	CHARGER 1B5 UNAVAILABLE DUE TO MAINTENANCE
DCP-REC-MA-1C4	1	3.00e-04	0.00	0.00	CHARGER 1C4 UNAVAILABLE DUE TO MAINTENANCE
DCP-REC-MA-1C5	1	3.00e-04	0.00	0.00	CHARGER 1C5 UNAVAILABLE DUE TO MAINTENANCE
DGX-LOD-CC-D3885	1	3.00e-04	0.00	0.00	LOAD/RELAY UNIT D3885 FAILS TO OPEN
DGX-LOD-OO-1514	1	3.00e-04	0.00	0.00	LOAD/RELAY UNIT 1514 FAILS TO CLOSE
DGX-LOD-OO-1611	1	3.00e-04	0.00	0.00	LOAD/RELAY UNIT 1611 FAILS TO CLOSE
DGX-LOD-OO-1701	1	3.00e-04	0.00	0.00	LOAD/RELAY UNIT 1701 FAILS TO CLOSE
DGX-LOD-OO-1704	1	3.00e-04	0.00	0.00	LOAD/RELAY UNIT 1704 FAILS TO CLOSE
DGX-LOD-OO-1706	1	3.00e-04	0.00	0.00	LOAD/RELAY UNIT 1706 FAILS TO CLOSE
DGX-LOD-OO-1901	1	3.00e-04	0.00	0.00	LOAD/RELAY UNIT 1901 FAILS TO CLOSE
DGX-LOD-OO-1902	1	3.00e-04	0.00	0.00	LOAD/RELAY UNIT 1902 FAILS TO CLOSE
DGX-LOD-OO-1903	1	3.00e-04	0.00	0.00	LOAD/RELAY UNIT 1903 FAILS TO OPEN
DGX-LOD-OO-1904	1	3.00e-04	0.00	0.00	LOAD/RELAY UNIT 1904 FAILS TO OPEN
DGX-LOD-VF-1702	1	3.00e-04	0.00	0.00	FAILURE TO RACK OUT RELAY UNIT 1702
DGX-LOD-VF-1703	1	3.00e-04	0.00	0.00	FAILURE TO RACK OUT RELAY UNIT 1703
DGX-LOD-VF-LSS	1	3.00e-04	0.00	0.00	LSS FAILS TO SHUT DOWN
DRYWELL-PRESS-HI	F	1.00e+00	0.00	0.00	DRYWELL PRESSURE HI PERMISSIVE FOR CS ACTUATION
DRYWELL-PRESS-LO	F	1.00e+00	0.00	0.00	DRYWELL PRESSURE TOO LOW TO CAUSE ACTUATION
EHV-FAN-FR-51B1C	2	2.40e-04	1.00e-05	0.00	HPCS PUMP ROOM COOLER FAN 51B1C FAILS TO RUN
EHV-FAN-FR-51B2A	2	2.40e-04	1.00e-05	0.00	LPCS PUMP ROOM COOLER FAN FAILS TO RUN
EHV-FAN-FR-51B3A	2	2.40e-04	1.00e-05	0.00	FAN UNIT COOLER QIT51B003A FAILS TO RUN

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
EHV-FAN-FR-51B4B	2	2.40e-04	1.00e-05	0.00	FAN UNIT COOLER QIT51B004B FAILS TO REMAIN RUNNING
EHV-FAN-FR-51B5B	2	2.40e-04	1.00e-05	0.00	FAN COOLER UNIT QIT51B005B FAILS TO REMAIN RUNNING
EHV-FAN-FR-51B6A	2	2.40e-04	1.00e-05	0.00	RCIC PUMP ROOM COOLER FAN 51B6A FAILS TO RUN
EHV-FAN-FR-77C02	2	2.40e-04	1.00e-05	0.00	DG 13 ROOM COOLER FAN 77C02 FAILS TO RUN
EHV-FAN-FR-77C1A	2	2.40e-04	1.00e-05	0.00	DG 11 ROOM COOLER FAN 77C1A FAILS TO RUN
EHV-FAN-FR-77C1B	2	2.40e-04	1.00e-05	0.00	DG 12 ROOM COOLER FAN 77C1B FAILS TO RUN
EHV-FAN-FS-51B1C	1	3.00e-04	0.00	0.00	HPCS PUMP ROOM COOLER FAN 51B1C FAILS TO START
EHV-FAN-FS-51B2A	1	3.00e-04	0.00	0.00	LPCS PUMP ROOM COOLER FAN 51B2A FAILS TO START
EHV-FAN-FS-51B3A	1	3.00e-04	0.00	0.00	FAN UNIT COOLER QIT51B003A FAILS TO START
EHV-FAN-FS-51B4B	1	3.00e-04	0.00	0.00	FAN UNIT COOLER QIT51B004B FAILS TO START
EHV-FAN-FS-51B5B	1	3.00e-04	0.00	0.00	FAN UNIT COOLER QIT51B005B FAILS TO START
EHV-FAN-FS-51B6A	1	3.00e-04	0.00	0.00	RCIC PUMP ROOM COOLER FAN 51B6A FAILS TO START
EHV-FAN-FS-77C02	1	3.00e-04	0.00	0.00	DG ROOM COOLER FAN 77C02 FAILS TO START
EHV-FAN-FS-77C1A	1	3.00e-04	0.00	0.00	DG ROOM COOLER FAN 77C1A FAILS TO START
EHV-FAN-FS-77C1B	1	3.00e-04	0.00	0.00	FAILURE OF DG ROOM FAN 77C1B DUE TO FIRE/ RANDOM EVENTS
EHV-FAN-MA-51B1C	1	2.00e-03	0.00	0.00	FAN COOLER UNAVAILABLE DUE TO MAINTENANCE
EHV-FAN-MA-51B2A	1	2.00e-03	0.00	0.00	FAN COOLER UNAVAILABLE DUE TO MAINTENANCE
EHV-FAN-MA-51B3A	1	2.00e-03	0.00	0.00	FAN COOLER UNAVAILABLE DUE TO MAINTENANCE
EHV-FAN-MA-51B4B	1	2.00e-03	0.00	0.00	FAN COOLER UNAVAILABLE DUE TO MAINTENANCE
EHV-FAN-MA-51B5B	1	2.00e-03	0.00	0.00	FAN COOLER UNAVAILABLE DUE TO MAINTENANCE
EHV-FAN-MA-51B6A	1	2.00e-03	0.00	0.00	FAN COOLER UNAVAILABLE DUE TO MAINTENANCE
EHV-FAN-MA-77C02	1	2.00e-03	0.00	0.00	FAN 77C02 OUT FOR MAINTENANCE
EHV-FAN-MA-77C1A	1	2.00e-03	0.00	0.00	FAN 77C1A OUT FOR MAINTENANCE
EHV-FAN-MA-77C1B	1	2.00e-03	0.00	0.00	FAN 77C1B OUT FOR MAINTENANCE
EHV-MOV-CC-MVC02	1	3.00e-03	0.00	0.00	MOTOR-OPERATED DAMPER MVC02 FAILS TO OPEN
EHV-MOV-CC-MVC1A	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MVC1A FAILS TO OPEN
EHV-MOV-CC-MVC1B	1	3.00e-03	0.00	0.00	MOTOR-OPERATED DAMPER MVC1B FAILS TO OPEN
EHV-MOV-MA-MVC02	1	8.00e-04	0.00	0.00	DAMPER MVC02 OUT FOR MAINTENANCE
EHV-MOV-MA-MVC1A	1	8.00e-04	0.00	0.00	DAMPER MVC1A OUT FOR MAINTENANCE
EHV-MOV-MA-MVC1B	1	8.00e-04	0.00	0.00	DAMPER MVC1B OUT FOR MAINTENANCE
ENSDC-UNAVAIL	1	1.00e+00	0.00	0.00	ENSDC IS UNAVAILABLE IN POS 5

Data Base

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Data Base

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
ESF-ASL-HI-N035A	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF LEVEL SENSOR/ TRANSMITTER LT-N035A
ESF-ASL-HI-N035B	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF LEVEL SENSOR/TRANSMITTER LT-N035B
ESF-ASL-HI-N054C	6	9.58e-04	2.66e-06	7.20e+02	CST LEVEL SENSOR/ TRANSMITTER LT-N054C FAILURE
ESF-ASL-HI-N054G	6	9.58e-04	2.66e-06	7.20e+02	CST LEVEL SENSOR/ TRANSMITTER LT-N054G FAILURE
ESF-ASL-HI-N063C	6	9.58e-04	2.66e-06	7.20e+02	REACTOR LEVEL SENSOR/TRANSMITTER LT-N063C FAILURE
ESF-ASL-HI-N063G	6	9.58e-04	2.66e-06	7.20e+02	REACTOR LEVEL SENSOR/TRANSMITTER LT-N063G FAILURE
ESF-ASL-HI-N063L	6	9.58e-04	2.66e-06	7.20e+02	REACTOR LEVEL SENSOR/TRANSMITTER LT-N063L FAILURE
ESF-ASL-HI-N063R	6	9.58e-04	2.66e-06	7.20e+02	REACTOR LEVEL SENSOR/TRANSMITTER LT-N063R FAILURE
ESF-ASL-HI-N091A	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR LEVEL SENSOR/TRANSMITTER LT-091A
ESF-ASL-HI-N091B	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR LEVEL SENSOR/TRANSMITTER LT-091B
ESF-ASL-HI-N091E	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR LEVEL SENSOR/TRANSMITTER LT-091E
ESF-ASL-HI-N091F	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR LEVEL SENSOR/TRANSMITTER LT-091F
ESF-ASL-HI-N095A	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR LEVEL SENSOR/TRANSMITTER LT-095A
ESF-ASL-HI-N095B	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR LEVEL SENSOR/TRANSMITTER LT-095B
ESF-ASL-HI-N680A	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR LEVEL SENSOR/TRANSMITTER N680A
ESF-ASL-HI-N680B	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR LEVEL SENSOR/TRANSMITTER N680B
ESF-ASL-HI-N680C	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR LEVEL SENSOR/TRANSMITTER N680C
ESF-ASL-HI-N680D	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR LEVEL SENSOR/TRANSMITTER N680D
ESF-ASL-HI-N681A	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR LEVEL SENSOR/TRANSMITTER N681A
ESF-ASL-HI-N681B	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR LEVEL SENSOR/TRANSMITTER N681B
ESF-ASL-HI-N681C	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR LEVEL SENSOR/TRANSMITTER N681C
ESF-ASL-HI-N681D	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR LEVEL SENSOR/TRANSMITTER N681D
ESF-ASL-HI-N697A	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR PRESS. SENSOR/XMITTER PS-N697A
ESF-ASL-HI-N697E	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR PRESS. SENSOR/XMITTER PS-N697E
ESF-ASL-HI-N698A	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR PRESS. SENSOR/XMITTER PS-N698A
ESF-ASL-HI-N698E	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR PRESS. SENSOR/XMITTER PS-N698E
ESF-ASL-LO-N674C	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR LEVEL SENSOR/TRANSMITTER N674C
ESF-ASL-LO-N674L	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF REACTOR LEVEL SENSOR/TRANSMITTER N674L
ESF-ASP-HI-N694B	6	9.58e-04	2.66e-06	7.20e+02	HIGH DRYWELL PRESSURE PS-N694B
ESF-ASP-HI-N694F	6	9.58e-04	2.66e-06	7.20e+02	HIGH DRYWELL PRESSURE FOR PS-N694F DUE TO FIRE/RANDOM EVENT
ESF-ASP-LO-N662A	6	9.58e-04	2.66e-06	7.20e+02	HIGH CONTAINMENT PRESSURE SENSOR PIS-N662A FAILURE

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Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
ESF-ASP-LO-N662B	6	9.58e-04	2.66e-06	7.20e+02	HIGH CONTAINMENT PRESSURE SENSOR PIS-N662B FAILURE
ESF-ASP-LO-N662C	6	9.58e-04	2.66e-06	7.20e+02	HIGH CONTAINMENT PRESSURE SENSOR PIS-N662C FAILURE
ESF-ASP-LO-N662D	6	9.58e-04	2.66e-06	7.20e+02	HIGH CONTAINMENT PRESSURE SENSOR PIS-N662D FAILURE
ESF-ASP-LO-N677C	6	9.58e-04	2.66e-06	7.20e+02	DRYWELL PRESSURE SENSOR/TRANSMITTER PT-N677C FAILURE
ESF-ASP-LO-N677G	6	9.58e-04	2.66e-06	7.20e+02	DRYWELL PRESSURE SENSOR/TRANSMITTER PT-N677G FAILURE
ESF-ASP-LO-N677L	6	9.58e-04	2.66e-06	7.20e+02	DRYWELL PRESSURE SENSOR/TRANSMITTER PT-N677L FAILURE
ESF-ASP-LO-N677R	6	9.58e-04	2.66e-06	7.20e+02	DRYWELL PRESSURE SENSOR/TRANSMITTER PT-N677R FAILURE
ESF-ASP-LO-N679A	6	9.58e-04	2.66e-06	7.20e+02	REACTOR PRESSURE SWITCH N679A FAILURE
ESF-ASP-LO-N679B	6	9.58e-04	2.66e-06	7.20e+02	REACTOR PRESSURE SWITCH N679B FAILURE
ESF-ASP-LO-N679C	6	9.58e-04	2.66e-06	7.20e+02	REACTOR PRESSURE SWITCH N679C FAILURE
ESF-ASP-LO-N679D	6	9.58e-04	2.66e-06	7.20e+02	REACTOR PRESSURE SWITCH N679D FAILURE
ESF-ASP-LO-N694A	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF DRYWELL PRESSURE SENSOR/TRANS. PT-694A
ESF-ASP-LO-N694B	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF DRYWELL PRESSURE SENSOR/TRANS. PT-694B
ESF-ASP-LO-N694E	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF DRYWELL PRESSURE SENSOR/TRANS. PT-694E
ESF-ASP-LO-N694F	6	9.58e-04	2.66e-06	7.20e+02	HARDWARE FAILURE OF DRYWELL PRESSURE SENSOR/TRANS. PT-694F
FW-AOV-CM-V282/3	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF THE FW DISTRIBUTION HEADER AOVs (CC)
FWS-AOV-CC-V282A	1	2.00e-03	0.00	0.00	AIR-OPERATED VALVE AV282A FAILS TO OPEN
FWS-AOV-CC-V282B	1	2.00e-03	0.00	0.00	AIR-OPERATED VALVE AV282B FAILS TO OPEN
FWS-AOV-CC-V283A	1	2.00e-03	0.00	0.00	AIR-OPERATED VALVE AV283A FAILS TO OPEN
FWS-AOV-CC-V283B	1	2.00e-03	0.00	0.00	AIR-OPERATED VALVE AV283B FAILS TO OPEN
FWS-AOV-MA-V282A	1	8.00e-04	0.00	0.00	AIR-OPERATED VALVE AV282A UNAVAILABLE DUE TO MAINTENANCE
FWS-AOV-MA-V282B	1	8.00e-04	0.00	0.00	AIR-OPERATED VALVE AV282B UNAVAILABLE DUE TO MAINTENANCE
FWS-AOV-MA-V283A	1	8.00e-04	0.00	0.00	AIR-OPERATED VALVE AV283A UNAVAILABLE DUE TO MAINTENANCE
FWS-AOV-MA-V283B	1	8.00e-04	0.00	0.00	AIR-OPERATED VALVE AV283B UNAVAILABLE DUE TO MAINTENANCE
FWS-CKV-HW-CV17	1	1.00e-04	0.00	0.00	CHECK VALVE CV17 FAILS TO OPEN
FWS-CKV-HW-CV2A	1	1.00e-04	0.00	0.00	CHECK VALVE CV2B FAILS TO OPEN
FWS-CKV-HW-CV2B	1	1.00e-04	0.00	0.00	CHECK VALVE CV2B FAILS TO OPEN
FWS-DDP-FR-DDPA	2	1.92e-02	8.00e-04	0.00	FWS DIESEL-DRIVEN PUMP A FAILS TO RUN
FWS-DDP-FR-DDPB	2	1.92e-02	8.00e-04	0.00	FWS DIESEL-DRIVEN PUMP B FAILS TO RUN
FWS-DDP-FS-CM	1	3.00e-02	0.00	0.00	FAILURE OF DIESEL DRIVEN PUMP TO START
FWS-DDP-FS-DDPA	1	3.00e-02	0.00	0.00	FWS DIESEL DRIVEN PUMP A FAILS TO START

Data Base

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
FWS-DDP-FS-DDPB	1	3.00e-02	0.00	0.00	FWS DIESEL DRIVEN PUMP B FAILS TO START
FWS-DDP-MA-DDPA	1	1.00e-02	0.00	0.00	FIREWATER PUMP A OUT FOR MAINTENANCE
FWS-DDP-MA-DDPB	1	1.00e-02	0.00	0.00	FIREWATER PUMP B OUT FOR MAINTENANCE
FWS-MDP-FR-MDP2	2	7.20e-04	3.00e-05	0.00	MOTOR-DRIVEN FIREWATER PUMPS FAILS TO RUN
FWS-MDP-FS-MDP2	1	3.00e-03	0.00	0.00	MOTOR-DRIVEN FIREWATER PUMP FAILS TO START
FWS-MDP-MA-MDP2	1	2.00e-03	0.00	0.00	MOTOR-DRIVEN FIRE WATER PUMP UNAVAILABLE DUE TO MAINTENANCE
FWS-XVM-PG-XV155	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV155 PLUGS
FWS-XVM-PG-XV16	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV16 FAILS CLOSED DUE TO PLUGGING
FWS-XVM-PG-XV18	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV18 FAILS CLOSED DUE TO PLUGGING
FWS-XVM-PG-XV1A	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV1A PLUGS
FWS-XVM-PG-XV1B	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV1B PLUGS
FWS-XVM-PG-XV23	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV23 PLUGS
FWS-XVM-PG-XV25	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV25 PLUGS
FWS-XVM-PG-XV296	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV296 PLUGS
FWS-XVM-PG-XV3A	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV3A PLUGS
FWS-XVM-PG-XV3B	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV3B PLUGS
FWS-XVM-PG-XV54	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV54 PLUGS
HCS-CKV-HW-CV16	1	1.00e-04	0.00	0.00	CHECK VALVE CV16 FAILS TO OPEN
HCS-CKV-HW-CV2	1	1.00e-04	0.00	0.00	CST SUCTION LINE CHECK VALVE FAILS TO OPEN
HCS-CKV-HW-CV24	1	1.00e-04	0.00	0.00	NO FLOW THRU HPCS PUMP DISCHARGE CHECK VALVE FAILS TO OPEN
HCS-ICC-FT-MV12	1	1.25e-04	0.00	0.00	ACTUATION LOGIC FAILURE ON MINIMUM FLOW MOV CIRCUIT
HCS-LOG-NO-HPCS	1	1.60e-03	0.00	0.00	HPCS ACTUATION CIRCUIT FAILURE
HCS-MDP-FR-MDP1	2	7.20e-04	3.00e-05	0.00	HPCS MOTOR-DRIVEN PUMP MDP1 FAILS TO RUN
HCS-MDP-FS-MDP1	1	3.00e-03	0.00	0.00	HPCS MOTOR-DRIVEN PUMP MDP1 FAILS TO START
HCS-MDP-MA-MDP1	1	2.00e-03	0.00	0.00	MOTOR-DRIVEN PUMP MDP1 OUT FOR MAINTENANCE
HCS-MOV-CC-MV12	1	3.00e-03	0.00	0.00	HPCS MOV MV12 FAILS TO OPEN
HCS-MOV-CC-MV15	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV15 FAILS TO OPEN
HCS-MOV-CC-MV4	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV4 FAILS TO OPEN
HCS-MOV-CO-MV10	2	1.20e-05	5.00e-07	0.00	MOTOR-OPERATED VALVE MV10 FAILS OPEN
HCS-MOV-CO-MV11	2	1.20e-05	5.00e-07	0.00	MOTOR-OPERATED VALVE MV11 FAILS OPEN
HCS-MOV-CO-MV23	2	1.20e-05	5.00e-07	0.00	MOTOR-OPERATED VALVE MV23 FAILS OPEN

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
HCS-MOV-MA-MV12	1	8.00e-04	0.00	0.00	MINIMUM FLOW MOV MV12 UNAVAILABLE BECAUSE OF MAINTENANCE
HCS-MOV-MA-MV15	1	8.00e-04	0.00	0.00	SUPPRESSION POOL SUCTION VALVE MV15 UNAVAILABLE
HCS-MOV-MA-MV4	1	8.00e-04	0.00	0.00	MOTOR-OPERATED VALVE MV4 (PS-8) OUT FOR MAINTENANCE
HCS-MOV-OO-MV1	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV1 FAILS TO CLOSE
HCS-MOV-OO-MV4	1	3.00e-03	0.00	0.00	MOV MV4 FAILS TO CLOSE ON DEMAND
HCS-SYS-MAINT	1	2.00e-01	0.00	0.00	HPCS UNAVAILABLE DUE TO SYSTEM MAINTENANCE
HCS-TCV-HW-TCV5	1	1.00e-04	0.00	0.00	TESTABLE CHECK VALVE TCV5 FAILS TO OPEN
HCS-XVM-PG-XV205	2	2.40e-06	1.00e-07	0.00	HPCS MANUAL INJECTION VALVE XV205 PLUGS
HCS-XVM-PG-XV70	2	2.40e-06	1.00e-07	0.00	NO FLOW THRU CST SUCTION LINE MANUAL VALVE PLUGS
IAS-AOV-CC-PR500	1	2.00e-03	0.00	0.00	PRESSURE REGULATOR PR500 (PS-304) FAILS TO OPEN
IAS-AOV-CC-PR504	1	2.00e-03	0.00	0.00	PRESSURE REGULATOR PR504 (PS-305) FAILS TO OPEN
IAS-AOV-OC-AV13	2	2.40e-06	1.00e-07	0.00	AIR-OPERATED VALVE AV13 FAILS TO REMAIN OPEN
IAS-AOV-OC-AV26A	2	2.40e-06	1.00e-07	0.00	AIR-OPERATED VALVE AV26A FAILS TO REMAIN OPEN
IAS-AOV-OC-AV26B	2	2.40e-06	1.00e-07	0.00	AIR-OPERATED VALVE AV26B FAILS TO REMAIN OPEN
IAS-AOV-OC-AV503	2	2.40e-06	1.00e-07	0.00	AIR-OPERATED VALVE AV503 FAILS TO REMAIN OPEN
IAS-CKV-HW-CV11	1	1.00e-04	0.00	0.00	CHECK VALVE (PS-304) CV11 FAILS TO OPEN
IAS-CKV-HW-CV298	1	1.00e-04	0.00	0.00	CHECK VALVE CV298 FAILS (PS-305) TO OPEN
IAS-MDC-CM-IAC	1	3.80e-03	0.00	0.00	COMMON MODE FAILURE OF THE IA COMPRESSORS TO RUN
IAS-MDC-FA-C001B	1	1.60e-03	0.00	0.00	STANDBY INSTRUMENT AIR COMPRESSOR ACTUATION LOGIC FAILURE
IAS-MDC-FR-C001B	2	4.80e-03	2.00e-04	0.00	STANDBY INSTRUMENT AIR COMPRESSOR FAILS TO RUN
IAS-MDC-FR-C001N	2	4.80e-03	2.00e-04	0.00	NORMALLY RUNNING INSTRUMENT AIR COMPRESSOR FAILS TO RUN
IAS-MDC-FS-C001B	1	8.00e-02	0.00	0.00	STANDBY INSTRUMENT AIR COMPRESSOR FAILS TO START ON DEMAND
IAS-MDC-MA-C001B	1	2.00e-03	0.00	0.00	STANDBY INSTRUMENT AIR COMPRESSOR UNAVAILABLE DUE TO MAINT.
LCI-CKV-HW-CV31A	1	1.00e-04	0.00	0.00	PS101 CHECK VALVE CV31A FAILS TO OPEN
LCI-CKV-HW-CV31B	1	1.00e-04	0.00	0.00	PS127 CHECK VALVE CV31B FAILS TO OPEN
LCI-CKV-HW-CV31C	1	1.00e-04	0.00	0.00	CHECK VALVE CV31C FAILS TO OPEN
LCI-CKV-HW-CV46A	1	1.00e-04	0.00	0.00	PS103 CHECK VALVE CV46A FAILS TO OPEN
LCI-CKV-HW-CV46B	1	1.00e-04	0.00	0.00	CHECK VALVE CV46B FAILS DUE TO HARDWARE
LCI-CKV-HW-CV46C	1	1.00e-04	0.00	0.00	CHECK VALVE CV46C FAILS TO OPEN
LCI-HTX-MA-HX1B	2	7.20e-04	3.00e-05	0.00	HEAT EXCHANGER HX1B OUT FOR MAINTENANCE
LCI-HTX-MA-HX2B	2	7.20e-04	3.00e-05	0.00	HEAT EXCHANGER HX2B OUT FOR MAINTENANCE

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
LCI-HTX-MA-HXR1A	2	7.20e-04	3.00e-05	7.00e+00	PS-104 HEAT EXCHANGER HX1A UNAVAILABLE BECAUSE OF MAINT.
LCI-HTX-MA-HXR1B	2	7.20e-04	3.00e-05	7.00e+00	HEAT EXCHANGER HX1B OUT FOR MAINTENANCE
LCI-HTX-MA-HXR2A	2	7.20e-04	3.00e-05	7.00e+00	PS-104 HEAT EXCHANGER HX2A UNAVAILABLE BECAUSE OF MAINT.
LCI-HTX-MA-HXR2B	2	7.20e-04	3.00e-05	7.00e+00	HEAT EXCHANGER HX2B OUT FOR MAINTENANCE
LCI-HTX-PG-HX1B	2	1.37e-04	5.70e-06	0.00	PS122 HEAT EXCHANGER HX1B PLUGS
LCI-HTX-PG-HX2B	2	1.37e-04	5.70e-06	0.00	PS122 HEAT EXCHANGER HX2B PLUGS
LCI-HTX-PG-HXR1A	2	1.37e-04	5.70e-06	0.00	PS104 HEAT EXCHANGER HX1A PLUGS
LCI-HTX-PG-HXR1B	2	1.37e-04	5.70e-06	0.00	PS122 HEAT EXCHANGER HX1B PLUGS
LCI-HTX-PG-HXR2A	2	1.37e-04	5.70e-06	0.00	PS104 HEAT EXCHANGER HX2A PLUGS
LCI-HTX-PG-HXR2B	2	1.37e-04	5.70e-06	0.00	PS122 HEAT EXCHANGER HX2B PLUGS
LCI-HTX-RP-HXR1A	2	7.20e-05	3.00e-06	0.00	HEAT EXCHANGER HX1A FAILS DUE TO RUPTURE
LCI-HTX-RP-HXR1B	2	7.20e-05	3.00e-06	0.00	HEAT EXCHANGER HX1B FAILS DUE TO RUPTURE
LCI-HTX-RP-HXR2A	2	7.20e-05	3.00e-06	0.00	HEAT EXCHANGER HX2A FAILS DUE TO RUPTURE
LCI-HTX-RP-HXR2B	2	7.20e-05	3.00e-06	0.00	HEAT EXCHANGER HX2B FAILS DUE TO RUPTURE
LCI-LOG-NO-LPCI	1	1.60e-03	0.00	0.00	ACTION CIRCUITRY FAILURE DUE TO HARDWARE
LCI-LOG-NO-MV8	1	1.60e-03	0.00	0.00	ACTION FAILURE OF MV8
LCI-LOG-NO-MV9	1	1.60e-03	0.00	0.00	ACTION FAILURE OF MV9
LCI-MDP-FR-MDP2A	2	7.20e-04	3.00e-05	0.00	PS101 MOTOR-DRIVEN PUMP MDP2A FAILS TO CONTINUE TO RUN
LCI-MDP-FR-MDP2B	2	7.20e-04	3.00e-05	0.00	PS127 MOTOR-DRIVEN PUMP MDP2B FAILS TO CONTINUE TO RUN
LCI-MDP-FR-MDP2C	2	7.20e-04	3.00e-05	0.00	MOTOR-DRIVEN PUMP MDP2C FAILS TO CONTINUE TO RUN
LCI-MDP-FS-MDP2A	1	3.00e-03	0.00	0.00	MOTOR DRIVEN PUMP MDP2A FAILS TO START AND RUN
LCI-MDP-FS-MDP2B	1	3.00e-03	0.00	0.00	MOTOR DRIVEN PUMP MDP2B FAILS TO START AND RUN
LCI-MDP-FS-MDP2C	1	3.00e-03	0.00	0.00	MOTOR DRIVEN PUMP MDP2C FAILS TO START AND RUN
LCI-MDP-MA-MDP2A	1	2.00e-03	0.00	0.00	PS-101 RHR PUMP A UNAVAILABLE BECAUSE OF MAINTENANCE
LCI-MDP-MA-MDP2B	1	2.00e-03	0.00	0.00	RHR PUMP B UNAVAILABLE BECAUSE OF MAINTENANCE
LCI-MDP-MA-MDP2C	1	2.00e-03	0.00	0.00	MOTOR-DRIVEN PUMP MDP2C UNAVAILABLE BECAUSE OF MAINTENANCE
LCI-MOV-CC-MV242	1	3.00e-03	0.00	0.00	LPCI VALVE MV242 FAILS TO OPEN
LCI-MOV-CC-MV3A	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV3A FAILS TO OPEN ON DEMAND
LCI-MOV-CC-MV3B	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV3B FAILS TO OPEN ON DEMAND
LCI-MOV-CC-MV42A	1	3.00e-03	0.00	0.00	MOTOR OPERATED VALVE MV42A FAILS TO OPEN
LCI-MOV-CC-MV42B	1	3.00e-03	0.00	0.00	MOV 42B FAILS TO OPEN

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
LCI-MOV-CC-MV42C	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV42C FAILS TO OPEN ON DEMAND
LCI-MOV-CC-MV48B	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV48B FAILS TO OPEN ON DEMAND
LCI-MOV-CC-MV4A	1	3.00e-03	0.00	0.00	MOV MV4A FAILS TO OPEN
LCI-MOV-CC-MV4B	1	3.00e-03	0.00	0.00	MOV MV4B FAILS TO OPEN
LCI-MOV-CC-MV4C	1	3.00e-03	0.00	0.00	SUPPRESSION POOL SUCTION VALVE MV4C FAILS TO OPEN
LCI-MOV-CC-MV64B	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV64B FAILS TO OPEN ON DEMAND
LCI-MOV-CC-MV64C	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV64C FAILS TO OPEN ON DEMAND
LCI-MOV-CC-MV66A	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV66A FAILS TO OPEN
LCI-MOV-CC-MV66B	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV66B FAILS TO OPEN
LCI-MOV-CC-MV6A	1	3.00e-03	0.00	0.00	MOV MV6A FAILS TO OPEN
LCI-MOV-CC-MV6B	1	3.00e-03	0.00	0.00	MOV MV6B FAILS TO OPEN
LCI-MOV-CC-MV8	1	3.00e-03	0.00	0.00	MOTOR OPERATED VALVE MV8 FAILS CLOSED
LCI-MOV-CC-MV9	1	3.00e-03	0.00	0.00	MOTOR OPERATED VALVE MV9 FAILS CLOSED
LCI-MOV-CM-MV3	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF LPCI MOV 3A/B ON TO OPERATE DEMAND
LCI-MOV-CM-MV4	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF MOV 4A/B/C TO OPERATE ON DEMAND
LCI-MOV-CM-MV42	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF MV 42A/B/C TO OPERATE ON DEMAND
LCI-MOV-CM-MV48	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF LPCI MOV 48A/B TO OPERATE ON DEMAND
LCI-MOV-CM-MV53	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF SDC INJECTION VALVES MV53B
LCI-MOV-CM-MV6	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF MOV 6A/B TO OPERATE ON DEMAND
LCI-MOV-CM-MV64	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF MOV 64A/B/C TO OPERATE ON DEMAND
LCI-MOV-CM-MV66	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF MOV 66A/B TO OPERATE ON DEMAND
LCI-MOV-CM-MV8-9	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF MOV 8 AND 9 TO OPERATE ON DEMAND
LCI-MOV-CO-MV21	2	1.20e-05	5.00e-07	0.00	FLOW DIVERTED AS MOV MV21 FAILS OPEN
LCI-MOV-CO-MV27A	2	1.20e-05	5.00e-07	0.00	MOTOR-OPERATED VALVE MV27A FAILS OPEN
LCI-MOV-CO-MV27B	2	1.20e-05	5.00e-07	0.00	MOV MV27B FAILS OPEN
LCI-MOV-CO-MV3B	2	1.20e-05	5.00e-07	0.00	MOV 3B OPEN FAILS OPEN
LCI-MOV-CO-MV42A	2	1.20e-05	5.00e-07	0.00	MOTOR OPERATED VALVE MV42A FAILS OPEN
LCI-MOV-CO-MV42B	2	1.20e-05	5.00e-07	0.00	MOV 42B FAILS OPEN
LCI-MOV-CO-MV48A	2	1.20e-05	5.00e-07	0.00	MOTOR-OPERATED VALVE MV48A FAILS TO OPEN
LCI-MOV-CO-MV48B	2	1.20e-05	5.00e-07	0.00	MOV MV48B FAILS OPEN
LCI-MOV-CO-MV64A	2	1.20e-05	5.00e-07	0.00	MOTOR-OPERATED VALVE MV64A FAILS OPEN

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Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lambda	Tau (Hrs)	Event Description
LCI-MOV-CO-MV64B	2	1.20e-05	5.00e-07	0.00	MOTOR-OPERATED VALVE MV-64B FAILS OPEN
LCI-MOV-MA-MV21	1	8.00e-04	0.00	0.00	LPCI MV21 OUT FOR MAINTENANCE
LCI-MOV-MA-MV242	1	8.00e-04	0.00	0.00	PS-117 INJ. VALVE MV242 UNAVAILABLE BECAUSE OF MAINTENANCE
LCI-MOV-MA-MV27A	1	8.00e-04	0.00	0.00	MOTOR-OPERATED VALVE MV27A UNAVAILABLE BECAUSE OF
LCI-MOV-MA-MV27B	1	8.00e-04	0.00	0.00	THROUGH MV27B FAILS BECAUSE OF MAINTENANCE ON MV27B
LCI-MOV-MA-MV3A	1	8.00e-04	0.00	0.00	MOTOR-OPERATED VALVE MV3A UNAVAILABLE ON MAINTENANCE
LCI-MOV-MA-MV3B	1	8.00e-04	0.00	0.00	PS-119 MOTOR- OPERATED VALVE MV3B UNAVAILABLE ON MAINTENANCE
LCI-MOV-MA-MV42A	1	8.00e-04	0.00	0.00	LPCI MV42A OUT FOR MAINTENANCE
LCI-MOV-MA-MV42B	1	8.00e-04	0.00	0.00	FLOW THROUGH PS-114 FAILS BECAUSE OF MAINTENANCE ON MV42B
LCI-MOV-MA-MV42C	1	8.00e-04	0.00	0.00	LPCI MV42C OUT FOR MAINTENANCE
LCI-MOV-MA-MV47A	1	8.00e-04	0.00	0.00	LPCI MV47A OUT FOR MAINTENANCE
LCI-MOV-MA-MV47B	1	8.00e-04	0.00	0.00	LPCI MV47B OUT FOR MAINTENANCE
LCI-MOV-MA-MV48A	1	8.00e-04	0.00	0.00	LPCI MV48A OUT FOR MAINTENANCE
LCI-MOV-MA-MV48B	1	8.00e-04	0.00	0.00	LPCI MV48B OUT FOR MAINTENANCE
LCI-MOV-MA-MV4A	1	8.00e-04	0.00	0.00	NO FLOW THRU PS-131 BECAUSE MV4A UNAVAIL. BECAUSE OF
LCI-MOV-MA-MV4B	1	8.00e-04	0.00	0.00	MOTOR-OPERATED VALVE MV4B CLOSED FOR MAINTENANCE
LCI-MOV-MA-MV4C	1	8.00e-04	0.00	0.00	LPCI MV4C OUT FOR MAINTENANCE
LCI-MOV-MA-MV64A	1	8.00e-04	0.00	0.00	PS-103 FAILS BECAUSE MV64A UNAVAIL/ MAINTENANCE
LCI-MOV-MA-MV64B	1	8.00e-04	0.00	0.00	LPCI MV64B OUT FOR MAINTENANCE
LCI-MOV-MA-MV64C	1	8.00e-04	0.00	0.00	LPCI MV64C OUT FOR MAINTENANCE
LCI-MOV-MA-MV66A	1	8.00e-04	0.00	0.00	LPCI MV66A OUT FOR MAINTENANCE
LCI-MOV-MA-MV66B	1	8.00e-04	0.00	0.00	LPCI MV66B OUT FOR MAINTENANCE
LCI-MOV-MA-MV6A	1	8.00e-04	0.00	0.00	LPCI MV6A OUT FOR MAINTENANCE
LCI-MOV-MA-MV6B	1	8.00e-04	0.00	0.00	LPCI MV6B OUT FOR MAINTENANCE
LCI-MOV-MA-MV8	1	8.00e-04	0.00	0.00	LPCI MV8 OUT FOR MAINTENANCE
LCI-MOV-MA-MV9	1	8.00e-04	0.00	0.00	LPCI MV9 OUT FOR MAINTENANCE
LCI-MOV-OO-MV48A	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV48A FAILS DUE TO HARDWARE
LCI-MOV-OO-MV48B	1	3.00e-03	0.00	0.00	RHR HEAT EXCHANGER BYPASS MOV MV48B FAILS TO CLOSE
LCI-MOV-OO-MV4A	1	3.00e-03	0.00	0.00	LPCI A SUCTION VALVE MV4A FAILS TO CLOSE ON DEMAND
LCI-MOV-OO-MV4B	1	3.00e-03	0.00	0.00	LPCI B SUCTION VALVE MV4B FAILS TO CLOSE ON DEMAND
LCI-MOV-OO-MV4C	1	3.00e-03	0.00	0.00	LPCI C SUCTION VALVE MV4C FAILS TO CLOSE ON DEMAND

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
LCI-MOV-OO-MV53B	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV53B FAILS TO CLOSE ON DEMAND
LCI-MOV-OO-MV64A	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV64A FAILS TO CLOSE ON DEMAND
LCI-MOV-OO-MV64B	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV64B FAILS TO CLOSE ON DEMAND
LCI-MOV-OO-MV64C	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV64C FAILS TO CLOSE ON DEMAND
LCI-MOV-OO-MV66B	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV66B FAILS TO CLOSE ON DEMAND
LCI-MOV-OO-MV6B	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV6B FAILS TO CLOSE ON DEMAND
LCI-MOV-OO-MV8	1	3.00e-03	0.00	0.00	SDC MOV 8 FAILS TO CLOSE
LCI-MOV-OO-MV9	1	3.00e-03	0.00	0.00	SDC MOV 9 FAILS TO CLOSE
LCI-MOV-PG-MV27A	2	2.40e-06	1.00e-07	0.00	FLOW THROUGH VALVE MV27A FAILS BECAUSE OF PLUGGING
LCI-MOV-PG-MV27B	2	2.40e-06	1.00e-07	0.00	NO FLOW THROUGH PS-115 VALVE MV27B BECAUSE OF PLUGGING
LCI-MOV-PG-MV3A	2	2.40e-06	1.00e-07	0.00	MV3A PLUGS
LCI-MOV-PG-MV3B	2	2.40e-06	1.00e-07	0.00	MV3B PLUGS
LCI-MOV-PG-MV47A	2	2.40e-06	1.00e-07	0.00	TRAIN PS-102 VALVE MV47A FAILS BECAUSE OF PLUGGING
LCI-MOV-PG-MV47B	2	2.40e-06	1.00e-07	0.00	TRAIN PS-126 VALVE MV47B FAILS BECAUSE OF PLUGGING
LCI-MOV-PG-MV48A	2	2.40e-06	1.00e-07	0.00	NO FLOW THROUGH MOTOR-OPERATED VALVE MV48A DUE TO PLUGGING
LCI-MOV-PG-MV48B	2	2.40e-06	1.00e-07	0.00	NO FLOW THROUGH PS-121 VALVE MV48B BECAUSE OF PLUGGING
LCI-MOV-PG-MV4A	2	2.40e-06	1.00e-07	0.00	FLOW THROUGH PS-131' MOV MV4A FAILS BECAUSE OF PLUGGING
LCI-MOV-PG-MV4B	2	2.40e-06	1.00e-07	0.00	FLOW THROUGH PS-128 MOV MV4B FAILS BECAUSE OF PLUGGING
LCI-MOV-PG-MV4C	2	2.40e-06	1.00e-07	0.00	VALVE MV4C FAILS BECAUSE OF PLUGGING
LCI-MOV-PG-MV64A	2	2.40e-06	1.00e-07	0.00	VALVE MV64A FAILS BECAUSE OF PLUGGING
LCI-MOV-PG-MV64B	2	2.40e-06	1.00e-07	0.00	VALVE MV64B FAILS BECAUSE OF PLUGGING
LCI-MOV-PG-MV64C	2	2.40e-06	1.00e-07	0.00	VALVE MV64C FAILS BECAUSE OF PLUGGING
LCI-MOV-PG-MV6B	2	2.40e-06	1.00e-07	0.00	MOTOR-OPERATED VALVE MV6B FAILS CLOSED
LCI-MOV-PG-MV8	2	2.40e-06	1.00e-07	0.00	MOTOR-OPERATED VALVE MV8 FAILS CLOSED
LCI-MOV-PG-MV9	2	2.40e-06	1.00e-07	0.00	MOTOR-OPERATED VALVE MV9 FAILS CLOSED
LCI-TCV-HW-CV241	1	1.00e-04	0.00	0.00	INJECTION LINE VALVE TCV241 FAILS TO OPEN
LCI-TCV-HW-CV41A	1	1.00e-04	0.00	0.00	TESTABLE CHECK VALVE TCV41A FAILS TO OPEN
LCI-TCV-HW-CV41B	1	1.00e-04	0.00	0.00	TESTABLE CHECK VALVE TCV41B FAILS TO OPEN
LCI-TCV-HW-CV41C	1	1.00e-04	0.00	0.00	TESTABLE CHECK VALVE TCV41C FAILS TO OPEN
LCI-XVM-MA-XV10	1	8.00e-04	0.00	0.00	MANUAL VALVE XV10 UNAVAILABLE ON MAINTENANCE
LCI-XVM-PG-V120A	2	2.40e-06	1.00e-07	0.00	PS104 MANUAL VALVE XV120A PLUGS

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Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
LCI-XVM-PG-V120B	2	2.40e-06	1.00e-07	0.00	PS122 MANUAL VALVE XV120B PLUGS
LCI-XVM-PG-V130A	2	2.40e-06	1.00e-07	0.00	PS104 MANUAL VALVE XV130A PLUGS
LCI-XVM-PG-V130B	2	2.40e-06	1.00e-07	0.00	PS122 MANUAL VALVE XV130B PLUGS
LCI-XVM-PG-XV10	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV10 PLUGS
LCI-XVM-PG-XV18A	2	2.40e-06	1.00e-07	0.00	PS103 MANUAL VALVE XV18A PLUGS
LCI-XVM-PG-XV18B	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XMV 18B PLUGS
LCI-XVM-PG-XV18C	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV18C PLUGS
LCI-XVM-PG-XV239	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV239 PLUGS
LCI-XVM-PG-XV29A	2	2.40e-06	1.00e-07	0.00	PS101 MANUAL VALVE XV29A PLUGS
LCI-XVM-PG-XV29B	2	2.40e-06	1.00e-07	0.00	PS127 MANUAL VALVE XV29B PLUGS
LCI-XVM-PG-XV29C	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV29C PLUGS
LCI-XVM-PG-XV39A	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV39A PLUGS
LCI-XVM-PG-XV39B	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV39B PLUGS
LCI-XVM-PG-XV39C	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV39C PLUGS
LCS-CKV-HW-CV3	1	1.00e-04	0.00	0.00	LPCS PUMP DISCHARGE CHECK VALVE CV3 FAILS TO OPEN
LCS-LOG-NO-LPCS	1	1.60e-03	0.00	0.00	ACTUATION CIRCUITRY FAILS BECAUSE OF HARDWARE
LCS-MDP-FR-MDP1	2	7.20e-04	3.00e-05	0.00	LPCS MOTOR-DRIVEN PUMP MDP1 FAILS TO RUN
LCS-MDP-FS-MDP1	1	3.00e-03	0.00	0.00	LPCS MOTOR DRIVEN PUMP FAILS TO START
LCS-MDP-MA-MDP1	1	2.00e-03	0.00	0.00	LPCS PUMP MDP1 UNAVAILABLE BECAUSE OF MAINTENANCE
LCS-MOV-CC-MV5A	1	3.00e-03	0.00	0.00	LPCS INJECTION VALVE F005-A FAILS CLOSED
LCS-MOV-CO-MV12	2	1.20e-05	5.00e-07	0.00	MOTOR OPERATED VALVE MV12 FAILS OPEN
LCS-MOV-CO-MV12A	2	1.20e-05	5.00e-07	0.00	NORMALLY CLOSED TEST ISOLATION VALVE F012A FAILS OPEN
LCS-MOV-FA-MV11	1	1.60e-03	0.00	0.00	HARDWARE FAILURE IN AUTOMATIC ACTUATION CIRCUITRY
LCS-MOV-MA-MV11	1	8.00e-04	0.00	0.00	MINIMUM FLOW LINE VALVE MV11 UNAVAILABLE DUE TO MAINTENANCE
LCS-MOV-MA-MV5	1	8.00e-04	0.00	0.00	REACTOR INJECTION MOTOR-OPERATED VALVE MV5 OUT FOR
LCS-MOV-MA-MV5A	1	8.00e-04	0.00	0.00	LPCS INJECTION VALVE F005-A OUT FOR MAINTENANCE
LCS-MOV-OO-MV11	1	3.00e-03	0.00	0.00	MINIMUM FLOW LINE ISOLATION VALVE FAILS TO CLOSE
LCS-MOV-OO-MV12A	1	3.00e-03	0.00	0.00	TEST LINE ISOLATION VALVE F012A FAILS OPEN
LCS-MOV-PG-MV1	2	2.40e-06	1.00e-07	0.00	PUMP SUCTION VALVE MV1 FAILS BECAUSE OF PLUGGING
LCS-MOV-PG-MV11	2	2.40e-06	1.00e-07	0.00	MINIMUM FLOW LINE MOV MV11 FAILS BECAUSE OF PLUGGING
LCS-TCV-HW-TCV6	1	1.00e-04	0.00	0.00	TESTABLE CHECK VALVE TCV6 FAILS TO OPEN

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
LCS-XVM-PG-XV205	2	2.40e-06	1.00e-07	0.00	MINIMUM FLOW LINE VALVE XV205 FAILS BECAUSE OF PLUGGING
LCS-XVM-PG-XV7	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV7 PLUGS
LOCA-SIGNAL	F	1.00e+00	0.00	0.00	LOCA SIGNAL IS PRESENT
LOSP-FLAG	F	1.00e+00	0.00	0.00	LOSP FLAG INDICATING THAT LOSP HAS OCCURRED
LPCI-HOUSE	F	1.00e+00	0.00	0.00	SPC TRAINS A AND B FAIL DUE TO AUTO-REALIGNMENT TO LPCI
NBS-AOV-CM-AV22	1	2.00e-03	0.00	0.00	COMMON MODE FAILURE OF INBOURD MSIVs TO OPERATE ON DEMAND
NBS-AOV-CM-AV28	1	2.00e-03	0.00	0.00	COMMON MODE FAILURE OF THE OUTBOURD MSIVs TO OPERATE
NBS-AOV-OO-AV22A	1	2.00e-03	0.00	0.00	INBOURD MSIV AV22A FAILS TO CLOSE ON DEMAND
NBS-AOV-OO-AV22B	1	2.00e-03	0.00	0.00	INBOURD MSIV AV22B FAILS TO CLOSE ON DEMAND
NBS-AOV-OO-AV22C	1	2.00e-03	0.00	0.00	INBOURD MSIV AV22C FAILS TO CLOSE ON DEMAND
NBS-AOV-OO-AV22D	1	2.00e-03	0.00	0.00	INBOURD MSIV AV22D FAILS TO CLOSE ON DEMAND
NBS-AOV-OO-AV28A	1	2.00e-03	0.00	0.00	OUTBOURD MSIV AV28A FAILS TO CLOSE ON DEMAND
NBS-AOV-OO-AV28B	1	2.00e-03	0.00	0.00	OUTBOURD MSIV AV28B FAILS TO CLOSE ON DEMAND
NBS-AOV-OO-AV28C	1	2.00e-03	0.00	0.00	OUTBOURD MSIV AV28C FAILS TO CLOSE ON DEMAND
NBS-AOV-OO-AV28D	1	2.00e-03	0.00	0.00	OUTBOURD MSIV AV28D FAILS TO CLOSE ON DEMAND
NBS-CKV-CB-CV10B	2	7.20e-05	3.00e-06	0.00	CHECK VALVE CV10B FAILS DUE TO INTERNAL RUPTURE
NBS-CKV-OO-CV10B	1	1.00e-03	0.00	0.00	CHECK VALVE CV10B FAILS TO CLOSE FOLLOWING SHUTDOWN OF FW
NBS-TCV-CB-CV32B	2	7.20e-05	3.00e-06	0.00	TESTABLE CHECK VALVE CV32B FAILS DUE TO INTERNAL RUPTURE
NBS-TCV-OO-CV32B	1	1.00e-03	0.00	0.00	TESTABLE CHECK VALVE CV32B FAILS TO CLOSE
NOT-LOSP	F	1.00e+00	0.00	0.00	FLAG INDICATING THAT LOSP HAS NOT OCCURRED
POS-5-FRACTION	1	3.10e-02	0.00	0.00	FRACTION OF TIME PLANT SPENDS IN POS 5
PRIMARY-CMT-OPEN	1	9.10e-01	0.00	0.00	PROBABILITY THAT PRIMARY CONTAINMENT IS OPEN
PSW-AOV-CC-AV501	1	2.00e-03	0.00	0.00	TEMP. CONTROL VALVE TV501 FAILS TO GO FULL OPEN
PSW-AOV-OO-AV11	1	2.00e-03	0.00	0.00	AIR-OPERATED VALVE AV11 FAILS TO CLOSE
PSW-AOV-OO-AV116	1	2.00e-03	0.00	0.00	AIR-OPERATED VALVE AV116 FAILS TO CLOSE
PSW-AOV-OO-AV117	1	2.00e-03	0.00	0.00	AIR-OPERATED VALVE AV117 FAILS TO CLOSE
PSW-AOV-PG-AV11	2	2.40e-06	1.00e-07	0.00	DISCHARGE HEADER AOV11 FAILS CLOSED
PSW-AOV-PG-AV116	2	2.40e-06	1.00e-07	0.00	DISCHARGE HEADER AOV AV116 FAILS CLOSED
PSW-AOV-PG-AV117	2	2.40e-06	1.00e-07	0.00	DISCHARGE HEADER AOV AV117 FAILS CLOSED
PSW-AOV-PG-AV120	2	2.40e-06	1.00e-07	0.00	AIR-OPERATED VALVE AV120 FAILS TO REMAIN OPEN
PSW-AOV-PG-AV121	2	2.40e-06	1.00e-07	0.00	AIR-OPERATED VALVE AV121 FAILS TO REMAIN OPEN

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
PSW-AOV-PG-AV122	2	2.40e-06	1.00e-07	0.00	AIR-OPERATED VALVE AV122 FAILS TO REMAIN OPEN
PSW-AOV-PG-AV123	2	2.40e-06	1.00e-07	0.00	AIR-OPERATED VALVE AV123 FAILS TO REMAIN OPEN
PSW-AOV-PG-AV501	2	2.40e-06	1.00e-07	0.00	TEMP. CONTROL VALVE TV501 FAILS TO REMAIN OPEN
PSW-HTX-PG-HX14	2	1.37e-04	5.70e-06	0.00	ADHRS COOLER HEAT EXCHANGER B014 FAILS DUE TO PLUGGING
PSW-HTX-PG-HX3A	2	1.37e-04	5.70e-06	0.00	ADHRS HEAT EXCHANGER HX3A FAILS DUE TO PLUGGING (SHELL)
PSW-HTX-PG-HX3B	2	1.37e-04	5.70e-06	0.00	ADHRS HEAT EXCHANGER HX3B FAILS DUE TO PLUGGING (SHELL)
PSW-HTX-RP-CCWA	2	7.20e-05	3.00e-06	0.00	PSW-CCW HEAT EXCHANGER A RUPTURES
PSW-HTX-RP-CCWC	2	7.20e-05	3.00e-06	0.00	PSW-CCW HEAT EXCHANGER C RUPTURES
PSW-HTX-RP-HX14	2	7.20e-05	3.00e-06	0.00	ADHRS ROOM COOLER HEAT EXCHANGER FAILS DUE TO RUPTURE
PSW-HTX-RP-HX3A	2	7.20e-05	3.00e-06	0.00	ADHRS HEAT EXCHANGER HX3A FAILS DUE TO RUPTURE (SHELL)
PSW-HTX-RP-HX3B	2	7.20e-05	3.00e-06	0.00	ADHRS HEAT EXCHANGER HX3B FAILS DUE TO RUPTURE (SHELL)
PSW-MDP-CM-MDPS	2	7.20e-04	3.00e-05	0.00	COMMON MODE FAILURE OF 8 OF 8 PSW PUMPS TO RUN
PSW-MOV-MA-MV127	1	8.00e-04	0.00	0.00	MOV MV127-N UNAVAILABLE ON MAINTENANCE
PSW-MOV-PG-F129	2	2.40e-06	1.00e-07	0.00	PSW FROM CCW HEAT EXCHANGERS OUTLET MOV FAILS TO STAY OPEN
PSW-MOV-PG-MV127	2	2.40e-06	1.00e-07	0.00	PSW TO CCW HEAT EXCHANGERS INLET MOV FAILS TO REMAIN OPEN
PSW-XVM-CC-XV483	1	1.00e-04	0.00	0.00	MANUAL VALVE XV483 FAILS TO OPEN ON DEMAND
PSW-XVM-CC-XV484	1	1.00e-04	0.00	0.00	MANUAL VALVE XV484 FAILS TO OPEN ON DEMAND
PSW-XVM-MA-V282B	1	8.00e-04	0.00	0.00	BUTTERFLY VALVE XV482B UNAVAILABLE ON MAINT.
PSW-XVM-MA-V481A	1	8.00e-04	0.00	0.00	BUTTERFLY VALVE XV481A UNAVAILABLE ON MAINT.
PSW-XVM-MA-V481B	1	8.00e-04	0.00	0.00	BUTTERFLY VALVE XV481B UNAVAILABLE ON MAINT.
PSW-XVM-MA-V482A	1	8.00e-04	0.00	0.00	BUTTERFLY VALVE XV482A UNAVAILABLE ON MAINT.
PSW-XVM-MA-XV483	1	8.00e-04	0.00	0.00	MANUAL VALVE XV483 UNAVAILABLE ON MAINT.
PSW-XVM-PG-F009A	2	2.40e-06	1.00e-07	0.00	PSW INLET MANUAL VALVE (F009A) TO CCW HTX A PLUGS
PSW-XVM-PG-F009B	2	2.40e-06	1.00e-07	0.00	PSW INLET MANUAL VALVE (F009B) TO CCW HTX B PLUGS
PSW-XVM-PG-F010A	2	2.40e-06	1.00e-07	0.00	PSW OUTLET MANUAL VALVE (F010A) FROM CCW HTX A PLUGS
PSW-XVM-PG-F010B	2	2.40e-06	1.00e-07	0.00	PSW OUTLET MANUAL VALVE (F010B) FROM CCW HTX B PLUGS
PSW-XVM-PG-V481A	2	2.40e-06	1.00e-07	0.00	BUTTERFLY VALVE XV481A PLUGS
PSW-XVM-PG-V481B	2	2.40e-06	1.00e-07	0.00	BUTTERFLY VALVE XV481B PLUGS
PSW-XVM-PG-V482A	2	2.40e-06	1.00e-07	0.00	BUTTERFLY VALVE XV482A PLUGS
PSW-XVM-PG-V482B	2	2.40e-06	1.00e-07	0.00	BUTTERFLY VALVE XV482B PLUGS
PSW-XVM-PG-XV4	2	2.40e-06	1.00e-07	0.00	BUTTERFLY VALVE XV4 PLUGS

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
PSW-XVM-PG-XV40	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE TO CIRC. WATER SYSTEM FAILS DUE TO PLUGGING
PSW-XVM-PG-XV483	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV483 PLUGS
PSW-XVM-PG-XV484	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV484 PLUGS
PSW-XVM-PG-XV485	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV485 FAILS CLOSED DUE TO PLUGGING
PSW-XVM-PG-XV486	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV486 FAILS CLOSED DUE TO PLUGGING
RHR-MDP-FS-CM	1	3.00e-03	0.00	0.00	FAILURE OF A RHR SYSTEM MDP DUE TO CCF
RPS-BAC-HW-RPSA	2	9.60e-05	4.00e-06	0.00	HARDWARE FAILURE OF RPS 120V AC BUS A
RPS-BAC-HW-RPSB	2	9.60e-05	4.00e-06	0.00	HARDWARE FAILURE OF RPS 120V AC BUS B
RPS-MGS-FR-MGSA	2	7.20e-04	3.00e-05	0.00	RPS MOTOR-GENERATOR SET A FAILS TO CONTINUE TO RUN
RPS-MGS-FR-MGSB	2	7.20e-04	3.00e-05	0.00	RPS MOTOR-GENERATOR SET B FAILS TO CONTINUE TO RUN
RRS-HOV-MA-HV60A	1	8.00e-04	0.00	0.00	HYDRAULIC-OPERATED VALVE HV60A UNAVAILABLE DUE TO MAINT.
RRS-HOV-PG-HV60B	2	2.40e-06	1.00e-07	0.00	HYDRAULIC OPERATED VALVE HV60B FAILS CLOSED DUE TO PLUGGING
RRS-MDP-CM-FR	2	7.20e-04	3.00e-05	0.00	COMMON MODE FAILURE OF RECIRCULATION PUMPS TO RUN
RRS-MDP-FR-C001A	2	7.20e-04	3.00e-05	0.00	MOTOR-DRIVEN RECIRCULATION PUMP C001A FAILS TO RUN
RRS-MDP-FR-C001B	2	7.20e-04	3.00e-05	0.00	MOTOR-DRIVEN RECIRCULATION PUMP C001B FAILS TO RUN
RRS-MDP-FS-MDPA	1	3.00e-03	0.00	0.00	MOTOR-DRIVEN RECIRCULATION PUMP C001A FAILS TO START
RRS-MDP-MA-C001A	1	2.00e-03	0.00	0.00	MOTOR-DRIVEN PUMP UNAVAILABLE DUE TO MAINTENANCE
RRS-MOV-CC-MV23A	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV23A FAILS TO OPEN ON DEMAND
RRS-MOV-CC-MV67A	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV67A FAILS TO OPEN ON DEMAND
RRS-MOV-CM-MV23	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF RRS MOVs MV23 A/B
RRS-MOV-CM-MV67	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF RRS MOVs MV67 A/B
RRS-MOV-MA-MV23A	1	8.00e-04	0.00	0.00	MOTOR-OPERATED VALVE MV23A UNAVAILABLE DUE TO MAINTENANCE
RRS-MOV-MA-MV67A	1	8.00e-04	0.00	0.00	MOTOR-OPERATED VALVE UNAVAILABLE DUE TO MAINTENANCE
RRS-MOV-OO-MV23B	1	3.00e-03	0.00	0.00	RRS MOV MV23B FAILS TO CLOSE ON DEMAND
RRS-MOV-OO-MV67B	1	3.00e-03	0.00	0.00	RRS MOV MV67B FAILS TO CLOSE ON DEMAND
RRS-MOV-PG-MV23B	2	2.40e-06	1.00e-07	0.00	MOTOR-OPERATED VALVE MV23B FAILS CLOSED DUE TO PLUGGING
RRS-MOV-PG-MV67B	2	2.40e-06	1.00e-07	0.00	MOTOR-OPERATED VALVE MV67B FAILS CLOSED DUE TO PLUGGING
RWC-AOV-FO-AV33	1	2.00e-03	0.00	0.00	LETDOWN FLOW CONTROL VALVE FAILS TO CONTROL LETDOWN
RWC-CKV-HW-CV12A	1	1.00e-04	0.00	0.00	RWCU PUMP C001A DISCHARGE CHECK VALVE CV12A FAILS TO OPEN
RWC-CKV-HW-CV12B	1	1.00e-04	0.00	0.00	RWCU PUMP C001B DISCHARGE CHECK VALVE CV12B FAILS TO OPEN
RWC-CKV-HW-CV51	1	1.00e-04	0.00	0.00	RWCU RETURN HEADER TO RX CHECK VALVE CV51 FAILS TO OPEN

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
RWC-FLT-PG-DEMIN	2	7.20e-04	3.00e-05	0.00	RWCU DEMINERALIZER FAILS TO PASS FLOW DUE TO PLUGGING
RWC-HTX-PG-B1A	2	1.37e-04	5.70e-06	0.00	RWCU NON-REGEN. HEAT EXCHANGER A FAILS DUE TO PLUGGING
RWC-HTX-PG-B1B	2	1.37e-04	5.70e-06	0.00	RWCU NON-REGEN. HEAT EXCHANGER B FAILS DUE TO PLUGGING
RWC-HTX-PG-B2A	2	1.37e-04	5.70e-06	0.00	RWCU REGEN. HEAT EXCHANGER A FAILS DUE TO PLUGGING
RWC-HTX-PG-B2B	2	1.37e-04	5.70e-06	0.00	RWCU REGEN. HEAT EXCHANGER B FAILS DUE TO PLUGGING
RWC-HTX-PG-B2C	2	1.37e-04	5.70e-06	0.00	RWCU REGEN. HEAT EXCHANGER C FAILS DUE TO PLUGGING
RWC-HTX-RP-B1A	2	7.20e-05	3.00e-06	0.00	RWCU NON-REGEN. HEAT EXCHANGER A FAILS DUE TO RUPTURE
RWC-HTX-RP-B1B	2	7.20e-05	3.00e-06	0.00	RWCU NON-REGEN. HEAT EXCHANGER B FAILS DUE TO RUPTURE
RWC-HTX-RP-B2A	2	7.20e-05	3.00e-06	0.00	RWCU REGEN. HEAT EXCHANGER A FAILS DUE TO RUPTURE
RWC-HTX-RP-B2B	2	7.20e-05	3.00e-06	0.00	RWCU REGEN. HEAT EXCHANGER B FAILS DUE TO RUPTURE
RWC-HTX-RP-B2C	2	7.20e-05	3.00e-06	0.00	RWCU REGEN. HEAT EXCHANGER C FAILS DUE TO RUPTURE
RWC-MDP-CM-MDPFR	2	7.20e-04	3.00e-05	0.00	RWCU MOTOR-DRIVEN PUMPS COMMON MODE FAILURE TO RUN
RWC-MDP-FR-C001A	2	7.20e-04	3.00e-05	0.00	MOTOR-DRIVEN PUMP C001A FAILS TO CONTINUE TO RUN
RWC-MDP-FR-C001B	2	7.20e-04	3.00e-05	0.00	MOTOR-DRIVEN PUMP C001B FAILS TO CONTINUE TO RUN
RWC-MDP-FS-C001A	1	3.00e-03	0.00	0.00	MDP C001A FAILS TO START
RWC-MDP-FS-C001B	1	3.00e-03	0.00	0.00	MDP C001B FAILS TO START
RWC-MDP-FS-CCF	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF RWCU MOTOR-DRIVEN PUMPS C001A/B
RWC-MOV-CC-107	1	3.00e-03	0.00	0.00	MOV F107 FAILS TO OPEN
RWC-MOV-CC-MV100	1	3.00e-03	0.00	0.00	RWCU MOTOR-OPERATED VALVE MV100 FAILS TO OPEN ON DEMAND
RWC-MOV-CC-MV102	1	3.00e-03	0.00	0.00	RWCU MOTOR-OPERATED VALVE MV102 FAILS TO OPEN ON DEMAND
RWC-MOV-CC-MV106	1	3.00e-03	0.00	0.00	RWCU MOTOR-OPERATED VALVE MV106 FAILS TO OPEN ON DEMAND
RWC-MOV-CC-MV250	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV250 FAILS TO OPEN ON DEMAND
RWC-MOV-CC-MV251	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV251 FAILS TO OPEN ON DEMAND
RWC-MOV-CC-MV252	1	3.00e-03	0.00	0.00	RWCU MOTOR-OPERATED VALVE MV252 FAILS TO OPEN ON DEMAND
RWC-MOV-CC-MV253	1	3.00e-03	0.00	0.00	RWCU MOTOR-OPERATED VALVE MV253 FAILS TO OPEN ON DEMAND
RWC-MOV-CC-MV255	1	3.00e-03	0.00	0.00	RWCU MOTOR-OPERATED VALVE MV255 FAILS TO OPEN ON DEMAND
RWC-MOV-CC-MV28	1	3.00e-03	0.00	0.00	RWCU MOTOR-OPERATED VALVE MV28 FAILS TO OPEN ON DEMAND
RWC-MOV-CC-MV34	1	3.00e-03	0.00	0.00	RWCU MOTOR-OPERATED VALVE MV34 FAILS TO OPEN ON DEMAND
RWC-MOV-CC-MV35	1	3.00e-03	0.00	0.00	RWCU MOTOR-OPERATED VALVE MV35 FAILS TO OPEN ON DEMAND
RWC-MOV-CC-MV39	1	3.00e-03	0.00	0.00	RWCU MOTOR-OPERATED VALVE MV39 FAILS TO OPEN ON DEMAND
RWC-MOV-CC-MV40	1	3.00e-03	0.00	0.00	RWCU MOTOR-OPERATED VALVE MV40 FAILS TO OPEN ON DEMAND

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
RWC-MOV-CC-MV44	1	3.00e-03	0.00	0.00	RWCU MOTOR-OPERATED VALVE MV44 FAILS TO OPEN ON DEMAND
RWC-MOV-CO-MV1	2	1.20e-05	5.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV1 FAILS OPEN
RWC-MOV-CO-MV254	2	1.20e-05	5.00e-07	0.00	RWCU MOTOR-OPERATED VALVE FAILS OPEN
RWC-MOV-CO-MV255	2	1.20e-05	5.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV255 FAILS OPEN
RWC-MOV-CO-MV256	2	1.20e-05	5.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV256 FAILS OPEN
RWC-MOV-OO-MV1	1	3.00e-03	0.00	0.00	RWCU MOTOR-OPERATED VALVE MV1 FAILS TO CLOSE ON DEMAND
RWC-MOV-OO-MV254	1	3.00e-03	0.00	0.00	RWCU MOTOR-OPERATED VALVE MV254 FAILS TO OPEN ON DEMAND
RWC-MOV-OO-MV256	1	3.00e-03	0.00	0.00	RWCU MOTOR-OPERATED VALVE MV256 FAILS TO CLOSE ON DEMAND
RWC-MOV-OO-MV4	1	3.00e-03	0.00	0.00	RWCU MOTOR-OPERATED VALVE MV4 FAILS TO CLOSE ON DEMAND
RWC-MOV-PG-MV100	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV100 FAILS DUE TO PLUGGING
RWC-MOV-PG-MV102	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV102 FAILS DUE TO PLUGGING
RWC-MOV-PG-MV106	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV106 FAILS DUE TO PLUGGING
RWC-MOV-PG-MV107	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV107 FAILS DUE TO PLUGGING
RWC-MOV-PG-MV1B	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV1B FAILS DUE TO PLUGGING
RWC-MOV-PG-MV252	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV252 FAILS DUE TO PLUGGING
RWC-MOV-PG-MV253	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV253 FAILS DUE TO PLUGGING
RWC-MOV-PG-MV254	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV254 FAILS DUE TO PLUGGING
RWC-MOV-PG-MV255	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV255 FAILS DUE TO PLUGGING
RWC-MOV-PG-MV256	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV256 FAILS DUE TO PLUGGING
RWC-MOV-PG-MV28B	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV28B FAILS DUE TO PLUGGING
RWC-MOV-PG-MV31	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV31 FAILS DUE TO PLUGGING
RWC-MOV-PG-MV34A	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV34A FAILS DUE TO PLUGGING
RWC-MOV-PG-MV35	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV35 FAILS DUE TO PLUGGING
RWC-MOV-PG-MV39	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV39 FAILS DUE TO PLUGGING
RWC-MOV-PG-MV40	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV40 FAILS DUE TO PLUGGING
RWC-MOV-PG-MV44	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV44 FAILS DUE TO PLUGGING
RWC-MOV-PG-MV4A	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV4A FAILS DUE TO PLUGGING
RWC-MOV-PG-MV54A	2	2.40e-06	1.00e-07	0.00	RWCU MOTOR-OPERATED VALVE MV54A FAILS DUE TO PLUGGING
RWS-AOV-CC-AV47	1	2.00e-03	0.00	0.00	AIR OPERATED VALVE AV47 FAILS TO OPEN ON DEMAND
RWS-AOV-MA-AV47	1	8.00e-04	0.00	0.00	AIR OPERATED VALVE AV47 UNAVAILABLE DUE TO MAINTENANCE
RWS-XVM-CC-XV39	1	1.00e-04	0.00	0.00	MANUAL VALVE XV39 FAILS TO OPEN ON DEMAND

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
RX-PUMP-TRIP	1	1.00e-04	0.00	0.00	RECIRCULATION PUMP TRIP FAILS
SAS-MDC-CM-SAC	1	3.80e-03	0.00	0.00	COMMON MODE FAILURE OF THE SERVICE AIR COMPRESSORS TO RUN
SAS-MDC-FR-C001A	2	4.80e-03	2.00e-04	0.00	SERVICE AIR COMPRESSOR C001A FAILS TO CONTINUE TO RUN
SAS-MDC-FR-C001B	2	4.80e-03	2.00e-04	0.00	SERVICE AIR COMPRESSOR C001B FAILS TO CONTINUE TO RUN
SAS-MDC-FS-C001B	1	8.00e-02	0.00	0.00	SERVICE AIR COMPRESSOR C001B FAILS TO START
SAS-MDC-MA-C001B	1	2.00e-03	0.00	0.00	STANDBY SERVICE AIR COMPRESSOR UNAVAILABLE DUE TO MAINT.
SDC-CCF-VF-MOV	1	2.60e-04	0.00	0.00	COMMON CAUSE FAILURE OF THE SDC VALVES
SDC-CKV-HW-CV50A	1	1.00e-04	0.00	0.00	CHECK VALVE CV50A FAILS TO OPEN
SDC-CKV-HW-CV50B	1	1.00e-04	0.00	0.00	CHECK VALVE CV50B FAILS TO OPEN
SDC-MOV-CC-MV53A	1	3.00e-03	0.00	0.00	MOTOR OPERATED VALVE MV53A FAILS TO OPEN
SDC-MOV-CC-MV53B	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV53B FAILS TO OPEN
SDC-MOV-CM-MV53	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF SDC MOV 53A/B TO OPERATE ON DEMAND
SDC-MOV-CO-MV53A	2	1.20e-05	5.00e-07	0.00	MOTOR OPERATED MV53A FAILS OPEN
SDC-MOV-CO-MV53B	2	1.20e-05	5.00e-07	0.00	MOTOR-OPERATED VALVE MV53B FAILS OPEN
SDC-MOV-MA-MV53A	1	8.00e-04	0.00	0.00	PS-109 FAILS BECAUSE OF MV53A IS OUT FOR MAINTENANCE
SDC-MOV-MA-MV53B	1	8.00e-04	0.00	0.00	PS-132 FAILS BECAUSE MV53B IS OUT FOR MAINTENANCE
SDC-MOV-PG-MV53B	2	2.40e-06	1.00e-07	0.00	MOTOR-OPERATED VALVE MV53B FAILS DUE TO PLUGGING
SPC-MOV-CC-MV24A	1	3.00e-03	0.00	0.00	PS-107 MOTOR-OPERATED VALVE MV24A FAILS TO OPEN
SPC-MOV-CC-MV24B	1	3.00e-03	0.00	0.00	PS-116 MOTOR-OPERATED VALVE MV24B FAILS TO OPEN
SPC-MOV-CM-MV24	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF SPC INJECTION VALVES
SPC-MOV-CO-MV24A	2	1.20e-05	5.00e-07	0.00	MOTOR-OPERATED VALVE MV24A FAILS OPEN
SPC-MOV-CO-MV24B	2	1.20e-05	5.00e-07	0.00	MOTOR-OPERATED VALVE MV24B FAILS OPEN
SPC-MOV-MA-MV24A	1	8.00e-04	0.00	0.00	PS-72A VALVE MV24A UNAVAILABLE BECAUSE OF MAINTENANCE
SPC-MOV-MA-MV24B	1	8.00e-04	0.00	0.00	PS-116 VALVE MV24B UNAVAILABLE BECAUSE OF MAINTENANCE
SPM-ASL-HI-N003A	6	9.58e-04	2.66e-06	7.20e+02	FAILURE OF SP LEVEL SENSOR/ TRANSMITTER LT-N003A
SPM-ASL-HI-N003B	6	9.58e-04	2.66e-06	7.20e+02	FAILURE OF SP LEVEL SENSOR/ TRANSMITTER LT-N003B
SPM-ASL-HI-N003C	6	9.58e-04	2.66e-06	7.20e+02	FAILURE OF SP LEVEL SENSOR/ TRANSMITTER LT-N003C
SPM-ASL-HI-N003D	6	9.58e-04	2.66e-06	7.20e+02	FAILURE OF SP LEVEL SENSOR/ TRANSMITTER LT-N003D
SPM-CCF-MC-N003	1	8.00e-04	0.00	0.00	COMMON MODE FAILURE OF SP LEVEL INSTRUMENTS
SPM-LOG-FA-A	1	1.60e-03	0.00	0.00	NO SPMU LEVEL ACTUATION SIGNAL - SPMU TRAIN A
SPM-LOG-FA-B	1	1.60e-03	0.00	0.00	NO SPMU LEVEL ACTUATION SIGNAL SPMU TRAIN B

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
SPM-LOG-NO-A	1	3.00e-04	0.00	0.00	FAILURE OF 30 MINUTE TIME DELAY RELAY - SPMU TRAIN A
SPM-LOG-NO-B	1	3.00e-04	0.00	0.00	FAILURE OF 30 MINUTE TIME DELAY RELAY - SPMU TRAIN B
SPM-MOV-CC-CM	1	3.00e-03	0.00	0.00	SPMU SYSTEM MOV FAILS TO OPEN DUE TO CCF
SPM-MOV-CC-MV1A	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV1A FAILS CLOSED
SPM-MOV-CC-MV1B	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV1B FAILS CLOSED
SPM-MOV-CC-MV2A	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV2A FAILS CLOSED
SPM-MOV-CC-MV2B	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV2B FAILS CLOSED
SPM-MOV-MA-MV1A	1	8.00e-04	0.00	0.00	MOTOR OPERATED VALVE F001A UNAVAIL/MAINT
SPM-MOV-MA-MV1B	1	8.00e-04	0.00	0.00	MOTOR OPERATED VALVE F001B UNAVAIL/MAINT
SPM-MOV-MA-MV2A	1	8.00e-04	0.00	0.00	MOTOR OPERATED VALVE 002A UNAVAIL/MAINT
SPM-MOV-MA-MV2B	1	8.00e-04	0.00	0.00	MOTOR OPERATED VALVE F002B UNAVAIL/MAINT
SRV-ACC-LK-SRVA	2	1.20e-04	5.00e-06	0.00	SRV "A" ACCUMULATOR LEAKS
SRV-ACC-LK-SRVB	2	1.20e-04	5.00e-06	0.00	SRV "B" ACCUMULATOR LEAKS
SRV-ACC-RP-SRVA	2	1.20e-04	5.00e-06	0.00	SRV "A" ACCUMULATOR RUPTURES
SRV-ACC-RP-SRVB	2	1.20e-04	5.00e-06	0.00	SRV "B" ACCUMULATOR LEAKS
SRV-ASP-LO-NO68A	6	9.58e-04	2.66e-06	7.20e+02	REACTOR PRESSURE SWITCH N068A FAILS LOW
SRV-ASP-LO-NO68B	6	9.58e-04	2.66e-06	7.20e+02	REACTOR PRESSURE SWITCH N068B FAILS LOW
SRV-ASP-LO-NO68E	6	9.58e-04	2.66e-06	7.20e+02	REACTOR PRESSURE SWITCH N068E FAILS LOW
SRV-ASP-LO-NO68F	6	9.58e-04	2.66e-06	7.20e+02	REACTOR PRESSURE SWITCH N068F FAILS LOW
SRV-CCF-CC-SRVS	1	1.00e-02	0.00	0.00	COMMON CAUSE FAILURE OF SRVs TO OPEN
SRV-PSS-NO-A	2	7.20e-05	3.00e-06	0.00	PRESSURE SWITCH "A" FAILS
SRV-PSS-NO-B	2	7.20e-05	3.00e-06	0.00	PRESSURE SWITCH "B" FAILS
SRV-PSS-NO-E	2	7.20e-05	3.00e-06	0.00	PRESSURE SWITCH "E" FAILS
SRV-PSS-NO-F	2	7.20e-05	3.00e-06	0.00	PRESSURE SWITCH "F" FAILS
SRV-SRV-CC-SRVA	1	1.00e-02	0.00	0.00	SRV "A" FAILS TO OPEN DUE TO HARDWARE FAULTS
SRV-SRV-CC-SRVB	1	1.00e-02	0.00	0.00	SRV "B" FAILS DUE TO HARDWARE FAULTS
SRV-SRV-OO-SRV	1	1.60e-02	0.00	0.00	OPEN SRV FAILS TO PROPERLY RECLOSE - VALVE HARDWARE FAULT
SSW-CKV-CB-CV98	2	7.20e-05	3.00e-06	0.00	CHECK VALVE CV98 FAILS DUE TO BADK LEAKAGE
SSW-CKV-HW-CV12	1	1.00e-04	0.00	0.00	CHECK VALVE CV12 FAILS TO OPEN
SSW-CKV-HW-CV174	1	1.00e-04	0.00	0.00	CHECK VALVE CV174 FAILS TO OPEN
SSW-CKV-HW-CV8A	1	1.00e-04	0.00	0.00	CHECK VALVE CV8A FAILS TO OPEN

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Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
SSW-CKV-HW-CV8B	1	1.00e-04	0.00	0.00	CHECK VALVE CV8B FAILS TO OPEN
SSW-CKV-HW-CV98	1	1.00e-04	0.00	0.00	CHECK VALVE CV98 FAILS TO OPEN
SSW-HTX-MA-HX6	2	7.20e-04	3.00e-05	0.00	HEAT EXCHANGER HX6 (PS-160) UNAVAILABLE BECAUSE OF MAINT
SSW-HTX-PG-HX01	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HX01 PLUGS
SSW-HTX-PG-HX1	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HX1 PLUGS
SSW-HTX-PG-HX1A	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HX1A PLUGS
SSW-HTX-PG-HX1B	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HX1B PLUGS
SSW-HTX-PG-HX1C	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HX1C PLUGS
SSW-HTX-PG-HX2	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HX2 PLUGS
SSW-HTX-PG-HX2A	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HX2A PLUGS
SSW-HTX-PG-HX2B	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HX2B PLUGS
SSW-HTX-PG-HX2C	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HX2C PLUGS
SSW-HTX-PG-HX3	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HX3 PLUGS
SSW-HTX-PG-HX4	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HX4 PLUGS
SSW-HTX-PG-HX4A	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HX4A PLUGS
SSW-HTX-PG-HX4B	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HX4B PLUGS
SSW-HTX-PG-HX5	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HX5 PLUGS
SSW-HTX-PG-HX6	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HX6 PLUGS
SSW-HTX-PG-HXR1A	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HXR1A PLUGS
SSW-HTX-PG-HXR1B	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HXR1B PLUGS
SSW-HTX-PG-HXR2A	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HXR2A PLUGS
SSW-HTX-PG-HXR2B	2	1.37e-04	5.70e-06	0.00	HEAT EXCHANGER HXR2B PLUGS
SSW-HTX-RP-HX01	2	7.20e-05	3.00e-06	0.00	DG13 JACKET WATER COOLER FAILS DUE TO RUPTURE
SSW-HTX-RP-HX1	2	7.20e-05	3.00e-06	0.00	HPCS DIESEL JACKET WATER COOLER FAILS DUE TO RUPTURE
SSW-HTX-RP-HX1A	2	7.20e-05	3.00e-06	0.00	SSW PUMP A OIL COOLER FAILS DUE TO RUPTURE
SSW-HTX-RP-HX1B	2	7.20e-05	3.00e-06	0.00	SSW PUMP B OIL COOLER FAILS DUE TO RUPTURE
SSW-HTX-RP-HX1C	2	7.20e-05	3.00e-06	0.00	HPCS DG 13 JACKET WATER COOLER FAILS DUE TO RUPTURE
SSW-HTX-RP-HX2	2	7.20e-05	3.00e-06	0.00	LPCS ROOM COOLER HEAT EXCHANGER FAILS DUE TO RUPTURE
SSW-HTX-RP-HX2A	2	7.20e-05	3.00e-06	0.00	RHR PUMP A HEAT EXCHANGER FAILS DUE TO RUPTURE
SSW-HTX-RP-HX2B	2	7.20e-05	3.00e-06	0.00	RHR PUMP B HEAT EXCHANGER FAILS DUE TO RUPTURE
SSW-HTX-RP-HX2C	2	7.20e-05	3.00e-06	0.00	RHR PUMP C HEAT EXCHANGER FAILS DUE TO RUPTURE

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
SSW-HTX-RP-HX3	2	7.20e-05	3.00e-06	0.00	RHR PUMP A ROOM COOLER HEAT EXCHANGER FAILS DUE TO RUPTURE
SSW-HTX-RP-HX4	2	7.20e-05	3.00e-06	0.00	RHR PUMP B ROOM COOLER HEAT EXCHANGER FAILS DUE TO RUPTURE
SSW-HTX-RP-HX4A	2	7.20e-05	3.00e-06	0.00	DG 11 JACKET WATER COOLER FAILS DUE TO RUPTURE
SSW-HTX-RP-HX4B	2	7.20e-05	3.00e-06	0.00	DG 12 JACKET WATER COOLER FAILS DUE TO RUPTURE
SSW-HTX-RP-HX5	2	7.20e-05	3.00e-06	0.00	RHR PUMP C ROOM COOLER HEAT EXCHANGER FAILS DUE TO RUPTURE
SSW-HTX-RP-HXR1A	2	7.20e-05	3.00e-06	0.00	RHR HEAT EXCHANGER HXR1A FAILS DUE TO RUPTURE
SSW-HTX-RP-HXR1B	2	7.20e-05	3.00e-06	0.00	RHR HEAT EXCHANGER HXR1B FAILS DUE TO RUPTURE
SSW-HTX-RP-HXR2A	2	7.20e-05	3.00e-06	0.00	RHR HEAT EXCHANGER HXR2A FAILS DUE TO RUPTURE
SSW-HTX-RP-HXR2B	2	7.20e-05	3.00e-06	0.00	RHR HEAT EXCHANGER HXR2B FAILS DUE TO RUPTURE
SSW-MDP-FR-MDP1A	2	7.20e-04	3.00e-05	0.00	MOTOR-DRIVEN PUMP MDP1A FAILS TO RUN
SSW-MDP-FR-MDP1B	2	7.20e-04	3.00e-05	0.00	MOTOR-DRIVEN PUMP MDP1B FAILS TO RUN
SSW-MDP-FR-MDP2C	2	7.20e-04	3.00e-05	0.00	MOTOR-DRIVEN PUMP MDP2C FAILS TO RUN
SSW-MDP-FS-CM	1	3.00e-03	0.00	0.00	FAILURE OF SSW SYSTEM MDP DUE TO CCF
SSW-MDP-FS-MDP1A	1	3.00e-03	0.00	0.00	FAILURE OF SSW PUMP DUE TO FIRE/ RANDOM EVENTS
SSW-MDP-FS-MDP1B	1	3.00e-03	0.00	0.00	MOTOR-DRIVEN PUMP MDP1B FAILS TO START
SSW-MDP-FS-MDP2C	1	3.00e-03	0.00	0.00	MOTOR-DRIVEN PUMP MDP2C FAILS TO START
SSW-MDP-MA-MDP1A	1	2.00e-03	0.00	0.00	TRAIN A PUMP MDP1A OUT FOR MAINTENANCE
SSW-MDP-MA-MDP1B	1	2.00e-03	0.00	0.00	TRAIN B PUMP MDP1B OUT FOR MAINTENANCE
SSW-MDP-MA-MDP2C	1	2.00e-03	0.00	0.00	TRAIN C PUMP MDP2C OUT FOR MAINTENANCE
SSW-MOV-CC-MV11	1	3.00e-03	0.00	0.00	TRAIN C DISCHARGE VALVE MV11 FAILS TO OPEN
SSW-MOV-CC-MV14A	1	3.00e-03	0.00	0.00	SSW TRAIN A VALVE MV14A FAILS TO OPEN
SSW-MOV-CC-MV14B	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV14B FAILS TO OPEN
SSW-MOV-CC-MV154	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV154 FAILS TO OPEN
SSW-MOV-CC-MV18A	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV18A DUE TO FIRE/RANDOM EVENTS
SSW-MOV-CC-MV18B	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV18B FAILS TO OPEN
SSW-MOV-CC-MV1A	1	3.00e-03	0.00	0.00	TRAIN A ISOLATION VALVE MV1A FAILS TO OPEN
SSW-MOV-CC-MV1B	1	3.00e-03	0.00	0.00	TRAIN B ISOLATION VALVE MV1B FAILS TO OPEN
SSW-MOV-CC-MV5A	1	3.00e-03	0.00	0.00	TRAIN A DISCHARGE VALVE MV5A FAILS TO OPEN
SSW-MOV-CC-MV5B	1	3.00e-03	0.00	0.00	TRAIN B DISCHARGE VALVE MV5B FAILS TO OPEN
SSW-MOV-CC-MV68A	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV68A DUE TO FIRE/RANDOM EVENTS
SSW-MOV-CC-MV68B	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV68B FAILS TO OPEN

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Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lambda	Tau (Hrs)	Event Description
SSW-MOV-CC-MV94	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV94 FAILS TO OPEN
SSW-MOV-CC-MV96	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV96 FAILS TO OPEN
SSW-MOV-CC-V155A	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV155A FAILS TO OPEN
SSW-MOV-CC-V155B	1	3.00e-03	0.00	0.00	MOTOR-OPERATED VALVE MV155B FAILS TO OPEN
SSW-MOV-CM-MV1	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF SSW MOV 1A/B TO OPERATE ON DEMAND
SSW-MOV-CM-MV14	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF SSW MOV 14A/B TO OPERATE ON DEMAND
SSW-MOV-CM-MV18	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF SSW MOV 18A/B TO OPERATE ON DEMAND
SSW-MOV-CM-MV5	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF SSW MOV 5A/B TO OPERATE ON DEMAND
SSW-MOV-CM-MV68	1	3.00e-03	0.00	0.00	COMMON MODE FAILURE OF SSW MOV 68A/B TO OPERATE ON DEMAND
SSW-MOV-CO-MV6A	2	1.20e-05	5.00e-07	0.00	MOTOR OPERATED VALVE MV6A FAILS OPEN
SSW-MOV-CO-MV6B	2	1.20e-05	5.00e-07	0.00	NORMALLY CLOSED MV6B FAILS OPEN
SSW-MOV-CO-MV96	2	1.20e-05	5.00e-07	0.00	NORMALLY CLOSED MV96 FAILS OPEN
SSW-MOV-MA-MV11	1	8.00e-04	0.00	0.00	TRAIN C DISCHARGE VALVE MV11 OUT FOR MAINTENANCE
SSW-MOV-MA-MV14A	1	8.00e-04	0.00	0.00	MOTOR-OPERATED VALVE MV14A UNAVAILABLE BECAUSE OF MAINT
SSW-MOV-MA-MV14B	1	8.00e-04	0.00	0.00	MOTOR-OPERATED VALVE MV14B UNAVAILABLE BECAUSE OF MAINT
SSW-MOV-MA-MV18A	1	8.00e-04	0.00	0.00	MOTOR-OPERATED VALVE MV18A OUT FOR MAINTENANCE
SSW-MOV-MA-MV18B	1	8.00e-04	0.00	0.00	MOTOR-OPERATED VALVE MV18B OUT FOR MAINTENANCE
SSW-MOV-MA-MV1A	1	8.00e-04	0.00	0.00	TRAIN A ISOLATION VALVE MV1A OUT FOR MAINTENANCE
SSW-MOV-MA-MV1B	1	8.00e-04	0.00	0.00	TRAIN B ISOLATION VALVE MV1B OUT FOR MAINTENANCE
SSW-MOV-MA-MV5A	1	8.00e-04	0.00	0.00	TRAIN A DISCHARGE VALVE MV5A OUT FOR MAINTENANCE
SSW-MOV-MA-MV5B	1	8.00e-04	0.00	0.00	TRAIN B DISCHARGE VALVE MV5B OUT FOR MAINTENANCE
SSW-MOV-MA-MV68A	1	8.00e-04	0.00	0.00	MOTOR-OPERATED VALVE MV68A UNAVAILABLE BECAUSE OF MAINT
SSW-MOV-MA-MV68B	1	8.00e-04	0.00	0.00	MOTOR-OPERATED VALVE MV68B UNAVAILABLE BECAUSE OF MAINT
SSW-MOV-MA-MV94	1	8.00e-04	0.00	0.00	MOTOR-OPERATED VALVE MV94 UNAVAILABLE BECAUSE OF MAINT
SSW-MOV-MA-MV96	1	8.00e-04	0.00	0.00	MOTOR-OPERATED VALVE MV96 UNAVAILABLE BECAUSE OF MAINT
SSW-MOV-PG-MV14B	2	2.40e-06	1.00e-07	0.00	FAILURE OF SSW MOV MV14B DUE TO PLUGGING
SSW-MOV-PG-MV1B	2	2.40e-06	1.00e-07	0.00	FAILURE OF SSW MOV MV1B DUE TO PLUGGING
SSW-MOV-PG-MV5B	2	2.40e-06	1.00e-07	0.00	FAILURE OF SSW MOV MV5B DUE TO PLUGGING
SSW-MOV-PG-MV68B	2	2.40e-06	1.00e-07	0.00	FAILURE OF SSW MOV MV68B DUE TO PLUGGING
SSW-XVM-PG-V102A	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV102A PLUGS
SSW-XVM-PG-V102B	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE V102B PLUGS

Table 11.2.1 Basic Events Used in LP&S Analysis (Continued)

Primary Name	Calculation Type (1)	Mean Probability	Lamda	Tau (Hrs)	Event Description
SSW-XVM-PG-V103A	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV103A PLUGS
SSW-XVM-PG-V103B	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV103B PLUGS
SSW-XVM-PG-V185A	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV185A PLUGS
SSW-XVM-PG-V185B	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV185B PLUGS
SSW-XVM-PG-V186A	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV186A PLUGS
SSW-XVM-PG-V186B	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV186B PLUGS
SSW-XVM-PG-V199A	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV199A PLUGGS
SSW-XVM-PG-V199B	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV199B PLUGS
SSW-XVM-PG-V210A	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV210A PLUGS
SSW-XVM-PG-V210B	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV210B PLUGS
SSW-XVM-PG-XV105	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV105 PLUGS
SSW-XVM-PG-XV106	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV106 PLUGS
SSW-XVM-PG-XV13	2	2.40e-06	1.00e-07	0.00	HARDWARE FAILURE OF TRAIN C VALVE XV13
SSW-XVM-PG-XV23A	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV23A PLUGS
SSW-XVM-PG-XV23B	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV23B PLUGS
SSW-XVM-PG-XV37	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV37 PLUGS
SSW-XVM-PG-XV38	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV38 PLUGS
SSW-XVM-PG-XV47	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV47 PLUGS
SSW-XVM-PG-XV48	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV48 PLUGS
SSW-XVM-PG-XV51	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV51 PLUGS
SSW-XVM-PG-XV52	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV52 PLUGS
SSW-XVM-PG-XV54B	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV54B PLUGS
SSW-XVM-PG-XV60	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV60 PLUGS
SSW-XVM-PG-XV83A	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV83A PLUGS
SSW-XVM-PG-XV83B	2	2.40e-06	1.00e-07	0.00	MANUAL VALVE XV83B PLUGS
(1) Calculation Types Are Defined as Follows: 1 - Probability 2 - Lambda * Mission Time 6 - Lambda * Tau/2.0 F - House Event					

Table 11.3.3-1 Definitions of Plant Operational States

POS	Begins when ...	Goes to	When ...
1D	Power < 15 % (estimated by interpolation in operator log)	2D	SCRAM or mode switch set to S/D
		Full Pwr	Power > 15 % (estimated by interpolation in operator log)
2D	SCRAM or mode switch set to S/D	3D	P < 500 psi
		1U	mode switch set to Startup
3D	P < 500 (estimated by interpolation in operator log)	4D	RHR S/D cooling
		1U	mode switch set to "Startup"
4D	RHR S/D Cooling	5D	"mode 4" in operator log
		1U	mode switch set to "Startup"
5D	"mode 4" in operator log	6D	Steam lines plugged
		1U	mode switch set to "Startup"
6D	Steam lines plugged	7D	Reactor cavity filled
7D	Reactor cavity filled	7U	Serviced RHR declared operable
7U	Serviced RHR declared operable	6U	Rx cavity drain commences
6U	Rx cavity drain commences	5U	Steam line plugs removed
5U	Steam line plugs removed	1U	Mode switch set to "Startup"
1U	Mode switch set to "Startup"	Full Pwr	Power > 15 % (estimated by interpolation in operator log)

Decomposition Process			Plant Condition	Fraction Spent in Each Conditions
f_p	Power > 15 %			$f f_p$
		$f_{1d c}$	1D	$f f f_{1d c}$
		$f_{2d c}$	2D	$f f f_{2d c}$
		$f_{3d c}$	3D	$f f f_{3d c}$
		$f_{4d c}$	4D	$f f f_{4d c}$
	Controlled S/D	$f_{5d c}$	5D	$f f f_{5d c}$
f_c	To Below 15 %	$f_{1u c}$	1U	$f f f_{1u c}$
		1.0		
		$f_{2d a}$	2D	$f f f_{2d a}$
		$f_{3d a}$	3D	$f f f_{3d a}$
		$f_{4d a}$	4D	$f f f_{4d a}$
		$f_{5d a}$	5D	$f f f_{5d a}$
f_r	During Fuel Cycle	f_s	1U	$f f f_{1u a}$
		1.0		
		$f_{1d r}$	1D	$f f f_{1d r}$
		$f_{2d r}$	2D	$f f f_{2d r}$
		$f_{3d r}$	3D	$f f f_{3d r}$
		$f_{4d r}$	4D	$f f f_{4d r}$
		$f_{5d r}$	5D	$f f f_{5d r}$
		$f_{6d r}$	6D	$f f f_{6d r}$
		$f_{7d r}$	7D	$f f f_{7d r}$
		$f_{7u r}$	7U	$f f f_{7u r}$
		$f_{6u r}$	6U	$f f f_{6u r}$
		$f_{5u r}$	5U	$f f f_{5u r}$
		$f_{1u r}$	1U	$f f f_{1u r}$
		1.0		1.0

Figure 11.3.3-1 Overview of Methodology

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shutdowns, and SCRAMs. The outages are then divided into plant stages.

Data between RFOs were taken on 16 January 1991 from operator logs available on microfilm. The microfilm files covered the period from December 12, 1984, through July 5, 1990, with the exception of two logs that were catalogued as being on the same microfilm reel, which was not in its assigned storage location. The missing periods were January 13, 1986, through February 12, 1986, and May 13, 1986, through June 12, 1986.

The analysis assumed that the missing periods could be neglected without introducing a bias in the statistics. A single operator log occupies about 5% of a microfilm reel; consequently, there was no reason to assume that the absence of the microfilm reel was related to the contents of the missing operator logs.

Most plant data for RFOs were taken from outage scenarios published by the plant. However, for coastdown to RFO and restart from RFO, some transitions times had to be estimated from the operator logs.

Due to the limited amount of data, the error factors given in this report are based on the judgment of the analyst. No detailed error analysis was performed.

11.3.3.2 Relative Time Spent in RFOs

The Grand Gulf engineering staff defines the refueling outage to be the period that the turbine generators are disconnected from the power grid. Because the opening and closing of the output breakers do not correspond to the POS transitions defined in Table 11.3.3-1, this analysis used a different definition of the refueling outage.

As used here, the refueling outage begins when the power falls below 15% during coastdown to the outage, (i.e., it begins with POS 1D). The outage ends when the power returns above 15%, leaving POS 1U.

The first fuel cycle was not typical because there were many special tests and a scheduled mid-cycle maintenance outage. Therefore the first cycle was excluded in calculating the average cycle length.

The first RFO was also eliminated because it was not expected to be representative of later RFOs.

The start and end of RFO4 could not be determined to the hour without the operator logs for those days. However, the outage scenario was sufficient to determine the dates within a day, and that was sufficient for this step of the analysis.

The durations of fuel cycles 2, 3 and 4 and their subsequent RFOs are shown in Table 11.3.3-2. The average RFO duration is 56 days with an average of 419 days between RFOs. Using these average times, the fraction of time spent in a fuel cycle, f_c , is 0.88, and the fraction of time spent in a refueling outage, f_r , is 0.12.

11.3.3.3 Relative Times Spent in POSs During RFOs

This section calculates the relative lengths of POSs during RFOs. Tables 11.3.3-3 through 11.3.3-5 contain details of POS changes during RFOs 2, 3, and 4. A few transition times are missing from RFO4 because the operator log was not available. However, information from a critique of RFO4 made it possible to estimate these times. Table 11.3.3-6 combines these data to derive estimates of the relative times spent in each POS of an RFO.

11.3.3.4 Relative Times Spent in Power Dips Between RFOs

Tables 11.3.3-7 through 11.3.3-10 contain details of POS changes between RFOs for fuel cycles 1, 2, 3, and 4 respectively. This information was obtained from a review of the microfilmed operator logs. Data were omitted for the startup testing period through the maintenance outage in the middle of fuel cycle 1 as being nonrepresentative of the "normal" operation of the plant.

Data were also omitted for two periods that would have been covered by the missing logs described in Section 11.3.3.1. Table 11.3.3-11 tabulates the total non-RFO time during which power dips could have been tabulated for this analysis, a total of 1016 days.

Table 11.3.3-12 summarize the power dips tabulated in Tables 11.3.3-7 through 11.3.3-10 for SCRAMs that occurred during the time period examined. Table 11.3.3-13 does the same for controlled shutdowns. The information contained in these two tables, along with the total non-RFO time as determined in Table 11.3.3-11 were used to estimate the fraction of time the plant spent responding to a SCRAM (f_s), and the fraction of time the plant spent in a controlled shutdown with power below 15% (f_c). These two fractions were then used to obtain

Table 11.3.3-2. Durations of Fuel Cycles 2 Through 4

			<u>Duration (days)</u>		<u>RFO</u>
			<u>Cycle</u>		
End	RFO1	01/08/87			
Begin	RFO2	11/07/87	Fuel Cycle 2	303	
End	RFO2	01/06/88	RFO2		60
End	RFO2	01/06/88			
Begin	RFO3	03/17/89	Fuel Cycle 3	436	
End	RFO3	04/29/89	RFO3		48
End	RFO3	04/29/89			
Begin	RFO4	09/28/90	Fuel Cycle 4	517	
End	RFO4	11/26/90	RFO4		59
Average			Fuel Cycle	419	
			RFO		56

$$f_r = 0.88$$

$$f_r = 0.12$$

Table 11.3.3-3 Plant Operational State Changes During Refueling Outage 2

Year	Date	Time	New Power	POS	Hours in POS	Remarks
1987	11/07	~ 0100	15 %	1	1	Coast down for RFO2
		0222		2	15	
		~ 1730		3	2	
		1935		4	0.1	
		1940		5	83	Mode 4 entered
	11/11	0600		6	38	Reactor head off
	11/12	~ 2000		7	589	
	12/07	0850		7	69	RHR B declared operable
	12/10	0600		6	292	
	12/22	1000		5	296	Reactor head on
1988	01/03	1727		1	59	Mode 2 entered
	01/06	~ 0430	15 %			

Table 11.3.3-4 Plant Operational State Changes During Refueling Outage 3

Year	Date	Time	New Power	POS	Hours in POS	Remarks
1989	03/17	~ 2140	15 %	1	7	
	03/18	0450		2	2	
		~ 0700		3	9	
		1531		4	4	
		1935		5	78	Mode 4 entered
	03/22	0115		6	117	Reactor head off
	03/26	200		7	175	
	04/03	435		7	67	
	04/05	2330		6	334	
	04/19	2100		5	17	Reactor head on
	04/20	1345		6	12	Reactor head off
	04/21	0145		5	173	Reactor head on
	04/28	0704		1	45	Mode 2 entered
	04/30	0416	~ 15 %			Mode 1 entered

Table 11.3.3-5 Plant Operational State Changes During Refueling Outage 4

Year	Date	Time	New Power	POS	Hours in POS	Remarks
1990	09/28	2300	~ 15	1	31	
	09/30	0600		2	0	Mode 3 entered
		0600		3	8	P at 480 at 0428
		1403		4	2	SDC A Started
		1620		5	87	Mode 4 entered
	10/04	0728		6	286	Reactor head off
	10/16	0530		7	323	
	10/29	1652		7	121	
	11/03	1737		6	237	
	11/13	1440		5	267	Reactor head on
	11/24	1718		1	43	Mode 2 entered
	11/26	1236	~ 15			Mode 1 entered

Table 11.3.3-6 Durations of Plant Operational States During RFOs 2, 3, and 4

POS	Hrs in RFO2	Hrs in RFO3	Hrs in RFO4	Average Hrs in RFO	Fraction of Time	Error Factor
1D	1	7	31	13	$f_{1d1r} = 0.01$	$EF(f_{1d1r}) = 5$
2D	15	2	0	6	$f_{2d1r} = 0.005$	$EF(f_{2d1r}) = 5$
3D	2	9	8	6	$f_{3d1r} = 0.005$	$EF(f_{3d1r}) = 3$
4D	0.1	4	2	2	$f_{4d1r} = 0.002$	$EF(f_{4d1r}) = 10$
5D	83	78	87	83	$f_{5d1r} = 0.064$	$EF(f_{5d1r}) = 2$
6D	38	117	286	147	$f_{6d1r} = 0.11$	$EF(f_{6d1r}) = 10$
7D	589	175	323	362	$f_{7d1r} = 0.28$	$EF(f_{7d1r}) = 3$
7U	69	67	121	86	$f_{7u1r} = 0.07$	$EF(f_{7u1r}) = 1.3$
6U	292	346	237	292	$f_{6u1r} = 0.23$	$EF(f_{6u1r}) = 1.2$
5U	296	190	267	251	$f_{5u1r} = 0.19$	$EF(f_{5u1r}) = 1.1$
1U	59	45	43	49	$f_{1u1r} = 0.04$	$EF(f_{1u1r}) = 2$
TOTAL	1444	1040	1405	1297	1	

Table 11.3.3-7 Plant Operational State Changes During Unscheduled Power Dips That Go Below 15% for Fuel Cycle 1

Year	Date	Time	New Power	POS	Min. in POS	Power Reduction Initiator
1985	12/19	1134	<100	2	146	SCRAM, condenser tube leaks
		~1400		3	160	
		1640		4	60	
		1740		5	3947	
	12/22	1127		1	2043	
	12/23	~2130	15			SCRAM, low HW water level
	12/31	1255	96	2	515	
		~2130		3	300	
1986	01/01	0230		1	1260	
		2340	15			
	02/12	1930	60	2	330	SCRAM, RFPT "B" tripped
	02/13	~0100		3	190	
		0410		4	95	
		0545		5	4925	
	02/16	1550		1	1426	
	02/17	1536	15			Controlled S/D, excess ADS receiver leakage Manual SCRAM
	03/19	~2030		1	70	
		2140		2	260	
	03/20	~0200		3	1485	
	03/21	0245		4	45	
		0330		5	4441	
	03/24	0531		1	2039	
	03/25	1530	15			Manual SCRAM, SRV stuck open until SCRAM
	04/07	1912	61	2	168	
		~2200		3	420	
	04/08	0500		4	125	
		0705		5	4194	
	04/11	0459		1	1741	SCRAM, Loss of PSW, Instr Air & others (human error, pwr pnl feeder inadvis. open) (held at P=500± for 15 hr, included all in POS 2)
	04/12	~1000	15			
	07/25	1520		2	1398	
	07/26	1438		1	1252	SCRAM, Turbine CV fast closure (cause not logged)
	07/27	~1130	15			
	08/25	1515		2	465	
		~2300		3	3285	
	08/28	0545		4	285	
		1030		5	4284	
	08/31	0954		1	1776	
	09/01	~1530	15			

Table 11.3.3-8 Plant Operational State Changes During Unscheduled Power Dips That Go Below 15% for Fuel Cycle 2

Year	Date	Time	New Power (%)	POS	Min. in POS	Power Reduction Initiator
1987	06/29	1925	100	2	883	SCRAM, turb trip on false low vacuum (relay failure)
	06/30	1008		1	2212	
	07/01	~ 2300	15			
	08/06	0625	100	2	3095	SCRAM, turbine trip (failed limit switches on 500 kV brkrs)
	08/08	~ 1000		3	1556	
	08/09	1156		1	1654	
	08/10	~ 1530	15			

Table 11.3.3-9 Plant Operational State Changes During Unscheduled Power Dips That Go Below 15% for Fuel Cycle 3

Year	Date	Time	New Power (%)	POS	Min. in POS	Power Reduction Initiator
1988	01/10	1508	92	2	472	SCRAM, main transformer failure
		~ 2300		3	3875	
	01/13	1535		1	3145	
	01/15	~ 2000	15			
	01/19	0438	96	2	3022	Manual SCRAM, false condensate level reading (manway leak onto level switch)
	01/21	~ 0700		3	1063	
	01/22	0043		1	1217	
		~ 2100	15			SCRAM, low level after 1/4 of rods SCRAM (true "half SCRAM" + wiring error)
	03/15	0950	100	2	586	
		1936		1	1104	
	03/16	~ 1400	15			SCRAM, Rx level < 11.4" (no reason in log)
	08/15	1553	100	2	424	
		2257		1	1443	
	08/16	~ 2300	15			SCRAM, Scram disch vol water level hi (while attempting to restore P64-F282B after failing stroke time)
	09/05	1828	100	2	512	
	09/06	0300		1	870	
		~ 1730	15			Controlled S/D, excessive drywell leakage (HPCS line break)
	09/08	~ 1430	15	1	3646	
	09/11	0316		2	104	
		~ 0500		3	120	
		0700		4	150	
		0930		5	986	
	09/12	0156		1	3154	
	09/14	~ 0630	15			SCRAM, spurious HPCS initiation
	10/10	1059	100	2	481	
		~ 1900		3	292	
		2352		1	1148	
	10/11	~ 1900	15			

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Table 11.3.3-10 Plant Operational State Changes During Unscheduled Power Dips That Go Below 15% for Fuel Cycle 4

Year	Date	Time	New Power (%)	POS	Min. in POS	Power Reduction Initiator
1989	05/04	~0530	15	1	930	Controlled S/D, flow control valve positnr repair
		~2100	15			
	05/05	0948	20	2	312	SCRAM, flow control valve stem replacement
		~1500		3	235	
		1855		4	63	
		1958		5	3209	
	05/08	0127		1	1413	
	05/09	~0100	15			
	05/12	~0500		1	2335	Controlled S/D, recirc pump shaft cracked SCRAM
	05/13	1955	4.5	2	305	
	05/14	~0100		3	2922	
	05/16	0142		4	20	
		0202		5	22167	
	05/31	1129		1	2491	
	06/02	~0500	15			SCRAM, lightning strike
	07/22	1723	100	2	427	
	07/23	~0030		3	150	
		~0300		1	1020	
		~2000	15			SCRAM, low condensor vacuum (expansion joint rupture)
	08/14	0818	100	2	252	
		~1230		3	420	
		1930		4	59	
		2029		5	11179	
	08/22	1448		1	1542	
	08/23	~1630	15			SCRAM, lightning strike
	11/07	1743	100	2	1160	
	11/08	1303		1	897	
	11/09	~0400	15			SCRAM, loss of PSW (lost radial well pumps)
	12/30	1758	~80	2	302	
		~2300		3	559	
	12/31	~0819		1	1001	
1990	01/01	~0100	15			

Table 11.3.3-11 Non-RFO Time Included in Analysis

Description	Date	Duration (days)
End First Outage	12/10/85	34
Begin missing log	01/13/86	89
End missing log	02/12/86	
Begin missing log	05/13/86	86
End missing log	06/12/86	
Begin RFO1	09/06/86	
End RFO1	01/08/87	
Fuel Cycle 2		303
Begin RFO2	11/07/87	
End RFO2	01/06/88	
Fuel Cycle 3		436
Begin RFO3	03/17/89	
End RFO3	04/29/89	
Fuel Cycle 4 (Partial)		68
End microfilm logs	07/05/90	1016
Total		

Table 11.3.3-12 Summary of SCRAMs

Date	Duration (hr)	Initiator
12/19/85	106	condenser tube leaks
12/31/85	35	low HW water level
02/12/86	116	RFPT "B" tripped
04/07/86	111	Manual SCRAM, SRV stuck open until SCRAM
07/25/86	44	Loss of PSW, Instr Air & others (human inadv. opened power panel feeder)
08/25/86	168	Turbine CV fast closure
06/29/87	52	Turb. trip on false low vacuum (relay failure)
08/06/87	105	turbine trip (failed limit switches on 500 kV breakers)
01/10/88	125	main transformer failure
01/19/88	88	Manual SCRAM, false condensate level reading (manway leak onto level switch)
03/15/88	28	low level after 1/4 of rods SCRAM (true "half SCRAM" + wiring error)
08/15/88	31	Rx level < 11.4" (no reason in log)
09/05/88	24	high SDV water level (while attempting to restore P64-F282B after failing stroke time)
10/10/88	32	spurious HPCS initiation
07/22/89	27	lightning strike
08/14/89	224	low condenser vacuum (expansion joint rupture)
11/07/89	34	lightning strike
12/30/89	31	loss of PSW (lost radial well pumps)
Total 1381 hr (58 days)		Average: 142 hr
$f_s = 0.057$		

Table 11.3.3-13 Summary of Controlled Shutdowns To Below 15%

Date	Duration (hr)	Initiator
03/19/86	139	excess ADS receiver leakage
09/08/88	136	excessive drywell leakage (HPCS line break)
05/04/89	16	flow control valve positioner repair
05/12/89	504	recirc pump shaft cracked
Total 795 hr 33 days		Average: 224 hr
$f_c = 0.033$		
$f_u = 0.91$		

the fraction of time the plant spent with its power level above 15% (f_p) by simply subtracting f_u and f_c from 1.

11.3.3.5 Relative Times Spent in POSs During Power Dips

Table 11.3.3-14 tabulates, for each controlled shutdown, the times spent in each POS. Table 11.3.3-15 does the same for SCRAMs.

11.3.3.6 Merging of Analyses

Combining all of the results into the format of Figure 11.3.3-1 yields Figure 11.3.3-2. The fractions for each POS are summed and displayed in Table 11.3.3-16.

For this study only the time spent in POS 5 during a refueling outage is considered. Thus, from Figure 11.3.3-2 we find the fraction of time spent in POS 5 to be 0.031 ($f_r f_{5d|r} + f_r f_{5u|r}$).

11.3.4 Maintenance Unavailabilities

To account for unavailabilities of components due to test and maintenance during a refueling outage, it is assumed that all Train A ECCS components are always unavailable in POS 5. At Grand Gulf, maintenance during a refueling outage is performed on a train basis (i.e., all ECCS Train A equipment is taken out for maintenance while Train B equipment is either used to maintain critical parameters, or is in standby). Once maintenance has been completed for one train, the freshly maintained train is declared the operational train and maintenance is begun on the other train. In effect,

one train is always out for maintenance. This approximation does not explicitly model the human errors involved in switching trains and subsystems from unavailable to available as the scheduled testing and maintenance activities progress during refueling. However, the more frequently occurring errors resulting in either the loss or isolation of a required system should be present in the data base used to identify applicable initiating events, resulting in their indirect incorporation into the models.

It is assumed that RHR/SDC Train B is the operable shutdown cooling subsystem, and Train A is being maintained. This assumption greatly simplifies the analysis, and the effect on the analysis results should not be significantly different if loop A were chosen to be the normally operating train.

11.3.5 Top Event Fractions

For certain top events (systems or states) contained in the event trees, the fraction of time the plant is on the system or in the state identified by the top event is important. The following subsections describe how the fraction associated with each top event was obtained.

11.3.5.1 PRESS - Fraction of Time Vessel is in Hydro Test (i.e., High Pressure)

Information from RFO 3 and 4 critiques was reviewed to determine the amount of time the plant spends in the Hydro Test condition where the reactor pressure is above atmospheric. Table 11.3.5-1 contains the information used to determine the amount of time the plant spent in

Table 11.3.3-14 Durations of Controlled Shutdown POSs

	Durations(min) for Given Date						
POS	03/86	09/88	05/89	05/89	Total	Avg	
1D	70	3646	930	2335	6981	1787	$f_{1dlc} = 0.2$
2D	260	104		305	669	260	$f_{2dlc} = 0.03$
3D	1486	120		2922	4528	842	$f_{3dlc} = 0.08$
4D	45	150		20	215	403	$f_{4dlc} = 0.04$
5D	4441	986		22167	27594	4380	$f_{5dlc} = 0.45$
1U	2039	3154		2491	7684	2298	$f_{1ulc} = 0.23$
Total	8341	8160	930	30240	47671	11918	

Table 11.3.3-15 Durations of SCRAM and Recovery POSs

	Durations (min) for Given POS					
Date	2D	3D	4D	5D	1U	Total
12/85	146	160	60	3947	2043	6356
12/85	515	300			1260	2075
02/86	330	190	95	4925	1426	6966
04/86	168	420	125	4194	1741	6648
07/86	1398				1252	2650
08/86	465	3285	285	4284	1776	8685
06/87	883				2212	3695
08/87	3095	1556			1654	7745
01/88	472	3875			3145	7492
01/88	3022	1063			1217	5302
03/88	586				1104	1690
08/88	424				1443	1867
09/88	512				870	
10/88	481	292			1148	1741
05/89	312	235	63	3209	1413	
07/89	427	150			1020	46027
08/89	252	420	59	11179	1542	
11/89	1160				897	2057
12/89	302	559			1001	1922
Total (hr)	263	163	181	1596	455	2658
$f_{pos,1u}$	0.10	0.06	0.07	0.60	0.17	

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Decomposition Process		Plant Condition	Fraction Spent in Each Conditions	
$f_p = 0.91$	Power > 15%		$f_{fp} = 0.80$	
	$f_{1d c} = 0.2$	1D	$f_{f_{1d c}} = 0.007$	
	$f_{2d c} = 0.03$	2D	$f_{f_{2d c}} = 0.001$	
	$f_{3d c} = 0.08$	3D	$f_{f_{3d c}} = 0.003$	
	$f_{4d c} = 0.04$	4D	$f_{f_{4d c}} = 0.001$	
	$f_{5d c} = 0.45$	5D	$f_{f_{5d c}} = 0.015$	
$f_c = 0.033$	$f_{1u c} = 0.23$	1U	$f_{f_{1u c}} = 0.008$	
	$\overline{1.0}$			
(During Fuel Cycle)	$f_{2d s} = 0.10$	2D	$f_{f_{2d s}} = 0.005$	
	$f_{3d s} = 0.06$	3D	$f_{f_{3d s}} = 0.003$	
	$f_{4d s} = 0.07$	4D	$f_{f_{4d s}} = 0.004$	
	$f_{5d s} = 0.60$	5D	$f_{f_{5d s}} = 0.03$	
$f_i = 0.88$	$f_{1u s} = 0.17$	1U	$f_{f_{1u s}} = 0.009$	
$f_s = 0.057$	$\overline{1.0}$			
(During RFO)	$f_{1d r} = 0.01$	1D	$f_{f_{1d r}} = 0.001$	
$f_r = 0.12$	$f_{2d r} = 0.005$	2D	$f_{f_{2d r}} = 0.0006$	
	$f_{3d r} = 0.005$	3D	$f_{f_{3d r}} = 0.0006$	
	$f_{4d r} = 0.002$	4D	$f_{f_{4d r}} = 0.0002$	
	$f_{5d r} = 0.064$	5D	$f_{f_{5d r}} = 0.008$	
	$f_{6d r} = 0.11$	6D	$f_{f_{6d r}} = 0.013$	
	$f_{7d r} = 0.28$	7D	$f_{f_{7d r}} = 0.034$	
	$f_{1u r} = 0.07$	7U	$f_{f_{1u r}} = 0.008$	
	$f_{6u r} = 0.23$	6U	$f_{f_{6u r}} = 0.028$	
	$f_{5u r} = 0.19$	5U	$f_{f_{5u r}} = 0.023$	
	$f_{1u r} = 0.04$	1U	$f_{f_{1u r}} = 0.005$	
	$\overline{1.0}$		$\overline{1.0}$	

Figure 11.3.3-2. Results of Analysis

Table 11.3.3-16 Relative Times in POSs

Plant Stage	f
1D	0.008
2D	0.0066
3D	0.0066
4D	0.0052
5D	0.053
6D	0.013
7D	0.034
7U	0.008
6U	0.028
5U	0.023
1U	0.022

Table 11.3.5-1 Time Vessel is in Hydro Test in POS 5

RFO	Date	Time	Hours in Hydro	Comments
3	4/23/89	1500	31.3	Start Hydro
	4/24/89	2215		End Hydro
4	11/17/90	2004	34.9	Start Hydro
	11/19/90	0700		End Hydro

Table 11.3.5-2 Fraction of Time Vessel is in Hydro Test in POS 5

Time in	RFO3	RFO4	Total Hours	Average Hours	Fraction, f
Hydro	31.3	34.9	77.2	33.1	.11
non-Hydro	236.7	319.1	555.8	277.9	.89
Total				311	1.0

Hydro for RFOs 3 and 4. This information is summarized in Table 11.3.5-2. The table also provides an estimate of the fraction of time in hydro (i.e., PRESS).

11.3.5.2 ISSDC - Initial Status of Shutdown Cooling in POS 5: Fraction of Time ADHR Operating to Remove Decay Heat

Information from RFO 2, 3, and 4 critiques was reviewed to determine the amount of time the plant spends operating with ADHRS as the decay heat removal mechanism. The information in the RFO 2 critique was too sparse to prove useful. However, the RFO 3 and 4

critiques did provide enough detailed information so that estimates could be made of the time spent cooling with ADHRS. Table 11.3.5-3 contains the information used to determine the time spent removing decay heat by using ADHRS. Since ADHRS is only viable when the plant is in a non-Hydro state, the fraction of time ADHRS is providing cooling must be based on the time spent in the non-Hydro state. From Table 11.3.5-2 the average number of hours spent in the non-Hydro state is 277.9. Table 11.3.5-4 summarizes the information from Table 11.3.5-3 and makes use of the non-Hydro state information to provide an estimate for the fraction of time spent on ADHRS. To arrive at the numerical value to be used for the ISSDC event, the fraction obtained in Table 11.3.5-4 must be divided by the non-Hydro

Table 11.3.5-3 Time Plant is on ADHR to Remove Decay Heat

RFO	Date	Time	POS	Hours on ADRHS
3	4/22/89	1610	5U ₂	54.1
	4/24/89	2215	5U ₂	
4	10/1/90	2015	5D	7.2
	10/2/90	0329	5d	
	10/3/90	0505	5D	1
		0605	5D	

Table 11.3.5-4 Fraction of Time Plant is on ADHR to Remove Decay Heat

RFO3 Hrs.	RFO4 Hrs.	Total Hrs.	Average Hrs.	Fraction, f
38.2	8.2	46.4	23.2	0.08
Average Total Hours in non-Hydro State (from Table 11.3.5-2)			277.9.	

fraction to properly account for the way the events are used in the event trees. Thus, the numerical value for ISSDC is 0.09 ($0.08 \div 0.89$).

11.3.5.3 ISSDB - Fraction of Time on RHR/SDC in POS 5

Since ISSDB represents the complement of ISSDC, the value for ISSDB is 0.91 ($1.00 - 0.09$).

11.3.5.4 ISADH - Fraction of Time on ADHR in POS 5

This event represents the same state as does ISSDC, except for a different set of initial conditions. Therefore, the value calculated for ISSDC in Section 11.3.5.2 can be used here for ISADH (i.e., 0.09).

11.3.5.5 ISSP - Initial Status of SP in POS 5: With Water or Empty

Information from RFO 2, 3, and 4 critiques was reviewed to determine the status of the SP in POS 5 (i.e., with water or empty). The RFO 2 critique did not contain enough information to be useful. However, the RFO 3 and 4 critiques did provide enough information so that estimates could be made of the time spent in POS 5 with the SP water at "normal" level, "reduced" level, or empty. Table 11.3.5-5 displays the information extracted from the critiques that was used to determine the amounts of time spent in each state. Table 11.3.5-6 summarizes this information and provides estimates for the fractions associated with each state. From Table 11.3.5-5 it can be seen that no time was spent with the SP empty. Grand Gulf's Tech Specs allow for the SP to be empty given that the HPCS system is available and aligned to take suction from the CST. In order to estimate the

Table 11.3.5-5 Time Spent With SP Water Level in Various States

RFO	Date	Time	POS	Hours SP Water Level is			Comments
				Normal	Reduced	Empty	
3	3/18/89	1935	5D	22.7			Mode 4 entered
	3/19/89	1815					Containment transfer canal gate set in place...
	2/22/89	0115	5D		55		Reactor Head off
	4/19/89	2100	5U		109.3		Total hours minus hours in POS 6U (121.3-12)
	4/24/89	2220	5U	80.7			Reactor cavity/SP flooded
	4/28/89	0704					
4	9/30/90	1620	5D	42.7			
	10/2/90	1103	5D		44.4		
	10/13/90	1440	5U		110.8		
	11/18/90	0530	5U	155.8			
	11/24/90	1718					

Table 11.3.5-6 Fraction of Time SP Water Level is Normal, Reduced, or Empty

SP Water Level	RFO3 Hrs.	RFO4 Hrs.	Total Hrs.	Average Hrs.	Fraction, f
Normal	103.4	198.5	301.9	150.95	0.48
Reduced	164.3	155.2	319.5	159.75	0.52
Empty	0	0	0	0	0.01
Total				310.7	1

importance of an empty SP without unnecessarily impacting the fractions of time water is available in the suppression pool, a screening value of 0.01 was assigned to the case where the SP is empty (i.e., ISSP).

11.3.5.6 SPWLV - Fraction of Time Suppression Pool Water Level is 12' 8"

Since no specific suppression pool water level data was available, the information from Table 11.3.5-6 was used

to estimate the value for SPWLV. The fraction 0.52 was chosen as the value most closely representing the SPWLV event.

11.3.5.7 ISMSV - Fraction of Time the MSIVs are Initially Open in POS 5

From an examination of RFO critiques it appears that the MSIVs are closed during all of POS 5. However, in an

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attempt to determine whether or not open MSIVs are important from a safety point of view, a screening value of 0.01 was assumed for the ISMSV event. This value was small enough not to significantly impact the sequences where the MSIVs are closed, but large enough to ensure that if open MSIVs are an important safety consideration the sequences would survive.

11.3.5.8 ISTRC - Fraction of Time Natural Recirculation is Possible

From an examination of RFO 4 information Table 11.3.5-7 was constructed. This table provides the information extracted from the RFO 4 critique. The information is summarized in Table 11.3.5-8 where the value for ISTRC is estimated to be 0.63. It should be noted that the information available to the analyst did not specifically state that forced recirculation was not occurring during the time the vessel water level was sufficient for natural circulation. This did not present any difficulty to the models since if forced recirculation was present during the time when water level was sufficient for natural circulation, the only impact would be to mix the water in a more thorough manner than would be possible by natural circulation.

11.3.5.9 ISTCT - Fraction of Time the Containment is Open and CTGOP - Fraction of Time the Containment is Open Low

From an examination of the RFO 3 and 4 critiques it was assumed that the containment was closed approximately eight percent of the time. Thus, the value for ISTCT was set at 0.92 (i.e., $1.0 - 0.08$). Furthermore, it was assumed that the value for CTGOP was 0.9.

11.3.6 Estimates for System Maintenance Unavailabilities

The following two subsections describe how system maintenance unavailability was determined for the HPCS and CDS systems respectively. These system maintenance unavailabilities were used during sequence quantification to represent the system maintenance basic events in the appropriate system fault trees.

11.3.6.1 HPCS System Maintenance Unavailability

Information from RFO critiques was examined to determine the availability of the HPCS system during POS 5. Table 11.3.6-1 contains the information

extracted from RFO critiques 2 and 4. Table 11.3.6-2 summarizes this information and provides an estimate for the HPCS system maintenance unavailability event. From Table 11.3.6-2 we see that for the HPCS, system unavailability is 0.2.

11.3.6.2 CDS System Maintenance Unavailability

Information from RFO critiques was examined to determine the availability of the CDS system during POS 5. Table 11.3.6-3 contains the information extracted from RFO critiques 3 and 4. Table 11.3.6-4 summarizes this information and provides an estimate for the CDS system maintenance unavailability event. From Table 11.3.6-4 we see that for the CDS, system unavailability is 0.4.

11.4 Data Changes Necessitated by the Time Window Analysis

After quantifying the accident sequences using the above estimates which were based on averaging the various events across the total time spent in a refueling outage POS 5, the sequences were re-examined during the Time Window Analysis. This analysis made use of three distinct time regimes in POS 5. These time regimes were:

Time Window 1 -	Entry into POS 5 to 24 hours after shutdown,
Time Window 2 -	24 hours after shutdown to entry into POS 6, and
Time Window 3 -	POS 5 after core alteration and vessel re-assembly.

In order to more realistically model the accident sequences in these time windows, the values associated with the top events and basic events described in Sections 11.3.4, 11.3.5, and 11.3.6 were recalculated. This re-analysis generated new values for the above events based on the specific availability/unavailability of the event in each time window. In addition, new values for battery depletion events, recovery from LOSP events, and actual unavailabilities of the ECCS Train A equipment were generated. The results of this re-examination and generation process are presented in Table 11.4.1

References for Section 11

- [Drouin, et al., 1989] M. T. Drouin et al.,
"Analysis of Core Damage
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NUREG/CR-4550, SAND86-
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Table 11.3.5-7 Time Vessel Level is Sufficient for Natural Circulation in POS 5

RFO	Date	Time	POS	Hours Level Sufficient for Natural Circulation	Hours Level Will Not Support Natural Circulation	Comments
4	9/30/90	1620	5D	87.1		Enter Mode 4
	10/4/90	0728	5D			Reactor Vessel Head Off
	11/13/90	1440	5U	134.8		Reactor Vessel Head On
	11/19/90	0526	5U			Commence Reactor Pressure Reduction
	11/19/90	0526	5U		131.9	
	11/24/90	1718	5U			Mode Switch to Startup

Table 11.3.5-8 Fraction of Time Vessel Level is Sufficient for Natural Circulation in POS 5

Time	Hours Level Supports Natrual Circulation	Hours Level Supports Forced Circulation	Total Hours	Fraction of Time, f, Level Supports Natural Circulation
RFO4	221.9	131.9	353.8	0.63

Table 11.3.6-1 Availability/Unavailability of HPCS During POS 5

RFO	Date	Time	Available	Hours
2	11/7/87	1940	Yes	20.3
	11/8/87	1600	No	62.3
	11/11/87	0600		
	12/22/87	1000	Yes	296
	1/3/88	1727		
4	9/30/90	1620	No	
	10/4/90	0728		87.1
	11/13/90	1440	Yes	266.6
	11/24/90	1718		

Table 11.3.6-2 Fraction of Time HPCS is Unavailable During POS 5

Available	RFO 2 Hours	RFO 4 Hours	Total Hours	Average Hours	Fraction, f
Yes	316.3	266.6	582.9	291.45	0.8
No	62.3	87.1	149.4	74.7	0.2
Total				366.15	1.0

Table 11.3.6-3 Availability/Unavailability of CDS During POS 5

RFO	Date	Time	Available	Hours
3	3/18/89	1935	Yes	0.2
		1950	No	77.4
	3/22/89	0115		
	4/19/89	2100	No	16.8
	4/20/89	1345		
	4/21/89	0145	No	11.4
		1310		
	4/28/89	0704	Yes	161.9
4	9/30/90	1620	Yes	13.2
	10/1/90	0500		
	10/4/90	0728	No	74.0
	11/13/90	1440	No	70.6
	11/16/90	1317		
	11/24/90	1718	Yes	196.0

Table 11.3.6-4 Fraction of Time CDS is Unavailable During POS 5

Available	RFO 3 Hours	RFO 4 Hours	Total Hours	Average Hours	Fraction, f
Yes	162.1	209.2	371.3	185.65	0.6
No	105.6	144.6	250.2	125.1	0.4
Total				310.75	1.0

Table 11.4.1 Event Values for Time Window Analysis

CTGOP-W1	9.000E-001
CTGOP-W2	9.000E-001
CTGOP-W3	9.000E-001
DC-12-G-DC3	9.320E-002
DC-12-G-DC3P5	9.200E-002
DC-12-G-DC5P5	7.690E-002
DC-14P5-G-DC2	2.290E-001
DC-18P5-G-DC12	4.907E-001
DC-20P5-G-DC12	6.756E-001
DC-21-G-DC12	7.222E-001
DC-2H-DEP	5.000E-003
DC-3-G-DC2	2.500E-003
DC-3P5-G-DC2	3.769E-003
DC-5P5-G-DC2	2.010E-002
DG11-UNAVAIL-W1	8.800E-001
DG11-UNAVAIL-W2	1.000E+000
HCS-SYS-MAINT-W1	6.700E-001
HCS-SYS-MAINT-W2	9.100E-001
HCS-SYS-MAINT-W3	0.000E+000
ISADH-W2	6.200E-002
ISADH-W3	1.010E-001
ISMSV-W1	1.000E-002
ISMSV-W2	1.000E-002
ISMSV-W3	1.000E-002
ISMSV-W3-0	0.000E+000
ISSDB-W1	1.000E+000
ISSDB-W2	9.380E-001
ISSDB-W3	8.990E-001
ISSDC-W1	0.000E+000
ISSDC-W2	6.200E-002
ISSDC-W3	1.010E-001
ISSP-W1	1.000E-002
ISSP-W2	1.000E-002

ISSP-W3	1.000E-002
ISTCT-W1	1.000E+000
ISTCT-W2	1.000E+000
ISTCT-W3	8.900E-001
ISTRC-W1	1.000E+000
ISTRC-W2	1.000E+000
ISTRC-W3	5.000E-001
PRESS-W1	0.000E+000
PRESS-W2	0.000E+000
PRESS-W3	1.690E-001
RA-HPCS-HW-1-W1	7.200E-001
RA-HPCS-HW-1-W2	9.600E-001
RA-HPCS-HW-1-W3	5.000E-002
RA-HPCS-HW-2-W1	7.200E-001
RA-HPCS-HW-2-W2	9.600E-001
RA-HPCS-HW-2-W3	5.000E-002
RA-LOSP-12-G-3	2.390E-001
RA-LOSP-12-G-3P5	3.380E-001
RA-LOSP-12-G-5P5	4.890E-001
RA-LOSP-3-G-2	7.280E-001
RA-LOSP-3P5-G-2	6.310E-001
RA-LOSP-3P5H	6.500E-002
RA-LOSP-5P5-G-2	4.370E-001
SDCA-W1	5.000E-002
SDCA-W2	2.900E-001
SPWLV-W1	0.000E+000
SPWLV-W2	6.800E-001
SPWLV-W3	4.800E-001
WD-1	3.000E-002
WD-2	2.120E-001
WD-3	7.580E-001

12 Accident Sequence Quantification

12.1 General Approach

The accident sequences that result in core damage for each initiating event (IE) examined in POS 5 are shown graphically by the event trees in Section 6. How the frequencies for each accident sequence were obtained is described in this section. In general, the process used the following steps:

- (1) Sequence logic for the "level" (i.e., the "sequence" logic through a specified number of transfer event trees) being analyzed was generated using the event trees as contained in the IRRAS [Russell, et al., 1992] data base for the IE being examined. (NOTE: Due to continued development of the IRRAS Code, in part to provide this project with more efficient tools, many different "versions" of IRRAS were used during this analysis. The reference is used only to represent the most up-to-date version that has been released for general use and in no way implies that all work was performed on Version 4.0.) This approach was necessary due to the large number of possible accident sequences.
- (2) Once the sequence logic was generated it was checked for any non-valid sequences. This step was necessary since the use of multiple transfer trees sometimes resulted in invalid sequence logic being generated.
- (3) After the sequence logic was checked, any changes that needed to be made to the base case values of the basic events were identified and incorporated into "Change Sets" as a means of modifying basic event values, turning on or off particular gates in the system fault trees, or simply using the name of a particular top event to represent the failure of some system.
- (4) After the Change Sets were finalized, the sequences that were to be analyzed were "marked" in the appropriate IRRAS menu. The appropriate truncation information was entered, and the sequences were solved using the logic information contained in the top event (system) fault trees both for the failed top events and the successful top events (to allow deletion of cut sets which are not appropriate for the sequence being analyzed (called DELETE TERM in SETS)).
- (5) If any of the sequences analyzed ended in core damage, the appropriate information was stored for later use. For any sequence surviving truncation, steps 1 through 4 were repeated for the next "level" of analysis. This process was repeated until all sequences either terminated in core damage or were eliminated by truncation.
- (6) After all core damage sequences were obtained for the IE being examined, the sequence cut sets were examined for validity and for potential operator recovery actions. For those cut sets where recovery was appropriate, a basic event was incorporated into the cut set. This basic event represents the failure of the operator to perform the required action(s).
- (7) Core damage sequences surviving the point estimate calculations from (6) were examined during the Time Window Analysis. This analysis incorporated specific system unavailabilities and decay heat loads for three distinct time regimes.
- (8) Uncertainty analyses were performed on each core damage sequence surviving the Time Window Analysis (i.e., (7)).

12.2 Point Estimate Results from the Quantification of Each IE Both Before and After Recovery

In this section, the results from the point estimate accident sequence quantification task will be presented. The results both before and after recovery will be presented for each IE in its own subsection. Section 12.3 summarizes the point estimate totals for all IEs before the Time Window Analysis, and Section 12.4 summarizes the results of the Time Window Analysis.

12.2.1 T5D - Loss of CCW

The results from the accident sequence analysis for T5D are presented in Table 12.2.1. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at 1E-8, the sequence frequency and the number of cut sets after the final

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recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.2 T5A - Loss of SSW

The results from the accident sequence analysis for T5A are presented in Table 12.2.2. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.3 TDB - Loss of 1E 125 V DC Bus B

The results from the accident sequence analysis for TDB are presented in Table 12.2.3. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.4 TIA - Loss of Instrument Air

The results from the accident sequence analysis for TIA are presented in Table 12.2.4. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.5 TAB - Loss of 1E 4160 V AC Bus B

The results from the accident sequence analysis for TAB are presented in Table 12.2.5. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final

recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.6 J2 - LOCA in Connected System (RHR)

The results from the accident sequence analysis for J2 are presented in Table 12.2.6. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.7 E1B - Isolation of SDC Loop B

The results from the accident sequence analysis for E1B are presented in Table 12.2.7. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.8 E2B - Loss of SDC Loop B

The results from the accident sequence analysis for E2B are presented in Table 12.2.8. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.9 E1D - Isolation of ADHRS

The results from the accident sequence analysis for E1D are presented in Table 12.2.9. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence

frequency and the number of cut sets after the final recovery pass with truncation at $1\text{E-}8$, and totals for each of the previous items.

12.2.10 E2D - Loss of ADHRS

The results from the accident sequence analysis for E2D are presented in Table 12.2.10. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1\text{E-}8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1\text{E-}8$, and totals for each of the previous items.

12.2.11 T5B - Loss of TBCW

The results from the accident sequence analysis for T5B are presented in Table 12.2.11. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1\text{E-}8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1\text{E-}8$, and totals for each of the previous items.

12.2.12 T5C - Loss of PSW

The results from the accident sequence analysis for T5C are presented in Table 12.2.12. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1\text{E-}8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1\text{E-}8$, and totals for each of the previous items.

12.2.13 A5 - Large LOCA

The results from the accident sequence analysis for A5 are presented in Table 12.2.13. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1\text{E-}8$, the sequence

frequency and the number of cut sets after the final recovery pass with truncation at $1\text{E-}8$, and totals for each of the previous items.

12.2.14 S2H-5 - Small LOCA During Hydro

The results from the accident sequence analysis for S2H-5 are presented in Table 12.2.14. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1\text{E-}8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1\text{E-}8$, and totals for each of the previous items.

12.2.15 S3H-5 - Small-Small LOCA During Hydro

As a result of the accident sequence analysis for S3H-5, all accident sequences were determined to be below the truncation value of $1\text{E-}8$, thus no sequences survived quantification.

12.2.16 A5HY - Large LOCA During Hydro

The results from the accident sequence analysis for A5HY are presented in Table 12.2.15. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1\text{E-}8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1\text{E-}8$, and totals for each of the previous items.

12.2.17 S1H-5 - Intermediate LOCA During Hydro

The results from the accident sequence analysis for S1H-5 are presented in Table 12.2.16. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1\text{E-}8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1\text{E-}8$, and totals for each of the previous items.

12.2.18 S2-5 - Small LOCA

The results from the accident sequence analysis for S2-5 are presented in Table 12.2.17. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.19 S3-5 - Small-Small LOCA

The results from the accident sequence analysis for S3-5 are presented in Table 12.2.18. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.20 S1-5 - Intermediate LOCA

The results from the accident sequence analysis for S1-5 are presented in Table 12.2.19. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.21 TIOP - Inadvertent Overpressurization (Loss of RWCU)

The results from the accident sequence analysis for TIOP are presented in Table 12.2.20. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.22 E1C - Isolation of RWCU During Hydro

As a result of the accident sequence analysis for E1C, all accident sequences were determined to be below the truncation value of $1E-8$, thus no sequences survived quantification.

12.2.23 E2C - Loss of RWCU During Hydro

As a result of the accident sequence analysis for E1C, all accident sequences were determined to be below the truncation value of $1E-8$, thus no sequences survived quantification.

12.2.24 E2T - Loss of SDC Common Suction Line

The results from the accident sequence analysis for E2T are presented in Table 12.2.21. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.25 E2V - Loss of Common Suction Line for ADHRS

The results from the accident sequence analysis for E2V are presented in Table 12.2.22. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.26 TLM - Loss of Makeup (CRD)

The results from the accident sequence analysis for TLM are presented in Table 12.2.23. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence

frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.27 E1T - Isolation of SDC Common Suction Line

The results from the accident sequence analysis for E1T are presented in Table 12.2.24. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.28 E1V - Isolation of Common Suction Line for ADHRS

The results from the accident sequence analysis for E1V are presented in Table 12.2.25. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.29 TIHP - Inadvertent Pressurization via Spurious HPCS Actuation

The results from the accident sequence analysis for TIHP are presented in Table 12.2.26. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.30 TIOF - Inadvertent Overfill via LPCS or LPCI

The results from the accident sequence analysis for TIOF are presented in Table 12.2.27. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.31 TORV - Stuck Open Relief Valve

As a result of the accident sequence analysis for TORV, all accident sequences were determined to be below the truncation value of $1E-8$, thus no sequences survived quantification.

12.2.32 T1 - Loss of Offsite Power

The results from the accident sequence analysis for T1 are presented in Table 12.2.28. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.33 H1 - Diversion to Suppression Pool via RHR

The results from the accident sequence analysis for H1 are presented in Table 12.2.29. This table provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.2.34 TRPT - Loss of Recirculation Pump

The results from the accident sequence analysis for TRPT are presented in Table 12.2.30. This table

Sequence Quantification

provides the name of the sequence (i.e., the unique identifier produced by the IRRAS code), the sequence frequency and the number of cut sets before recovery, the sequence frequency and the number of cut sets after the first recovery pass but before truncating at $1E-8$, the sequence frequency and the number of cut sets after the final recovery pass with truncation at $1E-8$, and totals for each of the previous items.

12.3 Point Estimate Summary Results for Each IE Before the Time Window Analysis

In this section, a summary of the point estimate results for each IE is presented. First, for each IE, a table containing only those sequences surviving after the final recovery pass is presented. These tables can be used to quickly identify the most dominant sequences. Tables 12.3.1 through 12.3.26 provide the above information for each IE in the same order as in Section 12.2.

In order to further summarize the point estimate sequence quantification results before the Time Window Analysis, Table 12.3.27 contains the total sequence frequency before recovery, the total number of cut sets before recovery, the total sequence frequency and total number of cut sets after the first recovery pass but before truncating at $1E-8$, the total sequence frequency and total number of cut sets after the final recovery pass with truncation for each IE. Table 12.3.27 also provides the total number of sequences for each of the above cases. This information is then summed to provide totals for each of the above categories.

12.4 Results from the Time Window Analysis

In this section, the results from the Time Window Analysis of the core damage sequences surviving the point estimate calculations in Section 12.3 are presented. Table 12.4.1 provides a listing of the sequences, the number of cut sets, and the total point estimate for each of the sequences surviving the Time Window Analysis. From Table 12.4.1 we see that 28 sequences with a total of 38 cut sets survived the Time Window Analysis.

12.5 Uncertainty Calculation Results for Each Sequence Surviving the Time Window Analysis

In this section, the results from the uncertainty calculations for each sequence surviving the point estimate Time Window analysis are presented. In addition, the results from a "total plant model" (i.e., all sequence cut sets) are presented.

12.5.1 Uncertainty Analysis Process

After completing the Time Window analysis, those sequences surviving with a point estimate core damage frequency greater than or equal to $1E-8$ were identified (See Section 12.4.). Uncertainty calculations were then performed for each of these sequences. The process used to perform the uncertainty analysis is as follows:

- (1) The surviving sequences (i.e., the 28 sequences from Section 12.4) were incorporated into a single IRRAS data base.
- (2) A list of all the basic events appearing in each of the surviving 38 cut sets was generated.
- (3) Uncertainty information was obtained for each of the basic events, and this information was entered into the IRRAS data base created in (1).
- (4) Uncertainty calculations were performed for each of the 28 sequences (at the same time) with the following IRRAS Uncertainty Calculation Values:
 - Normal Uncertainty
 - Latin Hypercube
 - Number of samples = 1000
 - Seed = 12345 for random number generator.
- (5) Finally, an uncertainty calculation for a total plant model (incorporating all 38 cut sets into a single analysis) was performed. This calculation used the same IRRAS Uncertainty Values as described in (4).

12.5.2 Uncertainty Analysis Results

Table 12.5.1 presents summary statistics (i.e., mean, 5th percentile, median, 95th percentile, minimum, maximum, and standard deviation) for each of the 28 sequences. Table 12.5.2 provides a comparison of the point estimate core damage frequency to the mean core damage frequency for each sequence. The results of the total plant model are as follows:

Mean	= 2.001E-06
5th Percentile	= 4.127E-07
Median	= 1.337E-06
95th Percentile	= 5.382E-06
Minimum	= 1.579E-07
Maximum	= 5.955E-05
Standard Deviation	= 2.884E-06

Table 12.2.1 Results from Quantification of T5D Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	03-31-28-02-39	2.25e-05	43	4.26e-09	43	0	0
2	03-31-28-02-67	2.02e-04	50	2.98e-09	50	0	0
3	03-31-28-07-39	2.44e-05	43	4.61e-09	43	0	0
4	03-31-28-07-67	2.19e-04	51	3.24e-09	51	0	0
5	03-31-28-13-39	3.92e-07	12	7.21e-11	12	0	0
6	03-31-28-13-67	3.53e-06	12	3.09e-11	12	0	0
7	03-31-28-18-39	4.25e-07	12	7.81e-11	12	0	0
8	03-31-28-18-67	3.83e-06	12	3.35e-11	12	0	0
9	03-31-28-24-03	1.91e-07	2	1.91e-10	2	0	0
10	03-31-28-24-05	1.91e-07	2	6.10e-09	2	0	0
11	03-31-28-50-1-03	8.17e-07	1	8.17e-10	1	0	0
12	03-31-28-50-1-05	8.17e-07	1	2.62e-08	1	0	0
13	03-31-28-50-2	4.30e-08	1	4.30e-08	1	4.30e-08	1
14	03-31-28-51-36	3.12e-08	1	3.12e-08	1	0	0
15	03-32-02-04-02	3.31e-07	3	5.79e-12	3	0	0
16	03-32-02-04-03	1.32e-07	3	2.32e-12	3	0	0
17	03-32-02-04-05	1.32e-07	3	2.32e-09	3	0	0
18	03-32-02-05-02	6.20e-08	6	1.09e-12	6	0	0
19	03-32-02-06-02	1.15e-07	3	2.01e-12	3	0	0
20	03-32-02-06-03	4.60e-08	3	8.05e-13	3	0	0
21	03-32-02-06-05	4.60e-08	3	8.05e-10	3	0	0
22	03-32-02-39	2.43e-05	25	4.59e-09	25	0	0
23	03-32-02-67	2.18e-04	27	3.23e-09	27	0	0
24	03-32-05-01-27	1.20e-08	1	1.08e-09	1	0	0
25	03-32-07-04-02	3.58e-07	3	6.27e-12	3	0	0

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
26	03-32-07-04-03	1.43e-07	3	2.51e-12	3	0	0
27	03-32-07-04-05	1.43e-07	3	2.51e-09	3	0	0
28	03-32-07-05-02	6.72e-08	6	1.18e-12	6	0	0
29	03-32-07-06-02	1.25e-07	3	2.18e-12	3	0	0
30	03-32-07-06-03	4.98e-08	3	8.72e-13	3	0	0
31	03-32-07-06-05	4.98e-08	3	8.72e-10	3	0	0
32	03-32-07-39	2.63e-05	25	4.97e-09	25	0	0
33	03-32-07-67	2.36e-04	42	3.58e-09	42	0	0
34	03-32-10-01-27	1.30e-08	1	1.17e-09	1	0	0
35	03-32-11-01-18	8.53e-08	1	8.53e-11	1	0	0
36	03-32-11-01-27	7.67e-07	1	6.91e-08	1	5.95e-08	1
37	03-32-13-39	1.73e-07	12	3.18e-11	12	0	0
38	03-32-13-67	1.56e-06	12	1.36e-11	12	0	0
39	03-32-18-39	1.88e-07	12	3.45e-11	12	0	0
40	03-32-18-67	1.69e-06	12	1.48e-11	12	0	0
41	03-32-24-02	1.19e-06	2	1.19e-09	2	0	0
42	03-32-24-03	2.61e-06	8	2.61e-09	8	0	0
43	03-32-24-05	2.61e-06	8	1.62e-07	8	0	0
44	03-32-50-1-35-03	1.48e-07	1	3.70e-08	1	0	0
45	03-32-50-2	4.68e-08	1	4.68e-08	1	0	0
46	03-32-51-35-03	6.02e-05	1	1.51e-05	1	4.52e-07	1
47	03-32-51-35-04	1.54e-06	1	1.54e-06	1	1.16e-08	1
48	03-32-51-35-05	1.36e-07	1	1.36e-07	1	0	0
49	03-32-51-35-06	1.63e-08	1	1.63e-08	1	1.63e-08	1
50	03-32-51-35-15	1.63e-08	1	4.07e-09	1	0	0

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
51	03-32-51-36	6.24e-07	1	6.24e-07	1	3.31e-08	1
52	03-47-28-02-39	3.83e-05	43	7.25e-09	43	0	0
53	03-47-28-02-67	3.44e-04	66	5.21e-09	66	0	0
54	03-47-28-07-39	4.15e-05	43	7.86e-09	43	0	0
55	03-47-28-07-67	3.72e-04	66	5.64e-09	66	0	0
56	03-47-28-13-39	6.68e-07	12	1.23e-10	12	0	0
57	03-47-28-13-67	6.01e-06	12	5.26e-11	12	0	0
58	03-47-28-18-39	7.24e-07	12	1.33e-10	12	0	0
59	03-47-28-18-67	6.51e-06	12	5.70e-11	12	0	0
60	03-47-28-24-03	3.25e-07	2	3.25e-10	2	0	0
61	03-47-28-24-05	3.25e-07	2	1.04e-08	2	0	0
62	03-47-28-50-1-03	1.39e-06	1	1.39e-09	1	0	0
63	03-47-28-50-1-05	1.39e-06	1	4.45e-08	1	0	0
64	03-47-28-50-2	7.32e-08	1	7.32e-08	1	0	0
65	03-47-28-51-36	5.31e-08	1	5.31e-08	1	0	0
66	03-48-02-04-02	5.98e-07	6	1.05e-11	6	0	0
67	03-48-02-04-03	2.25e-07	3	3.94e-12	3	0	0
68	03-48-02-04-05	2.25e-07	3	3.94e-09	3	0	0
69	03-48-02-05-02	1.06e-07	6	1.85e-12	6	0	0
70	03-48-02-06-02	1.96e-07	3	3.43e-12	3	0	0
71	03-48-02-06-03	7.83e-08	3	1.37e-12	3	0	0
72	03-48-02-06-05	7.83e-08	3	1.37e-09	3	0	0
73	03-48-02-39	4.13e-05	25	7.81e-09	25	0	0
74	03-48-02-67	3.70e-04	42	5.63e-09	42	0	0
75	03-48-05-01-27	2.05e-08	1	1.84e-09	1	0	0

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
76	03-48-07-04-02	6.48e-07	6	1.13e-11	6	0	0
77	03-48-07-04-03	2.44e-07	3	4.27e-12	3	0	0
78	03-48-07-04-05	2.44e-07	3	4.27e-09	3	0	0
79	03-48-07-05-02	1.14e-07	6	2.00e-12	6	0	0
80	03-48-07-06-02	2.12e-07	3	3.71e-12	3	0	0
81	03-48-07-06-03	8.48e-08	3	1.48e-12	3	0	0
82	03-48-07-06-05	8.48e-08	3	1.48e-09	3	0	0
83	03-48-07-39	4.47e-05	25	8.46e-09	25	0	0
84	03-48-07-67	4.00e-04	44	6.12e-09	44	0	0
85	03-48-10-01-27	2.22e-08	1	2.00e-09	1	0	0
86	03-48-11-01-18	1.45e-07	1	1.45e-10	1	0	0
87	03-48-11-01-27	1.31e-06	1	1.18e-07	1	1.01e-07	1
88	03-48-13-39	2.95e-07	12	5.42e-11	12	0	0
89	03-48-13-67	2.65e-06	12	2.32e-11	12	0	0
90	03-48-18-39	3.19e-07	12	5.87e-11	12	0	0
91	03-48-18-67	2.87e-06	12	2.51e-11	12	0	0
92	03-48-24-02	2.09e-06	8	2.09e-09	8	0	0
93	03-48-24-03	4.44e-06	8	4.44e-09	8	0	0
94	03-48-24-05	4.44e-06	8	1.42e-07	8	0	0
95	03-48-50-1-35-03	2.52e-07	1	6.29e-08	1	0	0
96	03-48-50-2	7.97e-08	1	7.97e-08	1	0	0
97	03-48-51-35-03	1.03e-04	1	2.56e-05	1	7.69e-07	1
98	03-48-51-35-05	2.42e-07	2	2.42e-07	2	0	0
99	03-48-51-35-06	2.78e-08	1	2.78e-08	1	2.78e-08	1
100	03-48-51-35-15	2.77e-08	1	6.92e-09	1	0	0

Sequence Quantification

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
101	03-48-51-36	1.06e-06	1	1.06e-06	1	5.63e-08	1
102	05-02-67	5.38e-07	10	5.38e-10	10	0	0
103	05-02-68-02	1.34e-06	37	1.34e-09	37	0	0
104	05-02-68-03	7.27e-07	32	7.27e-10	32	0	0
105	05-02-68-05	3.85e-07	11	4.87e-08	11	0	0
106	05-05-03-02	2.55e-07	4	2.55e-10	4	0	0
107	05-05-03-05	5.16e-07	12	4.70e-08	12	0	0
108	05-05-21-02	2.48e-08	1	2.48e-11	1	0	0
109	05-05-21-05	4.46e-08	3	8.91e-09	3	0	0
110	05-07-67	5.83e-07	10	5.83e-10	10	0	0
111	05-07-68-02	1.45e-06	37	1.45e-09	37	0	0
112	05-07-68-03	7.87e-07	32	7.87e-10	32	0	0
113	05-07-68-05	4.17e-07	11	5.27e-08	11	0	0
114	05-07-69-02	2.12e-08	1	2.12e-11	1	0	0
115	05-07-69-05	1.27e-08	1	2.55e-09	1	0	0
116	05-10-03-02	2.77e-07	4	2.77e-10	4	0	0
117	05-10-03-05	5.70e-07	13	5.30e-08	13	0	0
118	05-10-21-02	2.68e-08	1	2.68e-11	1	0	0
119	05-10-21-05	5.90e-08	4	1.18e-08	4	0	0
120	05-51-35-03	1.00e-07	2	1.51e-08	2	0	0
121	07-08-02-67	1.20e-07	6	1.05e-12	6	0	0
122	07-08-07-67	1.30e-07	6	2.40e-11	6	0	0
123	07-15-02-67	2.05e-07	6	1.79e-12	6	0	0
124	07-15-07-67	2.22e-07	6	1.94e-12	6	0	0
125	09-02-67	1.04e-06	12	9.53e-12	12	0	0

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
126	09-07-67	1.13e-06	12	1.03e-11	12	0	0
127	18-31-28-02-39	1.46e-06	4	4.02e-10	4	0	0
128	18-31-28-02-67	1.32e-05	8	1.73e-10	8	0	0
129	18-31-28-07-39	1.58e-06	4	4.35e-10	4	0	0
130	18-31-28-07-67	1.45e-05	31	3.17e-10	31	0	0
131	18-31-28-13-67	2.33e-07	8	3.06e-12	8	0	0
132	18-31-28-18-67	2.52e-07	8	3.31e-12	8	0	0
133	18-31-28-80-1-03	5.03e-08	1	5.03e-11	1	0	0
134	18-31-28-80-1-05	5.03e-08	1	1.61e-09	1	0	0
135	18-32-02-04-02	7.02e-08	4	1.93e-11	4	0	0
136	18-32-02-08-02	7.02e-08	4	0.00	4	0	0
137	18-32-02-39	1.59e-06	4	4.37e-10	4	0	0
138	18-32-02-40-02	8.16e-08	4	2.25e-11	4	0	0
139	18-32-02-67	1.44e-05	19	3.17e-10	19	0	0
140	18-32-02-68-02	7.80e-07	8	2.15e-10	8	0	0
141	18-32-02-68-03	2.94e-07	4	8.09e-11	4	0	0
142	18-32-02-68-05	7.34e-08	1	2.35e-09	1	0	0
143	18-32-02-69-02	1.38e-07	8	3.79e-11	8	0	0
144	18-32-02-70-02	2.55e-07	4	7.03e-11	4	0	0
145	18-32-02-70-03	1.02e-07	4	2.81e-11	4	0	0
146	18-32-02-70-05	2.55e-08	1	8.17e-10	1	0	0
147	18-32-05-03-02	6.30e-08	3	6.30e-11	3	0	0
148	18-32-07-04-02	7.60e-08	4	2.09e-11	4	0	0
149	18-32-07-08-02	7.60e-08	4	0.00	4	0	0
150	18-32-07-39	1.72e-06	4	4.73e-10	4	0	0

Sequence Quantification

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
151	18-32-07-40-02	8.84e-08	4	2.44e-11	4	0	0
152	18-32-07-67	2.34e-05	25	3.44e-10	25	0	0
153	18-32-07-68-02	8.45e-07	8	2.33e-10	8	0	0
154	18-32-07-68-03	3.18e-07	4	8.77e-11	4	0	0
155	18-32-07-68-05	7.95e-08	1	2.55e-09	1	0	0
156	18-32-07-69-02	1.49e-07	8	4.11e-11	8	0	0
157	18-32-07-70-02	2.76e-07	4	7.62e-11	4	0	0
158	18-32-07-70-03	1.11e-07	4	3.05e-11	4	0	0
159	18-32-07-70-05	2.76e-08	1	8.85e-10	1	0	0
160	18-32-10-03-02	6.83e-08	3	6.83e-11	3	0	0
161	18-32-11-01-27	7.59e-08	1	6.83e-09	1	0	0
162	18-32-11-21-02	1.26e-08	1	1.26e-11	1	0	0
163	18-32-13-67	1.54e-07	12	1.35e-12	12	0	0
164	18-32-39-02	1.17e-07	2	1.17e-10	2	0	0
165	18-32-39-03	1.17e-07	4	1.17e-10	4	0	0
166	18-32-39-05	1.17e-07	4	3.75e-09	4	0	0
167	18-32-39-12-05	2.02e-08	1	2.02e-08	1	0	0
168	18-32-80-1-02	8.79e-08	1	8.79e-11	1	0	0
169	18-32-80-1-03	3.52e-08	1	3.52e-11	1	0	0
170	18-32-80-1-05	3.52e-08	1	1.13e-09	1	0	0
171	18-32-81-35-03	5.96e-06	1	1.49e-06	1	1.49e-06	1
172	18-32-81-35-04	1.53e-07	1	1.53e-07	1	3.82e-08	1
173	18-32-81-35-05	1.34e-08	1	1.34e-08	1	0	0
174	18-32-81-36	6.17e-08	1	6.17e-08	1	0	0
175	18-47-28-02-39	2.48e-06	4	6.84e-10	4	0	0

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
176	18-47-28-02-67	2.28e-05	31	4.99e-10	31	0	0
177	18-47-28-07-39	2.69e-06	4	7.41e-10	4	0	0
178	18-47-28-07-67	2.47e-05	31	5.40e-10	31	0	0
179	18-47-28-13-67	3.96e-07	8	5.20e-12	8	0	0
180	18-47-28-18-67	4.30e-07	8	5.64e-12	8	0	0
181	18-47-28-39-03	3.21e-08	2	3.21e-11	2	0	0
182	18-47-28-39-05	3.21e-08	2	1.03e-09	2	0	0
183	18-47-28-80-1-03	8.56e-08	1	8.56e-11	1	0	0
184	18-47-28-80-1-05	8.56e-08	1	2.74e-09	1	0	0
185	18-48-02-04-02	1.19e-07	4	3.29e-11	4	0	0
186	18-48-02-04-03	4.78e-08	4	1.32e-11	4	0	0
187	18-48-02-04-05	1.19e-08	1	3.82e-10	1	0	0
188	18-48-02-08-02	1.19e-07	4	0.00	4	0	0
189	18-48-02-08-03	4.78e-08	4	0.00	4	0	0
190	18-48-02-08-05	4.78e-08	4	0.00	4	0	0
191	18-48-02-39	2.70e-06	4	7.44e-10	4	0	0
192	18-48-02-40-02	1.39e-07	4	3.83e-11	4	0	0
193	18-48-02-40-03	5.56e-08	4	1.53e-11	4	0	0
194	18-48-02-40-05	1.39e-08	1	4.44e-10	1	0	0
195	18-48-02-67	2.46e-05	20	5.50e-10	20	0	0
196	18-48-02-68-02	1.33e-06	8	3.66e-10	8	0	0
197	18-48-02-68-03	5.00e-07	4	1.38e-10	4	0	0
198	18-48-02-68-05	1.25e-07	1	4.00e-09	1	0	0
199	18-48-02-69-02	2.34e-07	8	6.46e-11	8	0	0
200	18-48-02-69-03	9.38e-08	8	2.58e-11	8	0	0

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
201	18-48-02-69-05	2.34e-08	2	7.50e-10	2	0	0
202	18-48-02-70-02	4.35e-07	4	1.20e-10	4	0	0
203	18-48-02-70-03	1.74e-07	4	4.79e-11	4	0	0
204	18-48-02-70-05	4.35e-08	1	1.39e-09	1	0	0
205	18-48-05-03-02	1.07e-07	3	1.07e-10	3	0	0
206	18-48-07-04-02	1.29e-07	4	3.57e-11	4	0	0
207	18-48-07-04-03	5.18e-08	4	1.43e-11	4	0	0
208	18-48-07-04-05	1.29e-08	1	4.14e-10	1	0	0
209	18-48-07-08-02	1.29e-07	4	0.00	4	0	0
210	18-48-07-08-03	5.18e-08	4	0.00	4	0	0
211	18-48-07-08-05	5.18e-08	4	0.00	4	0	0
212	18-48-07-39	2.92e-06	4	8.06e-10	4	0	0
213	18-48-07-40-02	1.50e-07	4	4.15e-11	4	0	0
214	18-48-07-40-03	6.02e-08	4	1.66e-11	4	0	0
215	18-48-07-40-05	1.50e-08	1	4.82e-10	1	0	0
216	18-48-07-67	2.66e-05	20	5.96e-10	20	0	0
217	18-48-07-68-02	1.44e-06	8	3.97e-10	8	0	0
218	18-48-07-68-03	5.42e-07	4	1.49e-10	4	0	0
219	18-48-07-68-05	1.35e-07	1	4.33e-09	1	0	0
220	18-48-07-69-02	2.54e-07	8	7.00e-11	8	0	0
221	18-48-07-69-03	1.02e-07	8	2.80e-11	8	0	0
222	18-48-07-69-05	2.54e-08	2	8.13e-10	2	0	0
223	18-48-07-70-02	4.71e-07	4	1.30e-10	4	0	0
224	18-48-07-70-03	1.88e-07	4	5.19e-11	4	0	0
225	18-48-07-70-05	4.71e-08	1	1.51e-09	1	0	0

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
226	18-48-10-03-02	1.16e-07	3	1.16e-10	3	0	0
227	18-48-11-01-18	1.44e-08	1	1.44e-11	1	0	0
228	18-48-11-01-27	1.29e-07	1	1.16e-08	1	1.00e-08	1
229	18-48-11-21-02	2.15e-08	1	2.15e-11	1	0	0
230	18-48-39-02	2.00e-07	2	2.00e-10	2	0	0
231	18-48-39-03	2.00e-07	4	2.00e-10	4	0	0
232	18-48-39-05	2.00e-07	4	6.39e-09	4	0	0
233	18-48-39-12-05	3.43e-08	1	3.43e-08	1	0	0
234	18-48-39-35-03	3.23e-08	2	3.23e-11	2	0	0
235	18-48-80-1-02	1.50e-07	1	1.50e-10	1	0	0
236	18-48-80-1-03	5.99e-08	1	5.99e-11	1	0	0
237	18-48-80-1-05	5.99e-08	1	1.92e-09	1	0	0
238	18-48-80-1-35-03	1.55e-08	1	3.87e-09	1	0	0
239	18-48-81-35-03	1.01e-05	1	2.54e-06	1	2.54e-06	1
240	18-48-81-35-04	2.60e-07	1	2.60e-07	1	6.50e-08	1
241	18-48-81-35-05	2.29e-08	1	2.29e-08	1	0	0
242	18-48-81-36	1.05e-07	1	1.05e-07	1	0	0
243	22-81-36	3.50e-11	2	3.50e-11	2	0	0
244	34-5-4-3-32-02	2.32e-08	1	2.32e-11	1	0	0
245	34-5-4-3-48-02	3.94e-08	1	3.94e-11	1	0	0
246	34-5-5	8.18e-08	1	8.18e-08	1	0	0
247	7AU-000004	2.62e-08	2	6.55e-09	2	0	0
248	7AU-000021	5.07e-06	24	0.00	24	0	0
249	7AU-000022	7.55e-08	6	0.00	6	0	0
250	7AU-000072	1.22e-08	1	3.04e-09	1	0	0

Sequence Quantification

Table 12.2.1 Results from Quantification of TSD Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
251	7AU-000089	1.10e-07	1	0.00	1	0	0
252	7AU-000106	2.06e-08	2	5.14e-09	2	0	0
253	7AU-000123	3.81e-08	1	9.52e-09	1	0	0
254	7AU-000140	1.51e-07	9	3.76e-08	9	0	0
255	7AU-000157	2.84e-08	2	7.09e-09	2	0	0
256	7AU-000174	5.49e-06	24	0.00	24	0	0
257	7AU-000175	8.18e-08	6	0.00	6	0	0
258	7AU-000225	1.32e-08	1	3.30e-09	1	0	0
259	7AU-000242	1.19e-07	1	0.00	1	0	0
260	7AU-000259	2.23e-08	2	5.57e-09	2	0	0
261	7AU-000276	4.13e-08	1	0.00	1	0	0
262	7AU-000293	1.63e-07	9	4.08e-08	9	0	0
263	7AU-000310	4.46e-08	2	1.11e-08	2	0	0
264	7AU-000327	8.63e-06	24	0.00	24	0	0
265	7AU-000328	2.14e-07	12	0.00	12	0	0
266	7AU-000378	2.07e-08	1	5.18e-09	1	0	0
267	7AU-000395	1.87e-07	1	0.00	1	0	0
268	7AU-000412	3.50e-08	2	8.75e-09	2	0	0
269	7AU-000429	6.49e-08	1	0.00	1	0	0
270	7AU-000446	2.56e-07	9	6.41e-08	9	0	0
271	7AU-000463	4.83e-08	2	1.21e-08	2	0	0
272	7AU-000480	9.34e-06	24	0.00	24	0	0
273	7AU-000481	2.32e-07	12	0.00	12	0	0
274	7AU-000497	1.21e-07	12	0.00	12	0	0
275	7AU-000514	6.04e-08	6	0.00	6	0	0

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
276	7AU-000531	2.25e-08	1	5.62e-09	1	0	0
277	7AU-000548	2.02e-07	1	0.00	1	0	0
278	7AU-000565	3.79e-08	2	9.48e-09	2	0	0
279	7AU-000582	7.03e-08	1	0.00	1	0	0
280	7AU-000599	2.78e-07	9	6.94e-08	9	0	0
281	7AU-000701	2.17e-08	2	5.42e-09	2	0	0
282	7AU-000837	2.35e-08	2	5.87e-09	2	0	0
283	7AU-000973	3.69e-08	2	9.23e-09	2	0	0
284	7AU-001109	4.00e-08	2	1.00e-08	2	0	0
285	7BU-000013	5.69e-08	3	9.95e-13	3	0	0
286	7BU-000030	6.16e-08	3	1.08e-12	3	0	0
287	7BU-000047	9.69e-08	3	1.70e-12	3	0	0
288	7BU-000064	1.05e-07	3	1.84e-12	3	0	0
289	7CU-000000	3.38e-07	3	8.45e-08	3	0	0
290	7CU-000013	5.75e-07	3	1.44e-07	3	0	0
291	7CU-000026	1.42e-08	1	3.56e-09	1	0	0
292	9AU-000000	3.04e-07	3	5.32e-09	3	0	0
293	9AU-000001	3.04e-07	3	5.32e-09	3	0	0
294	9AU-000016	1.06e-07	3	1.85e-09	3	0	0
295	9AU-000017	1.06e-07	3	1.85e-09	3	0	0
296	9AU-000024	2.43e-05	24	0.00	24	0	0
297	9AU-000025	2.44e-05	36	0.00	36	0	0
298	9AU-000032	8.55e-08	6	0.00	6	0	0
299	9AU-000033	8.55e-08	6	0.00	6	0	0
300	9AU-000040	3.70e-07	9	0.00	9	0	0

Sequence Quantification

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
301	9AU-000041	3.70e-07	9	0.00	9	0	0
302	9AU-000048	2.64e-07	6	0.00	6	0	0
303	9AU-000049	2.64e-07	6	0.00	6	0	0
304	9AU-000072	7.07e-07	6	6.19e-09	6	0	0
305	9AU-000073	7.07e-07	6	6.19e-09	6	0	0
306	9AU-000080	1.33e-07	12	1.16e-09	12	0	0
307	9AU-000081	1.33e-07	12	1.16e-09	12	0	0
308	9AU-000088	2.46e-07	6	2.15e-09	6	0	0
309	9AU-000089	2.46e-07	6	2.15e-09	6	0	0
310	9AU-000096	1.06e-06	1	5.30e-11	1	0	0
311	9AU-000097	1.06e-06	1	1.70e-09	1	0	0
312	9AU-000104	1.19e-06	12	1.04e-08	12	0	0
313	9AU-000105	1.19e-06	12	1.04e-08	12	0	0
314	9AU-000112	3.69e-07	1	1.84e-11	1	0	0
315	9AU-000113	3.69e-07	1	5.90e-10	1	0	0
316	9AU-000121	1.29e-07	4	9.95e-10	4	0	0
317	9AU-000123	1.54e-06	15	1.52e-07	15	0	0
318	9AU-000165	2.68e-08	2	0.00	2	0	0
319	9AU-000166	2.01e-07	9	4.02e-08	9	0	0
320	9AU-000173	3.29e-07	3	5.76e-09	3	0	0
321	9AU-000174	3.29e-07	3	5.76e-09	3	0	0
322	9AU-000181	6.18e-08	6	1.08e-09	6	0	0
323	9AU-000182	6.18e-08	6	1.08e-09	6	0	0
324	9AU-000189	1.14e-07	3	2.00e-09	3	0	0
325	9AU-000190	1.14e-07	3	2.00e-09	3	0	0

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
326	9AU-000197	2.64e-05	39	0.00	39	0	0
327	9AU-000198	2.67e-05	63	0.00	63	0	0
328	9AU-000205	2.16e-07	18	0.00	18	0	0
329	9AU-000206	2.16e-07	18	0.00	18	0	0
330	9AU-000213	4.01e-07	9	0.00	9	0	0
331	9AU-000214	4.01e-07	9	0.00	9	0	0
332	9AU-000221	2.86e-07	6	0.00	6	0	0
333	9AU-000222	2.86e-07	6	0.00	6	0	0
334	9AU-000245	7.66e-07	6	6.70e-09	6	0	0
335	9AU-000246	7.66e-07	6	6.70e-09	6	0	0
336	9AU-000253	1.44e-07	12	1.26e-09	12	0	0
337	9AU-000254	1.44e-07	12	1.26e-09	12	0	0
338	9AU-000261	2.66e-07	6	2.33e-09	6	0	0
339	9AU-000262	2.66e-07	6	2.33e-09	6	0	0
340	9AU-000269	1.15e-06	1	5.74e-11	1	0	0
341	9AU-000270	1.15e-06	1	1.84e-09	1	0	0
342	9AU-000277	1.29e-06	12	1.13e-08	12	0	0
343	9AU-000278	1.29e-06	12	1.13e-08	12	0	0
344	9AU-000285	3.99e-07	1	2.00e-11	1	0	0
345	9AU-000286	3.99e-07	1	6.39e-10	1	0	0
346	9AU-000294	1.40e-07	4	1.08e-09	4	0	0
347	9AU-000296	1.69e-06	17	1.66e-07	17	0	0
348	9AU-000338	2.90e-08	2	0.00	2	0	0
349	9AU-000339	2.18e-07	9	4.36e-08	9	0	0
350	9AU-000346	7.84e-08	1	7.84e-11	1	0	0

Sequence Quantification

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
351	9AU-000347	7.05e-07	1	6.35e-08	1	5.47e-08	1
352	9AU-000423	4.22e-07	12	0.00	12	0	0
353	9AU-000424	4.22e-07	12	0.00	12	0	0
354	9AU-000596	4.57e-07	12	0.00	12	0	0
355	9AU-000597	4.57e-07	12	0.00	12	0	0
356	9AU-000668	1.22e-07	12	1.07e-09	12	0	0
357	9AU-000669	1.22e-07	12	1.07e-09	12	0	0
358	9AU-000846	1.66e-07	1	1.66e-07	1	0	0
359	9AU-000863	1.76e-08	1	1.76e-08	1	0	0
360	9AU-000922	2.10e-08	1	2.10e-08	1	0	0
361	9AU-001021	3.19e-07	1	7.98e-08	1	0	0
362	9AU-001022	8.19e-09	1	8.19e-09	1	0	0
363	9AU-001034	5.50e-07	6	9.62e-09	6	0	0
364	9AU-001035	5.50e-07	6	9.62e-09	6	0	0
365	9AU-001042	9.71e-08	6	1.70e-09	6	0	0
366	9AU-001043	9.71e-08	6	1.70e-09	6	0	0
367	9AU-001050	1.80e-07	3	3.15e-09	3	0	0
368	9AU-001051	1.80e-07	3	3.15e-09	3	0	0
369	9AU-001058	4.16e-05	42	0.00	42	0	0
370	9AU-001059	4.21e-05	66	0.00	66	0	0
371	9BU-001066	3.40e-07	18	0.00	18	0	0
372	9BU-001067	3.40e-07	18	0.00	18	0	0
373	9BU-001074	6.30e-07	9	0.00	9	0	0
374	9BU-001075	6.30e-07	9	0.00	9	0	0
375	9BU-001082	4.50e-07	6	0.00	6	0	0

Table 12.2.1 Results from Quantification of TSD Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
376	9BU-001083	4.50e-07	6	0.00	6	0	0
377	9BU-001106	2.01e-07	1	1.00e-11	1	0	0
378	9BU-001107	6.14e-07	4	3.21e-10	4	0	0
379	9BU-001114	3.76e-08	2	0.00	2	0	0
380	9BU-001115	3.76e-08	2	0.00	2	0	0
381	9BU-001122	6.97e-08	1	0.00	1	0	0
382	9BU-001123	6.97e-08	1	0.00	1	0	0
383	9BU-001130	1.81e-06	1	9.03e-11	1	0	0
384	9BU-001131	5.67e-06	6	2.89e-09	6	0	0
385	9BU-001138	3.53e-07	3	0.00	3	0	0
386	9BU-001139	3.53e-07	3	0.00	3	0	0
387	9BU-001146	6.28e-07	1	3.14e-11	1	0	0
388	9BU-001147	1.88e-06	3	1.00e-09	3	0	0
389	9BU-001154	1.01e-08	1	1.01e-11	1	0	0
390	9BU-001155	2.35e-07	5	1.69e-09	5	0	0
391	9BU-001157	2.69e-06	20	2.65e-07	20	0	0
392	9BU-001199	1.16e-07	7	0.00	7	0	0
393	9BU-001200	3.42e-07	9	6.85e-08	9	0	0
394	9BU-001207	5.96e-07	6	1.04e-08	6	0	0
395	9BU-001208	5.96e-07	6	1.04e-08	6	0	0
396	9BU-001215	1.05e-07	6	1.84e-09	6	0	0
397	9BU-001216	1.05e-07	6	1.84e-09	6	0	0
398	9BU-001223	1.95e-07	3	3.41e-09	3	0	0
399	9BU-001224	1.95e-07	3	3.41e-09	3	0	0
400	9BU-001231	4.50e-05	42	0.00	42	0	0

Sequence Quantification

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
401	9BU-001232	4.56e-05	66	0.00	66	0	0
402	9BU-001239	3.68e-07	18	0.00	18	0	0
403	9BU-001240	3.68e-07	18	0.00	18	0	0
404	9BU-001247	6.82e-07	9	0.00	9	0	0
405	9BU-001248	6.82e-07	9	0.00	9	0	0
406	9BU-001255	4.87e-07	6	0.00	6	0	0
407	9BU-001256	4.87e-07	6	0.00	6	0	0
408	9BU-001279	2.17e-07	1	1.09e-11	1	0	0
409	9BU-001280	2.17e-07	1	3.48e-10	1	0	0
410	9BU-001287	2.45e-07	12	2.14e-09	12	0	0
411	9BU-001288	2.45e-07	12	2.14e-09	12	0	0
412	9BU-001295	4.53e-07	6	3.97e-09	6	0	0
413	9BU-001296	4.53e-07	6	3.97e-09	6	0	0
414	9BU-001303	1.96e-06	1	9.78e-11	1	0	0
415	9BU-001304	1.96e-06	1	3.13e-09	1	0	0
416	9BU-001311	2.30e-06	18	2.01e-08	18	0	0
417	9BU-001312	2.30e-06	18	2.01e-08	18	0	0
418	9BU-001319	6.80e-07	1	3.40e-11	1	0	0
419	9BU-001320	6.80e-07	1	1.09e-09	1	0	0
420	9BU-001327	1.10e-08	1	1.10e-11	1	0	0
421	9BU-001328	2.54e-07	5	1.84e-09	5	0	0
422	9BU-001330	2.96e-06	24	2.96e-07	24	0	0
423	9BU-001372	1.25e-07	7	0.00	7	0	0
424	9BU-001373	3.71e-07	9	7.42e-08	9	0	0
425	9BU-001380	1.33e-07	1	1.33e-10	1	0	0

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
426	9BU-001381	1.20e-06	1	1.08e-07	1	9.31e-08	1
427	9BU-001457	7.18e-07	12	0.00	12	0	0
428	9BU-001458	7.18e-07	12	0.00	12	0	0
429	9BU-001529	1.92e-07	12	1.68e-09	12	0	0
430	9BU-001530	1.92e-07	12	1.68e-09	12	0	0
431	9BU-001630	7.78e-07	12	0.00	12	0	0
432	9BU-001631	7.78e-07	12	0.00	12	0	0
433	9BU-001702	2.08e-07	12	1.82e-09	12	0	0
434	9BU-001703	2.08e-07	12	1.82e-09	12	0	0
435	9BU-001790	2.13e-08	2	1.92e-09	2	0	0
436	9BU-001880	2.96e-07	2	2.96e-07	2	0	0
437	9BU-001897	3.00e-08	1	3.00e-08	1	0	0
438	9BU-001956	3.57e-08	1	3.57e-08	1	0	0
439	9BU-001971	3.36e-08	2	8.39e-09	2	0	0
440	9BU-002055	5.44e-07	1	1.36e-07	1	0	0
441	9BU-002056	1.39e-08	1	3.48e-09	1	0	0
442	9BU-002057	1.23e-09	1	1.23e-09	1	0	0
443	D2U-000004	1.14e-08	1	2.85e-09	1	0	0
444	D2U-000021	2.21e-06	12	0.00	12	0	0
445	D2U-000038	7.95e-08	6	6.96e-10	6	0	0
446	D2U-000055	7.16e-07	6	6.26e-09	6	0	0
447	D2U-000072	1.34e-07	12	1.17e-09	12	0	0
448	D2U-000089	2.49e-07	6	2.18e-09	6	0	0
449	D2U-000106	4.10e-08	3	1.02e-08	3	0	0
450	D2U-000224	1.23e-08	1	3.09e-09	1	0	0

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
451	D2U-000241	2.39e-06	12	0.00	12	0	0
452	D2U-000258	8.61e-08	6	7.54e-10	6	0	0
453	D2U-000275	7.75e-07	6	6.78e-09	6	0	0
454	D2U-000292	1.45e-07	12	1.27e-09	12	0	0
455	D2U-000309	2.69e-07	6	2.36e-09	6	0	0
456	D2U-000326	4.44e-08	3	1.11e-08	3	0	0
457	D2U-000545	1.32e-08	1	3.30e-09	1	0	0
458	D2U-000579	1.94e-08	1	4.85e-09	1	0	0
459	D2U-000596	3.75e-06	12	0.00	12	0	0
460	D2U-000597	9.33e-08	6	0.00	6	0	0
461	D2U-000613	1.35e-07	6	1.18e-09	6	0	0
462	D2U-000630	2.03e-07	1	2.54e-09	1	0	0
463	D2U-000647	2.28e-07	12	2.00e-09	12	0	0
464	D2U-000664	4.23e-07	6	3.71e-09	6	0	0
465	D2U-000681	6.97e-08	3	1.74e-08	3	0	0
466	D2U-000799	2.10e-08	1	5.26e-09	1	0	0
467	D2U-000816	4.07e-06	12	0.00	12	0	0
468	D2U-000817	1.01e-07	6	0.00	6	0	0
469	D2U-000833	1.47e-07	6	1.28e-09	6	0	0
470	D2U-000850	2.20e-07	1	2.75e-09	1	0	0
471	D2U-000867	2.47e-07	12	2.17e-09	12	0	0
472	D2U-000884	4.59e-07	6	4.01e-09	6	0	0
473	D2U-000901	7.56e-08	3	1.89e-08	3	0	0
474	D2U-001120	2.25e-08	1	5.63e-09	1	0	0
475	D3U-000000	2.00e-08	2	5.26e-10	2	0	0

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
476	D3U-000001	2.00e-08	2	5.26e-10	2	0	0
477	D3U-000008	2.00e-08	2	0.00	2	0	0
478	D3U-000009	2.00e-08	2	0.00	2	0	0
479	D3U-000016	4.66e-08	4	6.12e-10	4	0	0
480	D3U-000017	4.66e-08	4	6.12e-10	4	0	0
481	D3U-000024	4.20e-07	4	5.51e-09	4	0	0
482	D3U-000025	4.20e-07	4	5.51e-09	4	0	0
483	D3U-000040	1.46e-07	4	1.91e-09	4	0	0
484	D3U-000041	1.46e-07	4	1.91e-09	4	0	0
485	D3U-000051	3.60e-08	3	7.20e-09	3	0	0
486	D3U-000066	2.17e-08	2	5.70e-10	2	0	0
487	D3U-000067	2.17e-08	2	5.70e-10	2	0	0
488	D3U-000074	2.17e-08	2	0.00	2	0	0
489	D3U-000075	2.17e-08	2	0.00	2	0	0
490	D3U-000082	5.05e-08	4	6.63e-10	4	0	0
491	D3U-000083	5.05e-08	4	6.63e-10	4	0	0
492	D3U-000090	4.54e-07	4	5.97e-09	4	0	0
493	D3U-000091	4.54e-07	4	5.97e-09	4	0	0
494	D3U-000098	8.52e-08	8	1.12e-09	8	0	0
495	D3U-000099	8.52e-08	8	1.12e-09	8	0	0
496	D3U-000106	1.58e-07	4	2.07e-09	4	0	0
497	D3U-000107	1.58e-07	4	2.07e-09	4	0	0
498	D3U-000117	3.90e-08	3	7.80e-09	3	0	0
499	D3U-000133	6.97e-08	1	6.28e-09	1	0	0
500	D3U-000142	1.16e-08	1	1.16e-11	1	0	0

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
501	D3U-000143	1.16e-08	1	3.72e-10	1	0	0
502	D3U-000297	2.98e-07	1	7.45e-11	1	0	0
503	D3U-000310	3.41e-08	2	8.96e-10	2	0	0
504	D3U-000311	3.41e-08	2	8.96e-10	2	0	0
505	D3U-000318	3.41e-08	2	0.00	2	0	0
506	D3U-000319	3.41e-08	2	0.00	2	0	0
507	D3U-000326	7.94e-08	4	1.04e-09	4	0	0
508	D3U-000327	7.94e-08	4	1.04e-09	4	0	0
509	D3U-000334	7.59e-07	8	9.96e-09	8	0	0
510	D3U-000335	7.59e-07	8	9.96e-09	8	0	0
511	D3U-000342	1.34e-07	8	1.76e-09	8	0	0
512	D3U-000343	1.34e-07	8	1.76e-09	8	0	0
513	D3U-000350	2.48e-07	4	3.26e-09	4	0	0
514	D3U-000351	2.48e-07	4	3.26e-09	4	0	0
515	D3U-000361	6.13e-08	3	1.23e-08	3	0	0
516	D3U-000376	3.70e-08	2	9.71e-10	2	0	0
517	D3U-000377	3.70e-08	2	9.71e-10	2	0	0
518	D3U-000384	3.70e-08	2	0.00	2	0	0
519	D3U-000385	3.70e-08	2	0.00	2	0	0
520	D3U-000392	8.60e-08	4	1.13e-09	4	0	0
521	D3U-000393	2.15e-08	1	0.00	1	0	0
522	D3U-000400	8.22e-07	8	1.08e-08	8	0	0
523	D3U-000401	8.22e-07	8	1.08e-08	8	0	0
524	D3U-000408	1.45e-07	8	1.90e-09	8	0	0
525	D3U-000409	1.45e-07	8	1.90e-09	8	0	0

Table 12.2.1 Results from Quantification of T5D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
526	D3U-000416	2.69e-07	4	3.53e-09	4	0	0
527	D3U-000417	2.69e-07	4	3.53e-09	4	0	0
528	D3U-000427	6.64e-08	3	1.33e-08	3	0	0
529	D3U-000442	1.32e-08	1	1.32e-11	1	0	0
530	D3U-000443	1.19e-07	1	1.07e-08	1	0	0
531	D3U-000452	1.98e-08	1	1.98e-11	1	0	0
532	D3U-000453	1.98e-08	1	6.33e-10	1	0	0
533	D3U-000607	5.07e-07	1	1.27e-07	1	1.27e-07	1
534	D3U-000608	1.30e-08	1	3.25e-09	1	0	0
535	D4U-000017	7.59e-08	4	9.96e-10	4	0	0
536	D4U-000077	8.22e-08	4	1.08e-09	4	0	0
537	D4U-000167	1.29e-07	4	1.70e-09	4	0	0
538	D4U-000197	4.49e-08	4	5.89e-10	4	0	0
539	D4U-000227	1.40e-07	4	1.84e-09	4	0	0
540	D4U-000257	4.86e-08	4	6.39e-10	4	0	0
Totals		3.487E-03	3,838	5.389E-05	3,838	5.938e-06	17

Sequence Quantification

Table 12.2.2 Results from Quantification of T5A Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	03-03-04-01	2.84e-06	8	8.15e-10	8	0	0
2	03-03-04-02	5.69e-06	24	1.64e-09	24	0	0
3	03-03-04-04	5.69e-06	48	1.64e-09	48	0	0
4	03-03-04-05	1.27e-06	8	8.24e-08	8	0	0
5	03-03-04-35-01	2.76e-07	4	7.93e-11	4	0	0
6	03-03-05-01	5.00e-07	8	1.44e-10	8	0	0
7	03-03-05-02	1.00e-06	24	2.89e-10	24	0	0
8	03-03-05-04	1.00e-06	48	2.89e-10	48	0	0
9	03-03-05-05	2.24e-07	8	1.45e-08	8	0	0
10	03-03-06-01	9.27e-07	4	2.67e-10	4	0	0
11	03-03-06-02	1.86e-06	12	5.35e-10	12	0	0
12	03-03-06-04	1.86e-06	24	5.35e-10	24	0	0
13	03-03-06-05	4.15e-07	4	2.69e-08	4	0	0
14	03-03-06-35-01	9.59e-08	4	2.76e-11	4	0	0
15	03-03-06-35-03	4.79e-08	2	0.00	2	0	0
16	03-03-08-01	2.84e-06	8	8.15e-10	8	0	0
17	03-03-08-02	4.17e-05	2	4.17e-08	2	0	0
18	03-03-08-04	5.69e-06	48	1.64e-09	48	0	0
19	03-03-08-05	3.58e-10	1	3.58e-10	1	0	0
20	03-03-08-35-01	2.76e-07	4	7.93e-11	4	0	0
21	03-03-08-35-03	4.45e-06	4	4.45e-06	4	0	0
22	03-03-08-35-04	1.10e-07	2	1.10e-07	2	0	0
23	03-03-09-01	5.00e-07	8	1.44e-10	8	0	0
24	03-03-09-02	2.01e-06	40	5.77e-10	40	0	0
25	03-03-09-04	1.00e-06	48	2.89e-10	48	0	0

Table 12.2.2 Results from Quantification of T5A Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
26	03-03-09-05	5.00e-07	16	5.00e-07	16	0	0
27	03-03-10-01	9.27e-07	4	2.67e-10	4	0	0
28	03-03-10-02	3.72e-06	20	1.07e-09	20	0	0
29	03-03-10-04	1.86e-06	24	5.35e-10	24	0	0
30	03-03-10-05	9.27e-07	8	9.27e-07	8	0	0
31	03-03-10-35-01	9.59e-08	4	2.76e-11	4	0	0
32	03-03-10-35-03	9.59e-08	4	9.59e-08	4	0	0
33	03-03-12-02	1.85e-06	8	5.33e-10	8	0	0
34	03-03-12-05	1.33e-08	4	8.62e-10	4	0	0
35	03-03-39	2.42e-05	1	1.62e-09	1	0	0
36	03-03-40-01	3.30e-06	8	9.48e-10	8	0	0
37	03-03-40-02	6.93e-07	1	6.93e-10	1	0	0
38	03-03-40-04	6.62e-06	48	1.90e-09	48	0	0
39	03-03-40-05	8.39e-07	5	5.45e-08	5	0	0
40	03-03-40-35-01	3.21e-07	4	9.22e-11	4	0	0
41	03-03-40-35-03	2.41e-07	3	0.00	3	0	0
42	03-03-40-35-04	2.06e-09	1	0.00	1	0	0
43	03-03-41-01	5.82e-07	8	1.67e-10	8	0	0
44	03-03-41-02	1.75e-06	32	5.03e-10	32	0	0
45	03-03-41-04	1.17e-06	48	3.36e-10	48	0	0
46	03-03-41-05	3.90e-07	12	2.54e-08	12	0	0
47	03-03-42-01	1.08e-06	4	3.10e-10	4	0	0
48	03-03-42-02	3.24e-06	16	9.33e-10	16	0	0
49	03-03-42-04	2.17e-06	24	6.23e-10	24	0	0
50	03-03-42-05	7.23e-07	6	1.57e-08	6	0	0

Table 12.2.2 Results from Quantification of T5A Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
51	03-03-42-35-01	1.11e-07	4	3.20e-11	4	0	0
52	03-03-42-35-03	5.57e-08	2	0.00	2	0	0
53	03-03-67	2.18e-04	1	1.46e-08	1	1.46e-08	1
54	03-03-68-01	7.87e-05	26	3.74e-09	26	0	0
55	03-03-68-02	6.24e-06	1	0.00	1	0	0
56	03-03-68-04	6.73e-05	46	2.50e-09	46	0	0
57	03-03-68-05	6.24e-06	2	4.06e-07	2	2.62e-08	2
58	03-03-68-35-01	3.07e-06	8	8.82e-10	8	0	0
59	03-03-68-35-03	2.21e-06	6	0.00	6	0	0
60	03-03-68-35-04	5.97e-07	2	1.85e-08	2	1.85e-08	1
61	03-03-69-01	5.63e-06	20	1.62e-09	20	0	0
62	03-03-69-02	1.09e-05	29	2.11e-10	29	0	0
63	03-03-69-04	5.40e-06	24	7.80e-11	24	0	0
64	03-03-69-05	1.26e-06	9	8.16e-08	9	0	0
65	03-03-69-35-01	5.41e-07	8	1.56e-10	8	0	0
66	03-03-69-35-03	2.71e-07	4	0.00	4	0	0
67	03-03-70-01	9.70e-06	4	2.79e-09	4	0	0
68	03-03-70-02	1.94e-05	10	3.64e-10	10	0	0
69	03-03-70-04	9.73e-06	10	1.82e-10	10	0	0
70	03-03-70-05	1.94e-05	18	3.64e-07	18	0	0
71	03-03-70-35-01	1.00e-06	4	2.88e-10	4	0	0
72	03-03-70-35-03	2.01e-06	8	1.82e-07	8	0	0
73	03-04-21-01	4.76e-05	1	4.29e-09	1	0	0
74	03-04-21-02	1.43e-04	3	9.29e-09	3	0	0
75	03-04-21-04	9.67e-08	6	9.67e-11	6	0	0

Table 12.2.2 Results from Quantification of T5A Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
76	03-04-21-35-01	6.05e-06	12	6.05e-09	12	0	0
77	03-04-21-35-03	8.38e-05	34	3.02e-05	34	8.81e-08	4
78	03-04-21-35-04	1.41e-07	1	1.41e-07	1	1.41e-07	1
79	03-08-04-01	3.07e-06	8	8.83e-10	8	0	0
80	03-08-04-02	6.17e-06	24	1.77e-09	24	0	0
81	03-08-04-04	6.17e-06	48	1.77e-09	48	0	0
82	03-08-04-05	1.37e-06	8	8.92e-08	8	0	0
83	03-08-04-35-01	2.99e-07	4	8.59e-11	4	0	0
84	03-08-04-35-03	1.49e-07	2	0.00	2	0	0
85	03-08-05-01	5.42e-07	8	1.56e-10	8	0	0
86	03-08-05-02	1.09e-06	24	3.13e-10	24	0	0
87	03-08-05-04	1.09e-06	48	3.13e-10	48	0	0
88	03-08-05-05	2.42e-07	8	1.57e-08	8	0	0
89	03-08-06-01	1.00e-06	4	2.89e-10	4	0	0
90	03-08-06-02	2.02e-06	12	5.80e-10	12	0	0
91	03-08-06-04	2.02e-06	24	5.80e-10	24	0	0
92	03-08-06-05	4.49e-07	4	2.92e-08	4	0	0
93	03-08-06-35-01	1.04e-07	4	2.99e-11	4	0	0
94	03-08-06-35-03	5.19e-08	2	0.00	2	0	0
95	03-08-08-01	3.07e-06	8	8.83e-10	8	0	0
96	03-08-08-02	1.45e-09	2	7.59e-13	2	0	0
97	03-08-08-04	6.17e-06	48	1.77e-09	48	0	0
98	03-08-08-05	3.88e-10	1	3.88e-10	1	0	0
99	03-08-08-35-01	2.99e-07	4	8.59e-11	4	0	0
100	03-08-08-35-03	4.82e-06	4	4.82e-06	4	0	0

Sequence Quantification

Table 12.2.2 Results from Quantification of T5A Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
101	03-08-08-35-04	1.20e-07	2	1.20e-07	2	0	0
102	03-08-09-01	5.42e-07	8	1.56e-10	8	0	0
103	03-08-09-02	2.17e-06	40	6.25e-10	40	0	0
104	03-08-09-04	1.09e-06	48	3.13e-10	48	0	0
105	03-08-09-05	5.42e-07	16	5.42e-07	16	0	0
106	03-08-10-01	1.00e-06	4	2.89e-10	4	0	0
107	03-08-10-02	4.03e-06	20	1.16e-09	20	0	0
108	03-08-10-04	2.02e-06	24	5.80e-10	24	0	0
109	03-08-10-05	1.00e-06	8	1.00e-06	8	0	0
110	03-08-10-35-01	1.04e-07	4	2.99e-11	4	0	0
111	03-08-10-35-03	1.04e-07	4	1.04e-07	4	0	0
112	03-08-12-02	2.01e-06	8	5.78e-10	8	0	0
113	03-08-12-05	1.44e-08	4	9.34e-10	4	0	0
114	03-08-12-35-03	5.19e-08	2	1.30e-08	2	0	0
115	03-08-39	2.63e-05	1	1.76e-09	1	0	0
116	03-08-40-01	3.57e-06	8	1.03e-09	8	0	0
117	03-08-40-02	7.51e-07	1	0.00	1	0	0
118	03-08-40-04	3.47e-06	12	6.64e-11	12	0	0
119	03-08-40-05	2.51e-05	12	5.26e-08	12	0	0
120	03-08-40-35-01	3.47e-07	4	9.99e-11	4	0	0
121	03-08-40-35-03	8.69e-08	1	2.17e-08	1	0	0
122	03-08-40-35-04	6.96e-08	1	6.96e-08	1	0	0
123	03-08-41-01	6.30e-07	8	1.81e-10	8	0	0
124	03-08-41-02	1.90e-06	32	5.45e-10	32	0	0
125	03-08-41-04	1.27e-06	48	3.64e-10	48	0	0

Table 12.2.2 Results from Quantification of T5A Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
126	03-08-41-05	2.82e-08	1	1.83e-09	1	0	0
127	03-08-42-01	1.17e-06	4	3.36e-10	4	0	0
128	03-08-42-02	3.51e-06	16	1.01e-09	16	0	0
129	03-08-42-04	2.35e-06	24	6.74e-10	24	0	0
130	03-08-42-05	1.57e-07	1	6.62e-10	1	0	0
131	03-08-42-35-01	1.21e-07	4	3.47e-11	4	0	0
132	03-08-42-35-03	6.04e-08	2	0.00	2	0	0
133	03-08-67	2.36e-04	1	1.58e-08	1	1.58e-08	1
134	03-08-68-01	3.89e-06	26	1.47e-10	26	0	0
135	03-08-68-02	6.76e-06	1	0.00	1	0	0
136	03-08-68-04	6.55e-05	158	1.91e-08	158	0	0
137	03-08-68-05	2.43e-08	2	1.58e-09	2	0	0
138	03-08-68-35-01	3.32e-06	8	9.55e-10	8	0	0
139	03-08-68-35-03	8.55e-07	3	2.50e-07	3	0	0
140	03-08-68-35-04	4.01e-08	2	2.00e-08	2	2.00e-08	1
141	03-08-69-01	6.10e-06	20	1.75e-09	20	0	0
142	03-08-69-02	1.84e-05	81	5.30e-09	81	0	0
143	03-08-69-04	1.21e-05	96	3.48e-09	96	0	0
144	03-08-69-05	1.30e-07	25	4.59e-09	25	0	0
145	03-08-69-35-01	5.86e-07	8	1.69e-10	8	0	0
146	03-08-69-35-03	2.93e-07	4	0.00	4	0	0
147	03-08-70-01	1.05e-05	4	3.02e-09	4	0	0
148	03-08-70-02	3.16e-05	16	9.09e-09	16	0	0
149	03-08-70-04	2.11e-05	24	6.07e-09	24	0	0
150	03-08-70-05	2.26e-07	7	5.25e-09	7	0	0

Sequence Quantification

Table 12.2.2 Results from Quantification of T5A Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
151	03-08-70-35-01	1.09e-06	4	3.12e-10	4	0	0
152	03-08-70-35-03	5.43e-07	2	0.00	2	0	0
153	03-14-39	1.35e-06	8	3.89e-10	8	0	0
154	03-14-67	1.23e-05	16	3.54e-09	16	0	0
155	03-15-21-01	7.44e-07	2	7.44e-10	2	0	0
156	03-15-21-02	2.24e-06	8	2.24e-09	8	0	0
157	03-15-21-04	1.49e-06	12	1.49e-09	12	0	0
158	03-15-21-05	7.98e-07	4	5.19e-08	4	0	0
159	03-19-08-02	2.52e-06	16	7.25e-10	16	0	0
160	03-19-08-05	6.31e-07	8	6.31e-07	8	0	0
161	03-19-39	1.47e-06	8	4.22e-10	8	0	0
162	03-19-40-02	2.93e-06	16	8.43e-10	16	0	0
163	03-19-40-05	1.05e-08	4	0.00	4	0	0
164	03-19-40-35-03	3.79e-08	2	0.00	2	0	0
165	03-19-67	1.34e-05	16	3.84e-09	16	0	0
166	03-19-68-01	4.22e-07	8	1.21e-10	8	0	0
167	03-19-68-02	2.79e-05	72	8.01e-09	72	0	0
168	03-19-68-04	8.48e-07	48	2.44e-10	48	0	0
169	03-19-68-05	8.56e-07	16	1.34e-07	16	0	0
170	03-19-68-35-03	3.41e-07	2	3.41e-07	2	0	0
171	03-19-70-01	1.47e-07	8	4.22e-11	8	0	0
172	03-19-70-02	4.42e-07	32	1.27e-10	32	0	0
173	03-19-70-04	1.77e-07	24	5.08e-11	24	0	0
174	03-19-70-05	5.91e-08	6	5.91e-08	6	0	0
175	03-20-21-01	8.06e-07	2	8.06e-10	2	0	0

Table 12.2.2 Results from Quantification of T5A Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
176	03-20-21-02	2.42e-06	8	2.42e-09	8	0	0
177	03-20-21-04	1.62e-06	12	1.62e-09	12	0	0
178	03-20-21-05	2.88e-06	16	1.87e-07	16	0	0
179	03-20-21-35-01	8.33e-08	2	8.33e-11	2	0	0
180	03-20-21-35-03	2.50e-07	6	0.00	6	0	0
181	03-22-21-01	7.83e-08	2	7.83e-11	2	0	0
182	03-22-21-02	2.35e-07	8	2.35e-10	8	0	0
183	03-22-21-04	1.57e-07	12	1.57e-10	12	0	0
184	03-22-21-05	2.80e-07	16	1.82e-08	16	0	0
185	03-24-01	3.43e-06	4	3.43e-09	4	0	0
186	03-24-02	1.04e-05	20	1.04e-08	20	0	0
187	03-24-04	6.85e-06	18	6.85e-09	18	0	0
188	03-24-05	1.22e-05	28	7.96e-07	28	0	0
189	03-24-12-05	1.11e-08	2	1.11e-08	2	0	0
190	03-24-35-01	3.50e-07	2	3.50e-10	2	0	0
191	03-24-35-03	1.05e-06	6	2.62e-07	6	0	0
192	03-24-35-05	3.95e-08	1	3.95e-08	1	0	0
193	03-50-01-01	5.38e-06	1	5.38e-09	1	0	0
194	03-50-01-02	1.62e-05	7	1.62e-08	7	0	0
195	03-50-01-04	1.08e-05	6	1.08e-08	6	0	0
196	03-50-01-05	1.93e-05	10	1.25e-06	10	0	0
197	03-50-01-12-05	1.06e-08	1	0.00	1	0	0
198	03-50-01-24-05	1.18e-08	1	1.18e-08	1	0	0
199	03-50-2	2.83e-07	1	2.83e-07	1	7.08e-08	1
200	03-51-35-01	3.43e-05	1	3.08e-09	1	0	0

Table 12.2.2 Results from Quantification of T5A Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
201	03-51-35-03	1.03e-04	15	2.59e-05	15	1.37e-07	4
202	03-51-35-04	8.79e-07	1	8.79e-07	1	2.20e-07	1
203	03-51-35-05	7.73e-08	1	7.73e-08	1	0	0
204	03-51-36	3.55e-07	1	3.55e-07	1	8.88e-08	1
205	04-03-08-02	1.40e-07	8	4.03e-11	8	0	0
206	04-03-08-05	2.10e-08	2	2.10e-08	2	0	0
207	04-03-39	8.15e-08	4	2.34e-11	4	0	0
208	04-03-40-02	1.63e-07	8	4.69e-11	8	0	0
209	04-03-40-05	3.50e-10	1	0.00	1	0	0
210	04-03-67	7.34e-07	4	2.11e-10	4	0	0
211	04-03-68-02	1.47e-06	8	4.22e-10	8	0	0
212	04-03-68-05	5.25e-09	2	0.00	2	0	0
213	04-03-68-35-03	6.07e-10	1	0.00	1	0	0
214	04-08-08-02	1.52e-07	8	4.37e-11	8	0	0
215	04-08-08-05	2.28e-08	2	2.28e-08	2	0	0
216	04-08-39	8.83e-08	4	2.54e-11	4	0	0
217	04-08-40-02	1.77e-07	8	5.08e-11	8	0	0
218	04-08-40-05	3.79e-10	1	0.00	1	0	0
219	04-08-67	7.95e-07	4	2.29e-10	4	0	0
220	04-08-68-02	1.59e-06	8	4.57e-10	8	0	0
221	04-08-68-05	5.68e-09	2	0.00	2	0	0
222	04-08-68-35-03	6.57e-10	1	0.00	1	0	0
223	04-51-01	2.96e-08	1	2.96e-11	1	0	0
224	04-51-02	8.89e-08	4	8.89e-11	4	0	0
225	04-51-04	5.93e-08	6	5.93e-11	6	0	0

Table 12.2.2 Results from Quantification of T5A Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
226	04-51-05	1.06e-07	8	6.87e-09	8	0	0
227	04-51-35-01	2.88e-08	1	2.88e-11	1	0	0
228	04-51-35-03	8.64e-08	3	2.16e-08	3	0	0
229	06-01-23	7.83e-08	1	7.83e-11	1	0	0
230	06-04-23	8.48e-08	1	8.48e-11	1	0	0
231	06-52-10	3.06e-08	1	3.06e-08	1	0	0
Totals		1.744E-03	2,823	7.641E-05	2,823	8.407e-07	18

Sequence Quantification

Table 12.2.3 Results from Quantification of TDB Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	3-01-31-11-01-27	4.76e-06	11	4.19e-07	11	3.37e-07	1
2	3-01-31-11-04-27	5.74e-08	2	5.16e-09	2	0	0
3	3-01-31-11-08-05	2.83e-08	2	9.06e-10	2	0	0
4	3-01-31-11-21-05	6.47e-07	1	0	0	0	0
5	3-01-31-22-01-27	5.16e-06	12	4.54e-07	12	3.65e-07	1
6	3-01-31-22-04-27	6.56e-08	2	5.91e-09	2	0	0
7	3-01-31-22-08-05	3.07e-08	2	9.81e-10	2	0	0
8	3-01-31-22-21-05	7.01e-07	1	0	0	0	0
9	3-01-31-27-01-27	9.13e-08	1	8.22e-09	1	0	0
10	3-01-31-27-21-05	1.36e-08	1	4.36e-10	1	0	0
11	3-01-32-03-12-05	2.45e-08	1	7.86e-10	1	0	0
12	3-01-32-03-40-05	2.82e-08	1	9.03e-10	1	0	0
13	3-01-32-03-68-05	2.54e-07	1	8.13e-09	1	0	0
14	3-01-32-03-70-05	8.83e-08	1	2.83e-09	1	0	0
15	3-01-32-04-01-27	1.96e-06	9	1.66e-07	9	1.39e-07	1
16	3-01-32-04-21-05	2.68e-07	1	8.56e-09	1	0	0
17	3-01-32-08-12-05	2.66e-08	1	8.51e-10	1	0	0
18	3-01-32-08-40-05	3.06e-08	1	9.79e-10	1	0	0
19	3-01-32-08-42-05	1.06e-08	1	3.40e-10	1	0	0
20	3-01-32-08-68-05	2.75e-07	1	8.81e-09	1	0	0
21	3-01-32-08-70-05	9.57e-08	1	3.06e-09	1	0	0
22	3-01-32-09-01-27	2.12e-06	9	1.91e-07	9	1.51e-07	1
23	3-01-32-09-21-05	2.90e-07	1	9.28e-09	1	0	0
24	3-01-32-11-01-27	1.89e-07	1	1.70e-08	1	1.47e-08	1
25	3-01-32-11-21-05	2.82e-08	1	9.01e-10	1	0	0

Table 12.2.3 Results from Quantification of TDB Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
26	3-01-32-15-04-27	2.51e-08	2	2.26e-09	2	0	0
27	3-01-32-20-04-27	2.72e-08	2	2.44e-09	2	0	0
28	3-01-32-23-12-05	3.13e-08	1	0	0	0	0
29	3-01-32-24-05	1.23e-07	2	3.94e-09	2	0	0
30	3-01-32-24-12-05	1.36e-08	1	1.36e-08	1	0	0
31	3-01-32-50-1-05	1.96e-07	1	6.27e-09	1	0	0
32	3-01-32-50-2	1.15e-08	1	1.15e-08	1	0	0
33	3-01-32-51-35-03	3.56e-06	1	8.91e-07	1	8.91e-07	1
34	3-01-32-51-35-04	9.13e-08	1	9.13e-08	1	2.28e-08	1
35	3-01-32-51-35-06	1.10e-08	1	1.10e-08	1	1.10e-08	1
36	3-01-32-51-36	3.69e-08	1	3.69e-08	1	0	0
37	3-01-47-11-01-27	8.13e-06	13	7.32e-07	13	5.73e-07	1
38	3-01-47-11-03-05	9.58e-08	4	1.92e-08	4	0	0
39	3-01-47-11-04-27	9.77e-08	2	8.79e-09	2	0	0
40	3-01-47-11-08-05	4.82e-08	2	1.54e-09	2	0	0
41	3-01-47-11-21-05	1.19e-06	8	3.82e-08	8	0	0
42	3-01-47-11-21-34	1.11e-08	1	3.56e-10	1	0	0
43	3-01-47-22-01-27	8.80e-06	13	7.93e-07	13	6.21e-07	1
44	3-01-47-22-03-05	1.04e-07	4	2.07e-08	4	0	0
45	3-01-47-22-04-27	1.12e-07	2	1.01e-08	2	0	0
46	3-01-47-22-08-05	5.53e-08	2	1.77e-09	2	0	0
47	3-01-47-22-21-05	1.29e-06	8	4.14e-08	8	0	0
48	3-01-47-22-21-34	1.21e-08	1	3.86e-10	1	0	0
49	3-01-47-27-01-27	1.56e-07	1	1.40e-08	1	1.21e-08	1
50	3-01-47-27-21-05	2.32e-08	1	7.42e-10	1	0	0
51	3-01-48-03-12-05	4.18e-08	1	1.34e-09	1	0	0

Sequence Quantification

Table 12.2.3 Results from Quantification of TDB Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
52	3-01-48-03-14-05	1.45e-08	1	4.65e-10	1	0	0
53	3-01-48-03-40-05	4.81e-08	1	1.54e-09	1	0	0
54	3-01-48-03-42-05	1.67e-08	1	5.35e-10	1	0	0
55	3-01-48-03-67	1.46e-05	1	9.81e-10	1	0	0
56	3-01-48-03-68-05	4.33e-07	1	1.38e-08	1	0	0
57	3-01-48-03-70-05	1.50e-07	1	4.81e-09	1	0	0
58	3-01-48-08-67	1.59e-05	1	1.06e-09	1	0	0
59	3-01-48-09-01-27	3.61e-06	9	3.25e-07	9	2.57e-07	1
60	3-01-48-09-03-05	4.29e-08	4	8.58e-09	4	0	0
61	3-01-48-09-21-05	4.94e-07	1	1.58e-08	1	0	0
62	3-01-48-11-01-27	3.22e-07	1	2.90e-08	1	2.50e-08	1
63	3-01-48-11-21-05	4.79e-08	1	1.53e-09	1	0	0
64	3-01-48-15-04-27	4.27e-08	2	3.84e-09	2	0	0
65	3-01-48-20-04-27	4.62e-08	2	4.16e-09	2	0	0
66	3-01-48-23-12-05	5.33e-08	1	5.33e-08	1	0	0
67	3-01-48-24-05	2.10e-07	2	6.71e-09	2	0	0
68	3-01-48-24-12-05	2.31e-08	1	2.31e-08	1	0	0
69	3-01-48-50-1-05	3.33e-07	1	1.07e-08	1	0	0
70	3-01-48-50-2	1.96e-08	1	1.96e-08	1	0	0
71	3-01-48-51-35-03	6.07e-06	1	1.52e-06	1	1.52e-06	1
72	3-01-48-51-35-04	1.56e-07	1	1.56e-07	1	3.89e-08	1
73	3-01-48-51-35-05	1.37e-08	1	1.37e-08	1	0	0
74	3-01-48-51-35-06	1.87e-08	1	1.87e-08	1	1.87e-08	1
75	3-01-48-51-36	6.28e-08	1	6.28e-08	1	1.57e-08	1
76	3-1-32-50-1-35-3	2.26e-08	1	5.66e-09	1	0	0
77	3-1-47-11-18-1-5	7.66e-08	1	2.45e-09	1	0	0
78	3-1-47-22-18-1-5	8.30e-08	1	2.65e-09	1	0	0

Table 12.2.3 Results from Quantification of TDB Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
79	3-1-48-50-1-35-3	3.85e-08	1	9.63e-09	1	0	0
80	3-14	1.21e-08	1	1.21e-08	1	1.21e-08	1
81	5-04-03-12-05	1.49e-08	1	2.98e-09	1	0	0
82	5-04-03-40-05	1.71e-08	1	3.43e-09	1	0	0
83	5-04-03-68-05	1.54e-07	1	3.09e-08	1	0	0
84	5-04-03-68-35-03	1.78e-08	1	4.46e-09	1	0	0
85	5-04-03-70-05	6.00e-08	1	1.20e-08	1	0	0
86	5-04-04-21-05	1.28e-06	8	2.55e-07	8	5.77e-08	1
87	5-04-04-21-35-03	1.36e-07	1	3.40e-08	1	1.36e-07	1
88	5-04-08-12-05	1.62e-08	1	3.23e-09	1	0	0
89	5-04-08-40-05	1.86e-08	1	3.72e-09	1	0	0
90	5-04-08-68-05	1.67e-07	1	3.34e-08	1	0	0
91	5-04-08-68-35-03	1.93e-08	1	4.83e-09	1	0	0
92	5-04-08-70-05	5.81e-08	1	1.16e-08	1	0	0
93	5-04-09-21-05	1.38e-06	8	2.77e-07	8	6.25e-08	1
94	5-04-09-21-35-03	1.48e-07	1	3.69e-08	1	1.48e-07	1
95	5-04-11-21-05	1.24e-07	1	2.48e-08	1	0	0
96	5-04-11-21-35-03	1.43e-08	1	3.58e-09	1	0	0
97	5-04-14-67	9.27e-08	2	6.21e-12	2	0	0
98	5-04-15-21-05	2.09e-08	2	4.18e-09	2	0	0
99	5-04-19-67	1.00e-07	2	6.73e-12	2	0	0
100	5-04-20-21-05	2.27e-08	2	4.53e-09	2	0	0
101	5-04-39-05	2.78e-08	2	5.55e-09	2	0	0
102	5-04-80-1-32	1.19e-07	1	1.19e-10	1	0	0
103	5-04-80-1-34	1.19e-07	1	2.38e-08	1	0	0
104	5-04-80-1-36	1.41e-08	1	1.41e-08	1	0	0
105	5-04-81-35-03	8.47e-07	1	2.12e-07	1	2.12e-07	1

Sequence Quantification

Table 12.2.3 Results from Quantification of TDB Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
106	5-04-81-35-04	2.17e-08	1	2.17e-08	1	0	0
107	5-05-81-35-03	1.22e-08	1	3.05e-09	1	0	0
108	7-5-4-6-03-39	1.31e-08	1	1.31e-11	1	0	0
109	7-5-4-6-03-67	1.18e-07	1	1.18e-10	1	0	0
110	7-5-4-6-04-03-03	2.66e-08	1	2.66e-11	1	0	0
111	7-5-4-6-04-03-05	2.66e-08	1	5.31e-09	1	0	0
112	7-5-4-6-08-39	1.42e-08	1	1.42e-11	1	0	0
113	7-5-4-6-08-67	1.28e-07	1	1.28e-10	1	0	0
114	7-5-4-6-09-03-03	2.88e-08	1	2.88e-11	1	0	0
115	7-5-4-6-09-03-05	2.88e-08	1	5.76e-09	1	0	0
116	7-5-4-6-51-35-03	1.11e-08	1	2.76e-09	1	0	0
117	7-5-05	2.05e-08	1	2.05e-08	1	0	0
118	SEQ-000378	7.48e-08	1	1.87e-08	1	7.48e-08	1
119	SEQ-000802	8.10e-08	1	2.02e-08	1	8.10e-08	1
120	SEQ-000941	2.94e-08	1	7.34e-09	1	0	0
121	SEQ-001080	1.02e-08	1	2.55e-09	1	0	0
122	SEQ-001504	3.09e-08	1	7.73e-09	1	0	0
123	SEQ-001643	3.18e-08	1	7.95e-09	1	0	0
124	SEQ-001782	1.11e-08	1	2.76e-09	1	0	0
125	SEQ-002206	3.35e-08	1	8.38e-09	1	0	0
126	SEQ-004035	1.27e-07	1	3.18e-08	1	1.27e-07	1
127	SEQ-004459	1.38e-07	1	3.45e-08	1	1.38e-07	1
128	SEQ-004598	5.00e-08	1	1.25e-08	1	5.00e-08	1
129	SEQ-004737	1.74e-08	1	4.35e-09	1	0	0
Totals		9.055E-05	254	7.688E-06	254	6.107E-06	28

Table 12.2.4 Results from Quantification of TIA Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	05-02-13-05	1.39e-08	1	1.40e-16	1	0	0
2	05-02-39	6.19e-07	20	6.19e-10	20	0	0
3	05-02-41-05	1.60e-08	1	1.60e-16	1	0	0
4	05-02-67	6.97e-06	92	6.20e-09	92	0	0
5	05-02-68-03	4.61e-08	2	4.61e-11	2	0	0
6	05-02-68-05	8.06e-08	3	8.39e-09	3	0	0
7	05-02-69-05	1.44e-07	1	1.44e-15	1	0	0
8	05-02-69-35-03	1.66e-08	1	1.60e-16	1	0	0
9	05-02-70-03	1.20e-08	1	1.20e-11	1	0	0
10	05-02-70-05	2.40e-08	2	2.79e-09	2	0	0
11	05-05-03-05	1.90e-06	5	3.80e-07	5	1.39e-08	1
12	05-05-03-35-03	2.17e-07	4	5.43e-08	4	3.29e-08	1
13	05-05-21-05	2.59e-07	4	5.18e-08	4	0	0
14	05-05-21-35-03	2.10e-08	1	5.26e-09	1	0	0
15	05-07-13-05	1.51e-08	1	1.60e-16	1	0	0
16	05-07-39	6.71e-07	20	6.71e-10	20	0	0
17	05-07-41-05	1.73e-08	1	1.80e-16	1	0	0
18	05-07-67	7.56e-06	92	6.71e-09	92	0	0
19	05-07-68-03	4.99e-08	2	4.99e-11	2	0	0
20	05-07-68-05	8.74e-08	3	9.09e-09	3	0	0
21	05-07-69-05	1.56e-07	1	1.56e-15	1	0	0
22	05-07-69-35-03	1.80e-08	1	1.80e-16	1	0	0
23	05-07-70-03	1.30e-08	1	1.30e-11	1	0	0
24	05-07-70-05	2.60e-08	2	3.02e-09	2	0	0
25	05-10-03-05	2.06e-06	5	4.12e-07	5	1.51e-08	1
26	05-10-03-35-03	2.35e-07	4	5.88e-08	4	3.56e-08	1

Sequence Quantification

Table 12.2.4 Results from Quantification of TIA Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
27	05-10-21-05	2.81e-07	4	5.61e-08	4	0	0
28	05-10-21-35-03	2.28e-08	1	5.70e-09	1	0	0
29	05-11-01-27	2.57e-08	1	2.31e-09	1	0	0
30	05-11-03-05	2.78e-08	1	5.55e-09	1	0	0
31	05-11-21-03	1.56e-07	1	1.56e-10	1	0	0
32	05-13-67	4.15e-08	4	4.15e-11	4	0	0
33	05-16-06-05	2.34e-08	2	4.68e-09	2	0	0
34	05-18-67	4.50e-08	4	4.50e-11	4	0	0
35	05-21-06-05	2.54e-08	2	5.08e-09	2	0	0
36	05-50-1-03	2.66e-08	1	2.66e-11	1	0	0
37	05-50-1-05	5.33e-08	2	6.18e-09	2	0	0
38	05-50-1-35-03	2.66e-07	1	6.66e-08	1	0	0
39	07-08-02-39	6.88e-08	6	3.44e-12	6	0	0
40	07-08-02-67	6.19e-07	6	3.10e-11	6	0	0
41	07-08-07-39	7.45e-08	6	3.73e-12	6	0	0
42	07-08-07-67	6.71e-07	6	3.35e-11	6	0	0
43	07-08-51-29-03	4.28e-08	1	1.07e-08	1	0	0
44	07-15-02-39	1.17e-07	6	5.86e-12	6	0	0
45	07-15-02-67	1.05e-06	6	5.27e-11	6	0	0
46	07-15-07-39	1.27e-07	6	6.35e-12	6	0	0
47	07-15-07-67	1.14e-06	6	5.71e-11	6	0	0
48	07-15-51-29-03	7.28e-08	1	1.82e-08	1	0	0
49	07-15-51-29-04	1.87e-09	1	1.87e-09	1	0	0
50	09-02-39	8.67e-07	12	4.33e-11	12	0	0
51	09-02-67	7.85e-06	14	4.41e-10	14	0	0
52	09-07-39	9.39e-07	12	4.69e-11	12	0	0

Table 12.2.4 Results from Quantification of TIA Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
53	09-07-67	8.50e-06	14	4.77e-10	14	0	0
54	09-07-68-02	1.25e-07	6	6.24e-12	6	0	0
55	09-07-68-04	1.25e-07	6	6.24e-09	6	0	0
56	09-07-69-04	5.07e-08	2	5.20e-16	2	0	0
57	09-11-01-27	1.43e-08	1	1.29e-09	1	0	0
58	09-50-1-02	1.48e-08	1	1.48e-11	1	0	0
59	09-50-1-04	1.48e-08	1	4.74e-10	1	0	0
60	09-50-2	8.71e-10	1	8.71e-10	1	0	0
61	09-51-29-03	6.47e-09	1	6.47e-09	1	0	0
62	18-32-02-12-03	1.52e-07	2	7.96e-11	2	0	0
63	18-32-02-12-05	1.52e-07	2	2.55e-09	2	0	0
64	18-32-02-14-03	5.27e-08	2	2.77e-11	2	0	0
65	18-32-02-14-05	5.27e-08	2	8.86e-10	2	0	0
66	18-32-02-39	1.18e-05	4	5.90e-10	4	0	0
67	18-32-02-40-03	1.74e-07	2	8.72e-12	2	0	0
68	18-32-02-40-05	1.74e-07	2	8.72e-09	2	0	0
69	18-32-02-42-03	6.06e-08	2	3.03e-12	2	0	0
70	18-32-02-42-05	6.06e-08	2	3.03e-09	2	0	0
71	18-32-02-67	5.37e-05	9	3.14e-09	9	0	0
72	18-32-02-68-03	1.57e-06	2	7.85e-11	2	0	0
73	18-32-02-68-05	1.57e-06	2	2.51e-09	2	0	0
74	18-32-02-69-03	2.94e-07	4	1.47e-11	4	0	0
75	18-32-02-69-05	2.94e-07	4	1.47e-08	4	0	0
76	18-32-02-70-03	5.46e-07	2	2.73e-11	2	0	0
77	18-32-02-70-05	5.46e-07	2	8.73e-10	2	0	0
78	18-32-07-12-03	1.64e-07	2	8.63e-11	2	0	0

Sequence Quantification

Table 12.2.4 Results from Quantification of TIA Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
79	18-32-07-12-05	1.64e-07	2	2.76e-09	2	0	0
80	18-32-07-14-03	5.71e-08	2	3.00e-11	2	0	0
81	18-32-07-14-05	5.71e-08	2	9.60e-10	2	0	0
82	18-32-07-39	6.39e-06	2	3.20e-10	2	0	0
83	18-32-07-40-03	1.89e-07	2	9.45e-12	2	0	0
84	18-32-07-40-05	1.89e-07	2	9.45e-09	2	0	0
85	18-32-07-42-03	6.57e-08	2	3.28e-12	2	0	0
86	18-32-07-42-05	6.57e-08	2	3.28e-09	2	0	0
87	18-32-07-67	5.82e-05	9	3.40e-09	9	0	0
88	18-32-07-68-03	1.70e-06	2	8.50e-11	2	0	0
89	18-32-07-68-05	1.70e-06	2	2.72e-09	2	0	0
90	18-32-07-69-03	3.19e-07	4	1.59e-11	4	0	0
91	18-32-07-69-05	3.19e-07	4	1.59e-08	4	0	0
92	18-32-07-70-03	5.91e-07	2	2.96e-11	2	0	0
93	18-32-07-70-05	5.91e-07	2	9.46e-10	2	0	0
94	18-32-11-01-18	6.49e-08	1	6.49e-11	1	0	0
95	18-32-11-01-27	5.84e-07	1	5.26e-08	1	4.53e-08	1
96	18-32-11-21-03	8.70e-08	1	8.70e-11	1	0	0
97	18-32-11-21-05	8.70e-08	1	2.78e-09	1	0	0
98	18-32-13-39	1.05e-07	4	5.24e-12	4	0	0
99	18-32-13-67	9.44e-07	4	4.72e-11	4	0	0
100	18-32-18-39	1.14e-07	4	5.68e-12	4	0	0
101	18-32-18-67	1.02e-06	4	5.11e-11	4	0	0
102	18-32-23-12-05	1.23e-07	1	1.23e-07	1	0	0
103	18-32-23-35-05	1.46e-08	1	1.46e-08	1	0	0
104	18-32-39-03	1.41e-07	2	1.41e-10	2	0	0

Table 12.2.4 Results from Quantification of TIA Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
105	18-32-39-05	2.82e-07	4	9.04e-09	4	0	0
106	18-32-39-12-05	1.55e-08	1	1.55e-08	1	0	0
107	18-32-80-1-03	6.05e-07	1	6.05e-10	1	0	0
108	18-32-80-1-05	6.05e-07	1	1.94e-08	1	0	0
109	18-32-80-1-35-03	6.99e-08	1	1.75e-08	1	1.75e-08	1
110	18-32-81-35-03	4.31e-06	1	1.08e-06	1	1.08e-06	1
111	18-32-81-35-04	1.11e-07	1	1.11e-07	1	2.76e-08	1
112	18-32-81-36	4.47e-08	1	4.47e-08	1	1.12e-08	1
113	18-48-02-12-03	2.58e-07	2	1.36e-10	2	0	0
114	18-48-02-12-05	2.58e-07	2	4.34e-09	2	0	0
115	18-48-02-13-03	4.84e-08	4	2.54e-11	4	0	0
116	18-48-02-13-05	4.84e-08	4	8.14e-10	4	0	0
117	18-48-02-14-03	8.98e-08	2	4.71e-11	2	0	0
118	18-48-02-14-05	8.98e-08	2	1.51e-09	2	0	0
119	18-48-02-39	1.02e-05	9	5.94e-10	9	0	0
120	18-48-02-40-03	2.97e-07	2	1.49e-11	2	0	0
121	18-48-02-40-05	2.97e-07	2	1.49e-08	2	0	0
122	18-48-02-41-03	5.57e-08	4	2.78e-12	4	0	0
123	18-48-02-41-05	5.57e-08	4	2.78e-09	4	0	0
124	18-48-02-42-03	1.03e-07	2	5.16e-12	2	0	0
125	18-48-02-42-05	1.03e-07	2	5.16e-09	2	0	0
126	18-48-02-67	9.15e-05	14	5.39e-09	14	0	0
127	18-48-02-68-03	2.67e-06	2	1.34e-10	2	0	0
128	18-48-02-68-05	2.67e-06	2	4.28e-09	2	0	0
129	18-48-02-69-03	5.23e-07	6	2.62e-11	6	0	0
130	18-48-02-69-05	5.23e-07	6	2.62e-08	6	0	0

Table 12.2.4 Results from Quantification of TIA Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
131	18-48-02-70-03	9.29e-07	2	4.65e-11	2	0	0
132	18-48-02-70-05	9.29e-07	2	1.49e-09	2	0	0
133	18-48-07-12-03	2.80e-07	2	1.47e-10	2	0	0
134	18-48-07-12-05	2.80e-07	2	4.70e-09	2	0	0
135	18-48-07-13-03	5.25e-08	4	2.75e-11	4	0	0
136	18-48-07-13-05	5.25e-08	4	8.81e-10	4	0	0
137	18-48-07-14-03	9.73e-08	2	5.11e-11	2	0	0
138	18-48-07-14-05	9.73e-08	2	1.63e-09	2	0	0
139	18-48-07-39	1.10e-05	9	6.43e-10	9	0	0
140	18-48-07-40-03	3.22e-07	2	1.61e-11	2	0	0
141	18-48-07-40-05	3.22e-07	2	1.61e-08	2	0	0
142	18-48-07-41-03	6.03e-08	4	3.02e-12	4	0	0
143	18-48-07-41-05	6.03e-08	4	3.02e-09	4	0	0
144	18-48-07-42-03	1.12e-07	2	5.59e-12	2	0	0
145	18-48-07-42-05	1.12e-07	2	5.59e-09	2	0	0
146	18-48-07-67	9.91e-05	14	5.84e-09	14	0	0
147	18-48-07-68-03	2.90e-06	2	1.45e-10	2	0	0
148	18-48-07-68-05	2.90e-06	2	4.63e-09	2	0	0
149	18-48-07-69-03	5.67e-07	6	2.83e-11	6	0	0
150	18-48-07-69-05	5.67e-07	6	2.83e-08	6	0	0
151	18-48-07-70-03	1.01e-06	2	5.03e-11	2	0	0
152	18-48-07-70-05	1.01e-06	2	1.61e-09	2	0	0
153	18-48-11-01-18	1.10e-07	1	1.10e-10	1	0	0
154	18-48-11-01-27	9.94e-07	1	8.95e-08	1	7.71e-08	1
155	18-48-11-21-03	1.48e-07	1	1.48e-10	1	0	0
156	18-48-11-21-05	1.48e-07	1	4.74e-09	1	0	0

Table 12.2.4 Results from Quantification of TIA Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
157	18-48-13-39	1.79e-07	4	8.93e-12	4	0	0
158	18-48-13-67	1.61e-06	4	8.03e-11	4	0	0
159	18-48-18-39	1.93e-07	4	9.67e-12	4	0	0
160	18-48-18-67	1.74e-06	4	8.70e-11	4	0	0
161	18-48-23-12-05	2.10e-07	1	2.10e-07	1	0	0
162	18-48-23-35-05	2.49e-08	1	2.49e-08	1	0	0
163	18-48-39-03	2.40e-07	2	2.40e-10	2	0	0
164	18-48-39-05	4.81e-07	4	1.54e-08	4	0	0
165	18-48-39-12-05	2.65e-08	1	2.65e-08	1	0	0
166	18-48-39-35-03	2.78e-08	2	6.95e-09	2	0	0
167	18-48-39-35-04	7.13e-10	2	7.13e-10	2	0	0
168	18-48-80-1-03	1.03e-06	1	1.03e-09	1	0	0
169	18-48-80-1-05	1.03e-06	1	3.30e-08	1	0	0
170	18-48-80-1-35-03	1.19e-07	1	2.98e-08	1	2.98e-08	1
171	18-48-80-2	6.06e-08	1	6.06e-08	1	1.52e-08	1
172	18-48-81-35-03	7.34e-06	1	1.84e-06	1	1.84e-06	1
173	18-48-81-35-04	1.88e-07	1	1.88e-07	1	4.71e-08	1
174	18-48-81-35-05	1.66e-08	1	1.66e-08	1	0	0
175	18-48-81-36	7.60e-08	1	7.60e-08	1	1.90e-08	1
176	20-02-39	9.77e-07	22	6.59e-10	22	0	0
177	20-02-67	9.90e-06	68	6.84e-09	68	0	0
178	20-02-68-03	1.27e-07	10	5.45e-11	10	0	0
179	20-02-68-05	1.65e-07	13	9.36e-09	13	0	0
180	20-02-69-05	1.27e-08	1	1.20e-16	1	0	0
181	20-05-01-27	7.35e-08	2	6.62e-09	2	0	0
182	20-05-03-05	3.49e-06	24	6.99e-07	24	0	0

Table 12.2.4 Results from Quantification of TIA Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
183	20-05-03-35-03	1.81e-07	4	4.53e-08	4	3.62e-08	3
184	20-05-21-05	4.33e-07	8	8.66e-08	8	0	0
185	20-07-39	2.30e-06	46	1.37e-09	46	0	0
186	20-07-67	2.27e-05	116	1.37e-08	116	0	0
187	20-07-68-03	1.37e-07	10	5.91e-11	10	0	0
188	20-07-68-05	3.57e-07	26	2.03e-08	26	0	0
189	20-07-69-05	1.37e-08	1	1.40e-16	1	0	0
190	20-10-01-27	7.96e-08	2	7.17e-09	2	0	0
191	20-10-03-05	1.89e-06	12	3.78e-07	12	0	0
192	20-10-03-35-03	1.96e-07	4	4.91e-08	4	3.92e-08	3
193	20-10-21-05	2.34e-07	4	4.69e-08	4	0	0
194	20-11-03-05	3.06e-08	3	6.11e-09	3	0	0
195	20-80-2	5.75e-09	10	5.75e-09	10	0	0
196	20-81-35-04	3.70e-08	23	3.70e-08	23	0	0
197	21-81-35-04	5.09e-08	1	5.09e-08	1	1.27e-08	1
198	21-81-36	2.06e-08	1	2.06e-08	1	0	0
199	22-08-02-67	2.13e-08	2	1.06e-12	2	0	0
200	22-08-07-67	2.30e-08	2	1.15e-12	2	0	0
201	22-15-02-67	3.62e-08	2	1.81e-12	2	0	0
202	22-15-07-67	3.92e-08	2	1.96e-12	2	0	0
203	33-5-4-6-02-67	5.19e-07	49	9.64e-11	49	0	0
204	33-5-4-6-07-67	5.63e-07	49	1.04e-10	49	0	0
205	33-5-4-8-02-67	7.42e-08	6	3.71e-12	6	0	0
206	33-5-4-8-07-67	8.04e-08	6	4.02e-12	6	0	0
207	33-5-5	6.14e-07	1	6.14e-07	1	0	0
208	33-7-3	1.18e-08	1	1.18e-08	1	0	0

Table 12.2.4 Results from Quantification of TIA Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
209	SEQ-000000	2.02e-08	2	1.01e-09	2	0	0
210	SEQ-000013	1.82e-07	2	9.08e-09	2	0	0
211	SEQ-000039	6.31e-08	2	3.15e-09	2	0	0
212	SEQ-000052	2.18e-08	2	1.09e-09	2	0	0
213	SEQ-000065	1.97e-07	2	9.83e-09	2	0	0
214	SEQ-000091	6.83e-08	2	3.42e-09	2	0	0
215	SEQ-000104	7.29e-08	1	1.82e-08	1	0	0
216	SEQ-000117	3.43e-08	2	1.72e-09	2	0	0
217	SEQ-000130	3.09e-07	2	1.55e-08	2	0	0
218	SEQ-000143	5.79e-08	4	2.90e-09	4	0	0
219	SEQ-000156	1.07e-07	2	5.37e-09	2	0	0
220	SEQ-000169	3.72e-08	2	1.86e-09	2	0	0
221	SEQ-000182	3.35e-07	2	1.67e-08	2	0	0
222	SEQ-000195	6.28e-08	4	3.14e-09	4	0	0
223	SEQ-000208	1.16e-07	2	5.82e-09	2	0	0
224	SEQ-000221	1.71e-08	1	4.28e-09	1	0	0
225	SEQ-6B0000	5.97e-08	4	7.84e-09	4	0	0
226	SEQ-6B0013	6.47e-08	4	8.49e-09	4	0	0
227	SEQ-700010	9.18e-08	6	4.59e-12	6	0	0
228	SEQ-700014	8.26e-07	6	4.13e-11	6	0	0
229	SEQ-700028	9.94e-08	6	4.97e-12	6	0	0
230	SEQ-700032	8.95e-07	6	4.47e-11	6	0	0
231	SEQ-700170	3.50e-08	3	6.99e-09	3	0	0
232	SEQ-700314	3.79e-08	3	7.58e-09	3	0	0
233	SEQ-800000	8.14e-09	2	4.07e-13	2	0	0
234	SEQ-800001	8.14e-09	2	1.30e-11	2	0	0

Sequence Quantification

Table 12.2.4 Results from Quantification of TIA Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
235	SEQ-800003	8.81e-09	2	4.41e-13	2	0	0
236	SEQ-800004	8.81e-09	2	1.41e-11	2	0	0
237	SEQ-800052	2.23e-08	1	5.59e-09	1	0	0
Totals		4.905E-04	1,343	7.780E-06	1,343	3.387E-06	22

Table 12.2.5 Results from Quantification of TAB Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	3-03-03-12-05	4.28e-08	1	8.55e-09	1	0	0
2	3-03-03-14-05	1.49e-08	1	2.97e-09	1	0	0
3	3-03-03-40-05	4.92e-08	1	9.84e-09	1	0	0
4	3-03-03-42-05	1.71e-08	1	3.42e-09	1	0	0
5	3-03-03-68-05	4.43e-07	1	8.85e-08	1	2.17e-08	1
6	3-03-03-68-35-03	5.12e-08	1	1.02e-08	1	5.12e-08	1
7	3-03-03-70-05	1.54e-07	1	3.08e-08	1	0	0
8	3-03-03-70-35-03	1.78e-08	1	3.56e-09	1	0	0
9	3-03-04-21-05	3.68e-06	9	7.33e-07	9	1.66e-07	1
10	3-03-04-21-35-03	3.91e-07	1	3.91e-07	1	3.91e-07	1
11	3-03-04-21-35-04	1.00e-08	1	2.00e-09	1	0	0
12	3-03-08-12-05	4.63e-08	1	9.27e-09	1	0	0
13	3-03-08-14-05	1.61e-08	1	3.22e-09	1	0	0
14	3-03-08-40-05	5.33e-08	1	1.07e-08	1	0	0
15	3-03-08-42-05	1.85e-08	1	3.70e-09	1	0	0
16	3-03-08-68-05	4.80e-07	1	9.59e-08	1	2.35e-08	1
17	3-03-08-68-35-03	5.54e-08	1	1.11e-08	1	5.54e-08	1
18	3-03-08-70-05	1.67e-07	1	3.33e-08	1	0	0
19	3-03-08-70-35-03	1.93e-08	1	3.85e-09	1	0	0
20	3-03-09-21-05	4.01e-06	11	7.98e-07	11	1.79e-07	1
21	3-03-09-21-35-03	4.23e-07	1	8.46e-08	1	4.23e-07	1
22	3-03-09-21-35-04	1.09e-08	1	2.17e-09	1	0	0
23	3-03-23-12-05	6.95e-08	1	6.95e-08	1	0	0
24	3-03-51-35-03	1.41e-06	1	1.41e-06	1	3.52e-07	1
25	3-03-51-35-04	3.61e-08	1	3.61e-08	1	0	0

Sequence Quantification

Table 12.2.5 Results from Quantification of TAB Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
26	3-03-51-36	1.46e-08	1	1.46e-08	1	0	0
27	5-04-03-68-05	4.27e-08	1	8.54e-09	1	0	0
28	5-04-03-70-05	1.48e-08	1	2.97e-09	1	0	0
29	5-04-04-21-05	3.26e-07	1	6.52e-08	1	1.60e-08	1
30	5-04-04-21-35-03	3.77e-08	1	7.53e-09	1	0	0
31	5-04-08-68-05	4.63e-08	1	9.25e-09	1	0	0
32	5-04-08-70-05	1.61e-08	1	3.22e-09	1	0	0
33	5-04-09-21-05	3.53e-07	1	7.06e-08	1	1.73e-08	1
34	5-04-09-21-35-03	4.08e-08	1	8.16e-09	1	0	0
35	5-04-11-21-05	3.43e-08	1	6.86e-09	1	0	0
36	5-04-14-67	2.57e-08	2	5.13e-12	2	0	0
37	5-04-19-67	2.78e-08	2	5.56e-12	2	0	0
38	5-04-81-35-03	2.34e-07	1	2.34e-07	1	5.86e-08	1
39	7-5-4-6-03-67	3.26e-08	1	3.26e-11	1	0	0
40	7-5-4-6-08-67	3.53e-08	1	3.53e-11	1	0	0
Totals		1.296E-05	60	4.281E-06	60	1.753E-06	12

Table 12.2.6 Results from Quantification of J2 Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	2-01-02-04-01	1.27e-06	6	4.33e-08	6	0	0
2	2-01-02-04-02	4.01e-07	2	2.00e-11	2	0	0
3	2-01-02-04-03	1.25e-06	18	4.26e-08	18	0	0
4	2-01-02-04-05	1.25e-06	18	4.26e-08	18	0	0
5	2-01-02-04-35-01	1.23e-07	3	4.21e-09	3	0	0
6	2-01-02-04-35-03	1.24e-07	6	4.25e-09	6	0	0
7	2-01-02-05-01	2.24e-07	6	7.64e-09	6	0	0
8	2-01-02-05-02	4.51e-07	24	1.62e-07	24	0	0
9	2-01-02-05-03	2.25e-07	24	7.70e-09	24	0	0
10	2-01-02-05-05	2.25e-07	24	7.70e-09	24	0	0
11	2-01-02-06-01	4.15e-07	3	1.42e-08	3	0	0
12	2-01-02-06-02	8.36e-07	12	3.00e-07	12	0	0
13	2-01-02-06-03	4.18e-07	12	1.43e-08	12	0	0
14	2-01-02-06-05	4.18e-07	12	1.43e-08	12	0	0
15	2-01-02-06-35-01	4.28e-08	3	1.46e-09	3	0	0
16	2-01-02-06-35-03	4.32e-08	6	1.48e-09	6	0	0
17	2-01-02-08-01	1.27e-06	6	4.33e-08	6	0	0
18	2-01-02-08-02	4.01e-07	2	2.00e-11	2	0	0
19	2-01-02-08-03	1.27e-05	18	3.29e-10	18	0	0
20	2-01-02-08-05	1.15e-05	24	2.56e-08	24	0	0
21	2-01-02-08-35-01	1.23e-07	3	4.21e-09	3	0	0
22	2-01-02-08-35-03	3.98e-06	9	1.36e-07	9	0	0
23	2-01-02-08-35-04	9.88e-08	3	3.37e-09	3	0	0
24	2-01-02-09-01	2.24e-07	6	7.64e-09	6	0	0
25	2-01-02-09-02	4.51e-07	24	1.62e-07	24	0	0
26	2-01-02-09-03	4.49e-07	36	1.53e-08	36	0	0

Sequence Quantification

Table 12.2.6 Results from Quantification of J2 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
27	2-01-02-10-01	4.15e-07	3	1.42e-08	3	0	0
28	2-01-02-10-02	8.36e-07	12	3.00e-07	12	0	0
29	2-01-02-10-03	8.32e-07	18	2.84e-08	18	0	0
30	2-01-02-10-05	8.32e-07	18	2.84e-08	18	0	0
31	2-01-02-10-35-01	4.28e-08	3	1.46e-09	3	0	0
32	2-01-02-10-35-03	8.60e-08	9	2.94e-09	9	0	0
33	2-01-02-12-03	4.15e-07	6	1.42e-08	6	0	0
34	2-01-02-12-05	4.15e-07	6	1.42e-08	6	0	0
35	2-01-02-12-35-03	4.28e-08	3	1.46e-09	3	0	0
36	2-01-02-39	4.41e-05	23	2.16e-09	23	0	0
37	2-01-02-40-01	4.62e-07	1	2.31e-11	1	0	0
38	2-01-02-40-02	4.66e-07	2	2.33e-11	2	0	0
39	2-01-02-40-03	2.80e-07	2	1.40e-11	2	0	0
40	2-01-02-40-05	2.48e-07	1	8.06e-10	1	0	0
41	2-01-02-40-35-01	2.87e-07	6	1.03e-07	6	0	0
42	2-01-02-40-35-03	2.89e-07	12	1.04e-07	12	0	0
43	2-01-02-41-01	5.20e-07	12	1.87e-07	12	0	0
44	2-01-02-41-02	5.24e-07	24	1.88e-07	24	0	0
45	2-01-02-41-03	5.24e-07	48	1.88e-07	48	0	0
46	2-01-02-41-05	5.24e-07	48	1.88e-07	48	0	0
47	2-01-02-42-01	9.64e-07	6	3.46e-07	6	0	0
48	2-01-02-42-02	9.72e-07	12	3.49e-07	12	0	0
49	2-01-02-42-03	9.72e-07	24	3.49e-07	24	0	0
50	2-01-02-42-05	9.72e-07	24	3.49e-07	24	0	0
51	2-01-02-42-35-01	9.96e-08	6	3.57e-08	6	0	0
52	2-01-02-42-35-03	1.00e-07	12	3.60e-08	12	0	0

Table 12.2.6 Results from Quantification of J2 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
53	2-01-02-67	3.95e-04	63	2.04e-08	63	0	0
54	2-01-02-68-01	8.73e-06	15	3.81e-10	15	0	0
55	2-01-02-68-02	8.80e-06	30	3.84e-10	30	0	0
56	2-01-02-68-03	4.19e-06	4	2.10e-10	4	0	0
57	2-01-02-68-05	3.72e-06	2	1.21e-08	2	0	0
58	2-01-02-68-35-01	4.30e-07	1	2.15e-11	1	0	0
59	2-01-02-68-35-03	4.30e-07	1	5.37e-09	1	0	0
60	2-01-02-68-35-04	6.62e-08	6	2.37e-08	6	0	0
61	2-01-02-69-01	7.80e-07	2	3.90e-11	2	0	0
62	2-01-02-69-02	7.86e-07	4	3.93e-11	4	0	0
63	2-01-02-69-03	4.72e-07	4	2.36e-11	4	0	0
64	2-01-02-69-05	4.18e-07	2	1.36e-09	2	0	0
65	2-01-02-69-35-01	4.84e-07	12	1.74e-07	12	0	0
66	2-01-02-69-35-03	4.88e-07	24	1.75e-07	24	0	0
67	2-01-02-70-01	1.45e-06	1	7.23e-11	1	0	0
68	2-01-02-70-02	1.46e-06	2	7.29e-11	2	0	0
69	2-01-02-70-03	1.46e-06	4	7.29e-11	4	0	0
70	2-01-02-70-05	1.29e-06	2	4.20e-09	2	0	0
71	2-01-02-70-35-01	8.97e-07	6	3.22e-07	6	0	0
72	2-01-02-70-35-03	9.04e-07	12	3.24e-07	12	0	0
73	2-01-05-01-27	4.34e-08	1	3.90e-09	1	0	0
74	2-01-05-03-01	1.74e-06	13	1.74e-09	13	0	0
75	2-01-05-03-02	3.50e-06	39	3.50e-09	39	0	0
76	2-01-05-03-05	5.34e-06	50	3.47e-07	50	0	0
77	2-01-05-03-35-01	1.59e-07	4	1.59e-10	4	0	0
78	2-01-05-03-35-03	4.78e-07	12	1.20e-07	12	0	0
79	2-01-05-21-01	2.13e-07	4	2.13e-10	4	0	0

Table 12.2.6 Results from Quantification of J2 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
80	2-01-05-21-02	4.28e-07	12	4.28e-10	12	0	0
81	2-01-05-21-05	6.35e-07	21	4.13e-08	21	0	0
82	2-01-07-04-01	1.37e-06	6	4.69e-08	6	0	0
83	2-01-07-04-02	4.34e-07	2	2.17e-11	2	0	0
84	2-01-07-04-03	1.38e-06	24	4.73e-08	24	0	0
85	2-01-07-04-05	1.38e-06	24	4.73e-08	24	0	0
86	2-01-07-04-35-01	1.34e-07	3	4.56e-09	3	0	0
87	2-01-07-04-35-03	1.35e-07	6	4.60e-09	6	0	0
88	2-01-07-05-01	2.42e-07	6	8.28e-09	6	0	0
89	2-01-07-05-02	4.88e-07	24	1.75e-07	24	0	0
90	2-01-07-05-03	2.44e-07	24	8.34e-09	24	0	0
91	2-01-07-05-05	2.44e-07	24	8.34e-09	24	0	0
92	2-01-07-06-01	4.49e-07	3	1.53e-08	3	0	0
93	2-01-07-06-02	9.05e-07	12	3.25e-07	12	0	0
94	2-01-07-06-03	4.53e-07	12	1.55e-08	12	0	0
95	2-01-07-06-05	4.53e-07	12	1.55e-08	12	0	0
96	2-01-07-06-35-01	4.64e-08	3	1.59e-09	3	0	0
97	2-01-07-06-35-03	4.68e-08	6	1.60e-09	6	0	0
98	2-01-07-08-01	1.37e-06	6	4.69e-08	6	0	0
99	2-01-07-08-02	4.34e-07	2	2.17e-11	2	0	0
100	2-01-07-08-03	1.38e-05	18	3.57e-10	18	0	0
101	2-01-07-08-05	1.24e-05	24	2.78e-08	24	0	0
102	2-01-07-08-35-01	1.34e-07	3	4.56e-09	3	0	0
103	2-01-07-08-35-03	4.31e-06	9	1.47e-07	9	0	0
104	2-01-07-08-35-04	1.07e-07	3	3.66e-09	3	0	0
105	2-01-07-09-01	2.42e-07	6	8.28e-09	6	0	0
106	2-01-07-09-02	4.88e-07	24	1.75e-07	24	0	0

Table 12.2.6 Results from Quantification of J2 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
107	2-01-07-09-03	4.86e-07	36	1.66e-08	36	0	0
108	2-01-07-09-05	4.86e-07	36	1.66e-08	36	0	0
109	2-01-07-10-01	4.49e-07	3	1.53e-08	3	0	0
110	2-01-07-10-02	9.05e-07	12	3.25e-07	12	0	0
111	2-01-07-10-03	9.02e-07	18	3.08e-08	18	0	0
112	2-01-07-10-05	9.02e-07	18	3.08e-08	18	0	0
113	2-01-07-10-35-01	4.64e-08	3	1.59e-09	3	0	0
114	2-01-07-10-35-03	9.32e-08	9	3.18e-09	9	0	0
115	2-01-07-12-03	4.49e-07	6	1.53e-08	6	0	0
116	2-01-07-12-05	4.49e-07	6	1.53e-08	6	0	0
117	2-01-07-12-35-03	4.64e-08	3	1.59e-09	3	0	0
118	2-01-07-39	4.78e-05	23	2.34e-09	23	0	0
119	2-01-07-40-01	5.01e-07	1	2.50e-11	1	0	0
120	2-01-07-40-02	5.05e-07	2	2.52e-11	2	0	0
121	2-01-07-40-03	3.22e-06	48	1.15e-06	48	0	0
122	2-01-07-40-05	3.22e-06	48	1.15e-06	48	0	0
123	2-01-07-40-35-01	3.11e-07	6	1.11e-07	6	0	0
124	2-01-07-40-35-03	3.13e-07	12	1.12e-07	12	0	0
125	2-01-07-41-01	5.63e-07	12	2.02e-07	12	0	0
126	2-01-07-41-02	5.68e-07	24	2.04e-07	24	0	0
127	2-01-07-41-03	5.68e-07	48	2.04e-07	48	0	0
128	2-01-07-41-05	8.39e-08	4	5.46e-09	4	0	0
129	2-01-07-42-01	1.04e-06	6	3.75e-07	6	0	0
130	2-01-07-42-02	1.05e-06	12	3.78e-07	12	0	0
131	2-01-07-42-03	1.05e-06	24	3.78e-07	24	0	0
132	2-01-07-42-05	1.05e-06	24	3.78e-07	24	0	0
133	2-01-07-42-35-01	1.08e-07	6	3.87e-08	6	0	0

Sequence Quantification

Table 12.2.6 Results from Quantification of J2 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
134	2-01-07-42-35-03	1.09e-07	12	3.90e-08	12	0	0
135	2-01-07-67	4.28e-04	70	2.21e-08	70	0	0
136	2-01-07-68-01	4.95e-06	14	1.88e-10	14	0	0
137	2-01-07-68-02	2.98e-07	4	2.78e-11	4	0	0
138	2-01-07-68-03	9.51e-06	14	5.20e-09	14	0	0
139	2-01-07-68-05	2.98e-05	60	1.07e-05	60	0	0
140	2-01-07-68-35-01	4.66e-07	1	2.33e-11	1	0	0
141	2-01-07-68-35-03	3.08e-06	30	1.11e-06	30	0	0
142	2-01-07-68-35-04	1.07e-08	1	1.07e-08	1	0	0
143	2-01-07-69-01	4.23e-07	1	2.11e-11	1	0	0
144	2-01-07-69-02	8.52e-07	4	4.26e-11	4	0	0
145	2-01-07-69-03	5.11e-07	4	2.56e-11	4	0	0
146	2-01-07-69-05	4.53e-07	2	1.47e-09	2	0	0
147	2-01-07-69-35-01	5.24e-07	12	1.88e-07	12	0	0
148	2-01-07-69-35-03	5.28e-07	24	1.90e-07	24	0	0
149	2-01-07-70-01	1.57e-06	1	7.83e-11	1	0	0
150	2-01-07-70-02	9.47e-06	12	3.40e-06	12	0	0
151	2-01-07-70-03	1.58e-06	4	7.90e-11	4	0	0
152	2-01-07-70-05	1.40e-06	2	4.55e-09	2	0	0
153	2-01-07-70-35-01	9.71e-07	6	3.49e-07	6	0	0
154	2-01-07-70-35-03	9.79e-07	12	3.51e-07	12	0	0
155	2-01-10-01-27	4.70e-08	1	4.23e-09	1	0	0
156	2-01-10-03-01	1.89e-06	13	1.89e-09	13	0	0
157	2-01-10-03-02	1.89e-06	13	1.89e-09	13	0	0
158	2-01-10-03-05	1.94e-06	22	1.26e-07	22	0	0
159	2-01-10-03-35-01	1.73e-07	4	1.73e-10	4	0	0
160	2-01-10-03-35-03	5.20e-07	16	5.20e-07	16	0	0

Table 12.2.6 Results from Quantification of J2 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
161	2-01-10-21-01	2.31e-07	4	2.31e-10	4	0	0
162	2-01-10-21-02	4.63e-07	12	4.63e-10	12	0	0
163	2-01-10-21-05	5.73e-07	18	3.72e-08	18	0	0
164	2-01-11-01-18	3.07e-07	1	3.07e-10	1	0	0
165	2-01-11-01-27	2.77e-06	1	2.49e-07	1	2.15e-07	1
166	2-01-11-03-01	6.01e-08	6	6.01e-08	6	0	0
167	2-01-11-03-02	1.21e-07	18	1.21e-10	18	0	0
168	2-01-11-21-01	4.61e-07	1	4.61e-07	1	0	0
169	2-01-11-21-02	9.26e-07	3	9.26e-10	3	0	0
170	2-01-11-21-03	1.66e-06	9	1.66e-09	9	0	0
171	2-01-11-21-05	6.60e-07	3	4.29e-08	3	0	0
172	2-01-11-21-35-01	4.77e-08	1	4.77e-11	1	0	0
173	2-01-11-21-35-03	1.43e-07	4	1.43e-07	4	0	0
174	2-01-13-39	6.05e-07	6	2.07e-11	6	0	0
175	2-01-13-67	5.51e-06	12	1.88e-10	12	0	0
176	2-01-13-68-01	3.48e-07	12	1.25e-07	12	0	0
177	2-01-13-68-03	3.51e-07	48	1.26e-07	48	0	0
178	2-01-13-68-05	3.51e-07	48	1.26e-07	48	0	0
179	2-01-13-70-01	2.02e-08	2	2.02e-11	2	0	0
180	2-01-18-39	6.55e-07	6	2.24e-11	6	0	0
181	2-01-18-67	5.97e-06	12	2.04e-10	12	0	0
182	2-01-18-68-01	3.78e-07	12	1.35e-07	12	0	0
183	2-01-18-68-03	3.81e-07	48	1.37e-07	48	0	0
184	2-01-18-68-05	3.81e-07	48	1.37e-07	48	0	0
185	2-01-18-70-01	1.31e-07	12	4.71e-08	12	0	0
186	2-01-22-04-27	3.86e-08	2	3.48e-09	2	0	0
187	2-01-23-12-05	4.80e-07	2	4.80e-07	2	0	0

Table 12.2.6 Results from Quantification of J2 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
188	2-01-23-35-05	5.44e-08	1	5.44e-08	1	0	0
189	2-01-24-01	2.04e-06	4	2.04e-09	4	0	0
190	2-01-24-02	2.06e-06	8	2.06e-09	8	0	0
191	2-01-24-03	2.03e-06	8	2.03e-06	8	0	0
192	2-01-24-05	1.80e-06	4	1.17e-07	4	0	0
193	2-01-24-12-05	1.98e-07	1	1.98e-07	1	0	0
194	2-01-24-35-01	1.04e-07	1	1.04e-10	1	0	0
195	2-01-24-35-03	5.34e-07	6	1.34e-07	6	0	0
196	2-01-24-35-05	2.35e-08	1	2.35e-08	1	0	0
197	2-01-50-1-01	3.21e-06	1	3.21e-09	1	0	0
198	2-01-50-1-02	3.21e-06	1	3.21e-09	1	0	0
199	2-01-50-1-03	1.16e-05	9	1.16e-05	9	0	0
200	2-01-50-1-35-01	3.31e-07	1	3.31e-10	1	0	0
201	2-01-50-1-35-03	9.97e-07	4	9.97e-07	4	0	0
202	2-01-50-2	1.69e-07	1	1.69e-07	1	0	0
203	2-01-51-35-01	5.22e-05	1	1.30e-08	1	0	0
204	2-01-51-35-03	1.04e-07	1	2.61e-08	1	0	0
205	2-01-51-35-04	1.34e-06	1	1.34e-06	1	1.00e-08	1
206	2-01-51-35-05	1.18e-07	1	1.18e-07	1	0	0
207	2-01-51-35-13	1.41e-08	1	1.41e-11	1	0	0
208	2-01-51-35-15	4.24e-08	4	4.24e-08	4	0	0
209	2-06-02-04-01	7.86e-08	2	2.06e-09	2	0	0
210	2-06-02-04-02	3.96e-08	2	1.98e-12	2	0	0
211	2-06-02-04-03	7.93e-08	8	2.08e-09	8	0	0
212	2-06-02-04-05	7.93e-08	8	2.08e-09	8	0	0
213	2-06-02-06-01	2.73e-08	2	7.17e-10	2	0	0
214	2-06-02-06-02	1.38e-08	2	6.89e-13	2	0	0

Table 12.2.6 Results from Quantification of J2 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
215	2-06-02-08-01	7.86e-08	2	2.06e-09	2	0	0
216	2-06-02-08-02	1.59e-07	8	4.37e-08	8	0	0
217	2-06-02-08-03	1.23e-06	2	3.07e-12	2	0	0
218	2-06-02-08-05	1.23e-06	2	9.83e-11	2	0	0
219	2-06-02-08-35-03	2.54e-07	2	6.67e-09	2	0	0
220	2-06-02-10-01	2.73e-08	2	7.17e-10	2	0	0
221	2-06-02-10-02	1.38e-08	2	6.89e-13	2	0	0
222	2-06-02-39	2.86e-06	2	7.50e-11	2	0	0
223	2-06-02-40-01	4.57e-08	1	2.29e-12	1	0	0
224	2-06-02-40-02	4.61e-08	2	2.30e-12	2	0	0
225	2-06-02-40-03	4.61e-08	4	2.30e-12	4	0	0
226	2-06-02-40-05	4.61e-08	4	7.37e-11	4	0	0
227	2-06-02-42-01	1.59e-08	1	7.95e-13	1	0	0
228	2-06-02-42-02	1.60e-08	2	8.01e-13	2	0	0
229	2-06-02-67	2.62e-05	16	1.14e-09	16	0	0
230	2-06-02-68-01	8.49e-07	3	2.29e-11	3	0	0
231	2-06-02-68-02	1.76e-06	16	4.86e-07	16	0	0
232	2-06-02-68-03	1.76e-06	32	4.86e-07	32	0	0
233	2-06-02-68-05	2.21e-07	1	7.17e-10	1	0	0
234	2-06-02-68-35-01	4.25e-08	1	2.13e-12	1	0	0
235	2-06-02-68-35-03	4.29e-08	2	2.13e-09	2	0	0
236	2-06-02-69-02	7.78e-08	4	3.89e-12	4	0	0
237	2-06-02-70-01	1.43e-07	1	7.15e-12	1	0	0
238	2-06-02-70-02	5.77e-07	8	1.59e-07	8	0	0
239	2-06-02-70-03	1.44e-07	4	7.21e-12	4	0	0
240	2-06-02-70-05	1.44e-07	4	7.21e-09	4	0	0
241	2-06-02-70-35-01	1.48e-08	1	7.39e-13	1	0	0

Table 12.2.6 Results from Quantification of J2 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
242	2-06-02-70-35-03	1.49e-08	2	1.86e-10	2	0	0
243	2-06-05-03-01	1.53e-07	4	1.53e-10	4	0	0
244	2-06-05-03-02	3.06e-07	12	3.06e-10	12	0	0
245	2-06-05-03-05	4.55e-07	21	2.96e-08	21	0	0
246	2-06-07-04-01	8.52e-08	2	2.24e-09	2	0	0
247	2-06-07-04-02	4.29e-08	2	2.15e-12	2	0	0
248	2-06-07-04-03	8.59e-08	8	2.25e-09	8	0	0
249	2-06-07-04-05	8.59e-08	8	2.25e-09	8	0	0
250	2-06-07-06-01	2.96e-08	2	7.77e-10	2	0	0
251	2-06-07-06-02	1.49e-08	2	7.46e-13	2	0	0
252	2-06-07-08-01	8.52e-08	2	2.24e-09	2	0	0
253	2-06-07-08-02	4.29e-08	2	2.15e-12	2	0	0
254	2-06-07-08-03	1.33e-06	2	3.33e-12	2	0	0
255	2-06-07-08-05	1.33e-06	2	1.06e-10	2	0	0
256	2-06-07-08-35-03	2.75e-07	2	7.22e-09	2	0	0
257	2-06-07-10-01	2.96e-08	2	7.77e-10	2	0	0
258	2-06-07-10-02	5.97e-08	8	1.65e-08	8	0	0
259	2-06-07-39	3.10e-06	2	8.13e-11	2	0	0
260	2-06-07-40-01	4.95e-08	1	2.48e-12	1	0	0
261	2-06-07-40-02	2.00e-07	8	5.50e-08	8	0	0
262	2-06-07-40-03	4.99e-08	4	2.50e-12	4	0	0
263	2-06-07-40-05	2.00e-07	16	5.50e-08	16	0	0
264	2-06-07-42-01	6.89e-08	4	1.90e-08	4	0	0
265	2-06-07-42-02	1.74e-08	2	8.68e-13	2	0	0
266	2-06-07-42-03	4.16e-08	8	1.15e-08	8	0	0
267	2-06-07-42-05	1.04e-08	2	1.67e-11	2	0	0
268	2-06-07-67	2.85e-05	18	1.26e-09	18	0	0

Table 12.2.6 Results from Quantification of J2 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
269	2-06-07-68-01	1.89e-06	8	5.22e-07	8	0	0
270	2-06-07-68-02	1.91e-06	16	5.26e-07	16	0	0
271	2-06-07-68-03	1.91e-07	4	9.55e-12	4	0	0
272	2-06-07-68-05	1.91e-07	4	3.06e-10	4	0	0
273	2-06-07-68-35-01	4.61e-08	1	2.30e-12	1	0	0
274	2-06-07-68-35-03	4.64e-08	2	5.80e-10	2	0	0
275	2-06-07-69-02	8.42e-08	4	4.21e-12	4	0	0
276	2-06-07-70-01	1.55e-07	1	7.75e-12	1	0	0
277	2-06-07-70-02	1.56e-07	2	7.81e-12	2	0	0
278	2-06-07-70-03	6.25e-07	16	1.72e-07	16	0	0
279	2-06-07-70-05	6.25e-07	16	1.72e-07	16	0	0
280	2-06-07-70-35-01	1.60e-08	1	8.01e-13	1	0	0
281	2-06-07-70-35-03	1.61e-08	2	2.02e-10	2	0	0
282	2-06-10-03-01	1.65e-07	4	1.65e-10	4	0	0
283	2-06-10-03-02	3.32e-07	12	3.32e-10	12	0	0
284	2-06-10-03-05	5.52e-07	27	5.52e-07	27	0	0
285	2-06-11-01-18	3.04e-08	1	3.04e-11	1	0	0
286	2-06-11-01-27	2.74e-07	1	2.46e-08	1	2.12e-08	1
287	2-06-11-21-01	4.56e-08	1	4.56e-11	1	0	0
288	2-06-11-21-02	9.16e-08	3	9.16e-11	3	0	0
289	2-06-11-21-03	1.65e-07	9	1.65e-10	9	0	0
290	2-06-11-21-05	1.47e-07	7	9.54e-09	7	0	0
291	2-06-13-67	3.59e-07	4	9.42e-12	4	0	0
292	2-06-18-39	4.32e-08	4	1.13e-12	4	0	0
293	2-06-18-67	3.89e-07	4	1.02e-11	4	0	0
294	2-06-23-12-05	4.54e-08	1	4.54e-08	1	0	0
295	2-06-24-01	2.00e-07	2	2.00e-07	2	0	0

Table 12.2.6 Results from Quantification of J2 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
296	2-06-24-02	2.01e-07	4	2.01e-10	4	0	0
297	2-06-24-03	1.01e-07	4	1.01e-10	4	0	0
298	2-06-24-05	1.78e-07	4	1.16e-08	4	0	0
299	2-06-24-12-05	1.96e-08	1	1.96e-08	1	0	0
300	2-06-24-35-01	2.06e-08	2	2.06e-11	2	0	0
301	2-06-24-35-03	6.19e-08	6	1.55e-08	6	0	0
302	2-06-50-1-01	3.17e-07	1	3.17e-10	1	0	0
303	2-06-50-1-02	3.17e-07	1	3.17e-10	1	0	0
304	2-06-50-1-03	1.14e-06	9	1.14e-09	9	0	0
305	2-06-50-1-05	8.50e-07	6	5.53e-08	6	0	0
306	2-06-50-1-35-01	3.28e-08	1	3.28e-11	1	0	0
307	2-06-50-1-35-03	9.83e-08	3	2.46e-08	3	0	0
308	2-06-50-2	1.67e-08	1	1.67e-08	1	0	0
309	2-06-51-35-01	5.16e-06	1	5.16e-09	1	0	0
310	2-06-51-35-03	1.56e-05	7	3.89e-06	7	1.03e-08	1
311	2-06-51-35-04	1.32e-07	1	1.32e-07	1	3.31e-08	1
312	2-06-51-35-05	1.16e-08	1	1.16e-08	1	0	0
313	2-06-51-36	5.34e-08	1	5.34e-08	1	1.34e-08	1
Totals		1.364E-03	3,022	5.580E-05	3,022	3.025E-07	6

Table 12.2.7 Results from Quantification of E1B Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	03-05-02-39	7.16e-08	4	7.16e-11	4	0	0
2	03-05-02-67	9.48e-07	14	9.48e-10	14	0	0
3	03-05-02-68-02	8.89e-06	21	4.52e-11	21	0	0
4	03-05-02-68-03	8.77e-06	16	3.76e-11	16	0	0
5	03-05-02-68-05	8.77e-06	16	2.16e-08	16	0	0
6	03-05-07-39	1.11e-07	10	1.11e-10	10	0	0
7	03-05-07-67	1.03e-06	14	1.03e-09	14	0	0
8	03-05-07-68-02	9.63e-06	21	4.89e-11	21	0	0
9	03-05-07-68-03	9.50e-06	16	4.07e-11	16	0	0
10	03-05-07-68-05	9.50e-06	16	2.34e-08	16	0	0
11	03-05-51-35-03	1.38e-07	5	3.45e-08	5	0	0
12	03-05-51-35-04	4.95e-07	1	4.95e-07	1	0	0
13	03-05-51-35-05	4.35e-08	1	4.35e-08	1	0	0
14	03-16-02-67	1.39e-08	2	1.39e-11	2	0	0
15	03-16-07-67	1.51e-08	2	1.51e-11	2	0	0
16	03-32-02-08-03	1.26e-05	20	0.00	20	0	0
17	03-32-02-08-05	1.27e-05	32	0.00	32	0	0
18	03-32-02-09-03	1.41e-08	16	0.00	16	0	0
19	03-32-02-09-05	1.41e-08	16	0.00	16	0	0
20	03-32-02-10-03	2.61e-08	8	0.00	8	0	0
21	03-32-02-10-05	2.61e-08	8	0.00	8	0	0
22	03-32-02-12-03	2.61e-08	8	0.00	8	0	0
23	03-32-02-12-05	2.61e-08	8	0.00	8	0	0
24	03-32-02-67	3.81e-08	6	3.81e-11	6	0	0
25	03-32-07-08-03	2.89e-06	28	0.00	28	0	0

Sequence Quantification

Table 12.2.7 Results from Quantification of E1B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
26	03-32-07-08-05	2.91e-06	52	0.00	52	0	0
27	03-32-07-09-03	1.53e-08	16	0.00	16	0	0
28	03-32-07-09-05	1.53e-08	16	0.00	16	0	0
29	03-32-07-10-03	2.83e-08	8	0.00	8	0	0
30	03-32-07-10-05	2.83e-08	8	0.00	8	0	0
31	03-32-07-12-03	2.83e-08	8	0.00	8	0	0
32	03-32-07-12-05	2.83e-08	8	0.00	8	0	0
33	03-32-07-67	4.13e-08	6	4.13e-11	6	0	0
34	03-32-51-35-03	1.93e-08	1	4.82e-09	1	0	0
35	03-32-51-35-04	9.89e-07	2	0.00	2	0	0
36	03-32-51-35-05	8.71e-08	2	0.00	2	0	0
37	03-37-28-02-39	2.71e-08	5	2.71e-11	5	0	0
38	03-37-28-02-67	5.56e-07	20	5.56e-10	20	0	0
39	03-37-28-07-39	2.84e-08	5	2.84e-11	5	0	0
40	03-37-28-07-67	6.02e-07	20	6.02e-10	20	0	0
41	03-38-02-39	1.79e-07	10	1.79e-10	10	0	0
42	03-38-02-67	1.66e-06	14	1.66e-09	14	0	0
43	03-38-02-68-02	7.03e-08	8	3.01e-13	8	0	0
44	03-38-02-68-03	2.53e-08	4	1.08e-13	4	0	0
45	03-38-02-68-05	2.53e-08	4	1.64e-09	4	0	0
46	03-38-07-39	1.94e-07	10	1.94e-10	10	0	0
47	03-38-07-67	1.79e-06	14	1.79e-09	14	0	0
48	03-38-07-68-02	7.61e-08	8	3.26e-13	8	0	0
49	03-38-07-68-03	2.74e-08	4	1.17e-13	4	0	0
50	03-38-07-68-05	2.74e-08	4	8.48e-11	4	0	0

Table 12.2.7 Results from Quantification of E1B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
51	03-38-11-01-27	1.15e-08	1	1.04e-09	1	0	0
52	03-38-50-1-02	2.58e-08	2	2.32e-12	2	0	0
53	03-38-50-1-03	5.16e-06	2	4.64e-10	2	0	0
54	03-38-50-1-05	5.16e-06	2	2.67e-07	2	0	0
55	03-38-50-1-12-05	1.13e-08	1	1.13e-08	1	0	0
56	03-38-50-1-35-03	5.33e-07	1	1.33e-07	1	0	0
57	03-38-50-1-35-04	1.37e-08	1	1.37e-08	1	0	0
58	03-38-51-35-03	2.35e-07	5	5.88e-08	5	0	0
59	03-38-51-35-04	8.42e-07	1	8.42e-07	1	0	0
60	03-38-51-35-05	7.41e-08	1	7.41e-08	1	0	0
61	03-47-28-02-67	5.88e-10	1	5.88e-13	1	0	0
62	03-47-28-07-67	6.37e-10	1	6.37e-13	1	0	0
63	03-48-02-08-03	4.54e-06	32	2.16e-13	32	0	0
64	03-48-02-08-05	4.58e-06	56	7.67e-11	56	0	0
65	03-48-02-09-03	2.40e-08	16	0.00	16	0	0
66	03-48-02-09-05	2.40e-08	16	0.00	16	0	0
67	03-48-02-10-03	4.44e-08	8	0.00	8	0	0
68	03-48-02-10-05	4.44e-08	8	0.00	8	0	0
69	03-48-02-12-03	4.44e-08	8	0.00	8	0	0
70	03-48-02-12-05	4.44e-08	8	0.00	8	0	0
71	03-48-02-40-03	2.93e-08	4	2.63e-12	4	0	0
72	03-48-02-40-05	2.93e-08	4	9.37e-10	4	0	0
73	03-48-02-67	1.30e-07	14	1.30e-10	14	0	0
74	03-48-02-68-03	4.39e-07	8	1.88e-12	8	0	0
75	03-48-02-68-05	4.39e-07	8	1.41e-08	8	0	0

Sequence Quantification

Table 12.2.7 Results from Quantification of E1B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
76	03-48-07-08-03	4.92e-06	32	2.34e-13	32	0	0
77	03-48-07-08-05	4.96e-06	56	2.34e-13	56	0	0
78	03-48-07-09-03	2.60e-08	16	0.00	16	0	0
79	03-48-07-09-05	2.60e-08	16	0.00	16	0	0
80	03-48-07-10-03	4.81e-08	8	0.00	8	0	0
81	03-48-07-10-05	4.81e-08	8	0.00	8	0	0
82	03-48-07-12-03	4.81e-08	8	0.00	8	0	0
83	03-48-07-12-05	4.81e-08	8	0.00	8	0	0
84	03-48-07-40-03	5.29e-08	8	2.27e-13	8	0	0
85	03-48-07-40-05	5.29e-08	8	8.05e-11	8	0	0
86	03-48-07-67	1.40e-07	14	1.40e-10	14	0	0
87	03-48-07-68-03	4.76e-07	8	2.04e-12	8	0	0
88	03-48-07-68-05	4.76e-07	8	7.25e-10	8	0	0
89	03-48-51-35-03	3.28e-08	1	8.21e-09	1	0	0
90	03-48-51-35-04	1.68e-06	2	0.00	2	0	0
91	03-48-51-35-05	1.48e-07	2	0.00	2	0	0
92	05-02-08-03	2.65e-06	68	0.00	68	0	0
93	05-02-08-05	3.10e-06	76	0.00	76	0	0
94	05-02-08-35-03	2.07e-07	22	0.00	22	0	0
95	05-02-39	3.81e-06	57	3.81e-09	57	0	0
96	05-02-67	3.55e-05	86	3.55e-08	86	0	0
97	05-02-68-01	1.04e-06	38	3.04e-11	38	0	0
98	05-02-68-02	1.04e-06	38	3.04e-11	38	0	0
99	05-02-68-03	1.18e-06	156	3.77e-08	156	0	0
100	05-02-68-05	1.46e-06	174	2.11e-08	174	0	0

Table 12.2.7 Results from Quantification of E1B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
101	05-02-69-05	4.67e-08	2	0.00	2	0	0
102	05-02-70-01	3.53e-07	36	9.86e-12	36	0	0
103	05-02-70-02	3.53e-07	36	9.86e-12	36	0	0
104	05-05-01-18	1.80e-08	1	1.62e-12	1	0	0
105	05-05-01-27	1.62e-07	1	1.46e-08	1	1.26e-08	1
106	05-05-03-01	6.43e-06	12	5.79e-10	12	0	0
107	05-05-03-02	1.29e-05	27	5.82e-10	27	0	0
108	05-05-03-05	2.32e-05	86	4.29e-07	86	0	0
109	05-05-03-35-01	5.42e-07	6	4.88e-11	6	0	0
110	05-05-03-35-03	1.63e-06	18	1.36e-07	18	0	0
111	05-05-21-01	8.78e-07	8	7.90e-11	8	0	0
112	05-05-21-02	1.76e-06	16	7.90e-11	16	0	0
113	05-05-21-03	9.73e-08	7	2.43e-12	7	0	0
114	05-05-21-05	3.29e-06	40	5.35e-08	40	0	0
115	05-05-21-35-01	7.62e-08	3	6.86e-12	3	0	0
116	05-05-21-35-03	2.29e-07	9	1.91e-08	9	0	0
117	05-07-08-03	2.87e-06	68	0.00	68	0	0
118	05-07-08-05	3.36e-06	76	0.00	76	0	0
119	05-07-08-35-03	2.25e-07	22	0.00	22	0	0
120	05-07-39	4.13e-06	57	4.13e-09	57	0	0
121	05-07-67	3.85e-05	86	3.85e-08	86	0	0
122	05-07-68-01	1.12e-06	38	3.29e-11	38	0	0
123	05-07-68-02	1.12e-06	38	3.29e-11	38	0	0
124	05-07-68-03	1.27e-06	156	2.31e-11	156	0	0
125	05-07-68-05	1.58e-06	174	2.29e-08	174	0	0

Sequence Quantification

Table 12.2.7 Results from Quantification of E1B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
126	05-07-69-05	5.06e-08	2	0.00	2	0	0
127	05-07-70-01	3.82e-07	36	1.07e-11	36	0	0
128	05-07-70-02	3.82e-07	36	1.07e-11	36	0	0
129	05-07-70-03	1.99e-07	66	3.59e-12	66	0	0
130	05-07-70-05	2.31e-07	72	4.66e-09	72	0	0
131	05-10-01-18	1.95e-08	1	1.76e-12	1	0	0
132	05-10-01-27	1.76e-07	1	1.58e-08	1	1.36e-08	1
133	05-10-03-01	6.96e-06	12	6.27e-10	12	0	0
134	05-10-03-02	1.40e-05	27	1.26e-09	27	0	0
135	05-10-03-05	2.51e-05	86	4.65e-07	86	0	0
136	05-10-03-35-01	5.87e-07	6	5.29e-11	6	0	0
137	05-10-03-35-03	1.76e-06	18	1.47e-07	18	0	0
138	05-10-21-01	9.51e-07	8	8.56e-11	8	0	0
139	05-10-21-02	1.90e-06	16	8.56e-11	16	0	0
140	05-10-21-03	1.05e-07	7	2.64e-12	7	0	0
141	05-10-21-05	3.56e-06	40	5.79e-08	40	0	0
142	05-10-21-35-01	8.26e-08	3	7.43e-12	3	0	0
143	05-10-21-35-03	2.48e-07	9	2.06e-08	9	0	0
144	05-11-01-27	3.41e-07	11	3.07e-08	11	0	0
145	05-11-03-01	1.12e-07	3	1.01e-11	3	0	0
146	05-11-03-02	2.25e-07	6	2.02e-11	6	0	0
147	05-11-03-05	4.05e-07	21	7.31e-09	21	0	0
148	05-13-67	5.63e-07	72	1.17e-11	72	0	0
149	05-16-06-01	9.49e-08	6	8.54e-12	6	0	0
150	05-16-06-02	1.90e-07	12	8.54e-12	12	0	0

Table 12.2.7 Results from Quantification of E1B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
151	05-18-67	6.10e-07	72	1.27e-11	72	0	0
152	05-21-06-01	1.03e-07	6	9.25e-12	6	0	0
153	05-21-06-02	2.06e-07	12	9.25e-12	12	0	0
154	05-21-06-05	2.47e-07	24	4.01e-09	24	0	0
155	05-50-1-01	5.04e-07	14	4.53e-11	14	0	0
156	05-50-1-02	1.51e-06	42	4.53e-11	42	0	0
157	05-50-1-03	1.42e-06	77	3.56e-11	77	0	0
158	05-50-1-05	1.81e-06	98	3.27e-08	98	0	0
159	05-51-35-01	2.05e-06	27	1.85e-10	27	0	0
160	05-51-35-03	6.15e-06	81	5.13e-07	81	0	0
161	05-51-35-06	1.20e-08	1	1.20e-08	1	0	0
162	08-02-04-01	1.38e-07	1	1.24e-11	1	0	0
163	08-02-04-02	1.38e-07	1	1.24e-11	1	0	0
164	08-02-04-05	1.38e-07	2	8.98e-09	2	0	0
165	08-02-04-35-01	1.43e-08	1	1.28e-12	1	0	0
166	08-02-04-35-03	1.43e-08	1	3.57e-09	1	0	0
167	08-02-05-01	2.59e-08	2	2.33e-12	2	0	0
168	08-02-05-02	2.59e-08	2	2.33e-12	2	0	0
169	08-02-06-01	4.80e-08	1	4.32e-12	1	0	0
170	08-02-06-02	4.80e-08	1	4.32e-12	1	0	0
171	08-02-06-05	4.80e-08	2	3.12e-09	2	0	0
172	08-02-08-01	1.38e-07	1	1.24e-11	1	0	0
173	08-02-08-02	1.38e-07	1	1.24e-11	1	0	0
174	08-02-08-05	4.45e-06	4	0.00	4	0	0
175	08-02-08-35-01	1.43e-08	1	0.00	1	0	0

Sequence Quantification

Table 12.2.7 Results from Quantification of E1B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
176	08-02-08-35-03	4.60e-07	2	0.00	2	0	0
177	08-02-08-35-04	1.14e-08	1	0.00	1	0	0
178	08-02-09-01	2.59e-08	2	0.00	2	0	0
179	08-02-09-02	2.59e-08	2	0.00	2	0	0
180	08-02-10-01	4.80e-08	1	0.00	1	0	0
181	08-02-10-02	4.80e-08	1	0.00	1	0	0
182	08-02-10-05	9.60e-08	4	0.00	4	0	0
183	08-02-12-05	4.80e-08	2	3.12e-09	2	0	0
184	08-02-39	5.02e-06	1	5.02e-09	1	0	0
185	08-02-40-01	1.71e-07	2	1.54e-11	2	0	0
186	08-02-40-02	1.71e-07	2	1.54e-11	2	0	0
187	08-02-40-05	1.61e-07	2	1.04e-08	2	0	0
188	08-02-40-35-01	1.66e-08	1	1.49e-12	1	0	0
189	08-02-40-35-03	1.66e-08	1	4.15e-09	1	0	0
190	08-02-41-01	3.01e-08	2	2.71e-12	2	0	0
191	08-02-41-02	3.01e-08	2	2.71e-12	2	0	0
192	08-02-42-01	5.58e-08	1	5.02e-12	1	0	0
193	08-02-42-02	5.58e-08	1	5.02e-12	1	0	0
194	08-02-42-05	5.58e-08	2	3.63e-09	2	0	0
195	08-02-67	4.52e-05	1	3.03e-09	1	0	0
196	08-02-68-01	1.54e-06	2	1.38e-10	2	0	0
197	08-02-68-02	1.55e-06	3	1.39e-10	3	0	0
198	08-02-68-05	1.58e-06	6	1.09e-07	6	0	0
199	08-02-68-35-01	1.49e-07	1	1.34e-11	1	0	0
200	08-02-68-35-03	1.49e-07	1	3.73e-08	1	0	0

Table 12.2.7 Results from Quantification of E1B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
201	08-02-69-01	2.83e-07	3	2.55e-11	3	0	0
202	08-02-69-02	2.83e-07	3	2.55e-11	3	0	0
203	08-02-69-05	2.71e-07	4	1.76e-08	4	0	0
204	08-02-69-35-01	2.80e-08	2	2.52e-12	2	0	0
205	08-02-69-35-03	2.80e-08	2	7.00e-09	2	0	0
206	08-02-70-01	5.02e-07	1	4.52e-11	1	0	0
207	08-02-70-02	5.02e-07	1	4.52e-11	1	0	0
208	08-02-70-05	5.02e-07	2	3.27e-08	2	0	0
209	08-02-70-35-01	5.19e-08	1	4.67e-12	1	0	0
210	08-02-70-35-03	5.19e-08	1	1.30e-08	1	0	0
211	08-05-21-01	1.40e-07	13	1.26e-11	13	0	0
212	08-05-21-02	2.80e-07	26	1.26e-11	26	0	0
213	08-05-21-05	4.72e-07	60	8.50e-09	60	0	0
214	08-05-21-35-01	1.18e-08	5	1.06e-12	5	0	0
215	08-05-21-35-03	3.54e-08	15	2.95e-09	15	0	0
216	08-07-04-01	1.50e-07	1	1.35e-11	1	0	0
217	08-07-04-02	1.50e-07	1	1.35e-11	1	0	0
218	08-07-04-05	1.50e-07	2	9.73e-09	2	0	0
219	08-07-04-35-01	1.55e-08	1	1.39e-12	1	0	0
220	08-07-04-35-03	1.55e-08	1	3.87e-09	1	0	0
221	08-07-05-01	2.81e-08	2	2.52e-12	2	0	0
222	08-07-05-02	2.81e-08	2	2.52e-12	2	0	0
223	08-07-06-01	5.20e-08	1	4.68e-12	1	0	0
224	08-07-06-02	5.20e-08	1	4.68e-12	1	0	0
225	08-07-06-05	5.20e-08	2	3.38e-09	2	0	0

Sequence Quantification

Table 12.2.7 Results from Quantification of E1B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
226	08-07-08-01	1.50e-07	1	0.00	1	0	0
227	08-07-08-02	1.50e-07	1	0.00	1	0	0
228	08-07-08-05	4.83e-06	4	0.00	4	0	0
229	08-07-08-35-01	1.55e-08	1	1.39e-12	1	0	0
230	08-07-08-35-03	4.99e-07	2	0.00	2	0	0
231	08-07-08-35-04	1.24e-08	1	0.00	1	0	0
232	08-07-09-01	2.81e-08	2	0.00	2	0	0
233	08-07-09-02	2.81e-08	2	0.00	2	0	0
234	08-07-10-01	5.20e-08	1	0.00	1	0	0
235	08-07-10-02	5.20e-08	1	0.00	1	0	0
236	08-07-10-05	1.04e-07	4	0.00	4	0	0
237	08-07-12-05	5.20e-08	2	3.38e-09	2	0	0
238	08-07-39	5.44e-06	1	5.44e-09	1	0	0
239	08-07-40-01	1.85e-07	2	1.66e-11	2	0	0
240	08-07-40-02	1.85e-07	2	1.66e-11	2	0	0
241	08-07-40-05	1.74e-07	2	1.13e-08	2	0	0
242	08-07-40-35-01	1.80e-08	1	1.62e-12	1	0	0
243	08-07-40-35-03	1.80e-08	1	4.50e-09	1	0	0
244	08-07-41-01	3.26e-08	2	2.94e-12	2	0	0
245	08-07-41-02	3.26e-08	2	2.94e-12	2	0	0
246	08-07-42-01	6.05e-08	1	5.44e-12	1	0	0
247	08-07-42-02	6.05e-08	1	5.44e-12	1	0	0
248	08-07-42-05	6.05e-08	2	3.93e-09	2	0	0
249	08-07-67	4.89e-05	1	3.28e-09	1	0	0
250	08-07-68-01	1.66e-06	2	1.50e-10	2	0	0

Table 12.2.7 Results from Quantification of E1B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
251	08-07-68-02	1.68e-06	3	1.51e-10	3	0	0
252	08-07-68-05	1.71e-06	6	1.18e-07	6	0	0
253	08-07-68-35-01	1.72e-07	2	1.55e-11	2	0	0
254	08-07-68-35-03	1.72e-07	2	4.30e-08	2	0	0
255	08-07-69-01	3.06e-07	3	2.76e-11	3	0	0
256	08-07-69-02	3.06e-07	3	2.76e-11	3	0	0
257	08-07-69-05	2.94e-07	4	1.91e-08	4	0	0
258	08-07-69-35-01	3.03e-08	2	2.73e-12	2	0	0
259	08-07-69-35-03	3.03e-08	2	7.59e-09	2	0	0
260	08-07-70-01	5.44e-07	1	4.90e-11	1	0	0
261	08-07-70-02	5.44e-07	1	4.90e-11	1	0	0
262	08-07-70-05	5.44e-07	2	3.54e-08	2	0	0
263	08-07-70-35-01	5.62e-08	1	5.06e-12	1	0	0
264	08-07-70-35-03	5.62e-08	1	1.41e-08	1	0	0
265	08-10-21-01	1.52e-07	13	1.36e-11	13	0	0
266	08-10-21-02	3.03e-07	26	1.36e-11	26	0	0
267	08-10-21-05	5.17e-07	64	9.31e-09	64	0	0
268	08-10-21-35-01	1.28e-08	5	1.15e-12	5	0	0
269	08-10-21-35-03	3.83e-08	15	3.20e-09	15	0	0
270	08-11-21-01	1.60e-07	1	1.44e-11	1	0	0
271	08-11-21-02	3.20e-07	2	1.44e-11	2	0	0
272	08-11-21-05	5.77e-07	7	1.04e-08	7	0	0
273	08-11-21-35-01	1.66e-08	1	1.49e-12	1	0	0
274	08-11-21-35-03	4.97e-08	3	4.14e-09	3	0	0
275	08-13-08-05	7.66e-08	4	0.00	4	0	0

Table 12.2.7 Results from Quantification of E1B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
276	08-13-39	8.91e-08	2	5.97e-12	2	0	0
277	08-13-67	8.02e-07	2	5.37e-11	2	0	0
278	08-13-68-01	2.57e-08	2	2.31e-12	2	0	0
279	08-13-68-02	2.57e-08	2	2.31e-12	2	0	0
280	08-18-08-05	8.30e-08	4	0.00	4	0	0
281	08-18-39	9.66e-08	2	6.47e-12	2	0	0
282	08-18-67	8.69e-07	2	5.82e-11	2	0	0
283	08-18-68-01	2.78e-08	2	2.50e-12	2	0	0
284	08-18-68-02	2.78e-08	2	2.50e-12	2	0	0
285	08-22-21-01	2.84e-09	2	2.56e-13	2	0	0
286	08-22-21-02	5.69e-09	4	2.56e-13	4	0	0
287	08-23-12-05	2.37e-07	2	2.37e-07	2	0	0
288	08-23-35-05	2.40e-08	1	2.40e-08	1	0	0
289	08-24-01	2.60e-07	2	2.60e-10	2	0	0
290	08-24-02	7.82e-07	8	2.36e-11	8	0	0
291	08-24-03	9.38e-07	18	2.36e-11	18	0	0
292	08-24-05	1.04e-06	20	1.70e-08	20	0	0
293	08-24-12-05	2.86e-08	1	7.15e-09	1	0	0
294	08-24-35-01	2.69e-08	2	2.42e-12	2	0	0
295	08-24-35-03	8.06e-08	6	6.72e-09	6	0	0
296	08-50-1-01	1.11e-06	1	1.00e-10	1	0	0
297	08-50-1-02	3.34e-06	3	1.00e-10	3	0	0
298	08-50-1-05	4.01e-06	7	7.24e-08	7	0	0
299	08-50-1-35-01	1.15e-07	1	1.04e-11	1	0	0
300	08-50-1-35-03	3.45e-07	3	2.88e-08	3	0	0

Table 12.2.7 Results from Quantification of E1B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
301	08-50-2	5.86e-08	1	5.86e-08	1	0	0
302	08-51-35-01	4.10e-06	1	3.69e-10	1	0	0
303	08-51-35-03	1.24e-05	6	1.04e-06	6	0	0
304	08-51-35-04	1.05e-07	1	1.05e-07	1	0	0
305	08-51-36	4.25e-08	1	4.25e-08	1	0	0
306	10-02-08-05	3.86e-08	2	0.00	2	0	0
307	10-02-39	4.49e-08	1	3.01e-12	1	0	0
308	10-02-67	4.04e-07	1	2.71e-11	1	0	0
309	10-02-68-01	1.29e-08	1	1.16e-12	1	0	0
310	10-02-68-02	1.29e-08	1	1.16e-12	1	0	0
311	10-07-08-05	4.18e-08	2	0.00	2	0	0
312	10-07-39	4.86e-08	1	3.26e-12	1	0	0
313	10-07-67	4.37e-07	1	2.93e-11	1	0	0
314	10-07-68-01	1.40e-08	1	1.26e-12	1	0	0
315	10-07-68-02	1.40e-08	1	1.26e-12	1	0	0
316	10-11-21-01	1.04e-08	1	1.04e-11	1	0	0
317	10-11-21-02	2.08e-08	2	2.08e-11	2	0	0
318	10-51-35-01	1.62e-07	1	1.46e-11	1	0	0
319	10-51-35-03	4.86e-07	3	4.05e-08	3	0	0
320	11-15-51-29-03	1.31e-08	1	3.29e-09	1	0	0
321	13-02-39	4.39e-08	4	1.40e-13	4	0	0
322	13-02-67	3.95e-07	4	1.26e-12	4	0	0
323	13-07-39	4.76e-08	4	1.52e-13	4	0	0
324	13-07-67	4.28e-07	4	1.37e-12	4	0	0
325	13-51-29-03	1.77e-08	1	4.42e-09	1	0	0

Table 12.2.7 Results from Quantification of E1B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
326	16-02-67	1.75e-08	1	1.17e-12	1	0	0
327	16-07-67	1.90e-08	1	1.27e-12	1	0	0
328	SEQ-000419	9.06e-07	8	1.08e-08	8	0	0
329	SEQ-000420	1.04e-09	2	1.04e-09	2	0	0
330	SEQ-000936	1.17e-06	14	0.00	14	0	0
331	SEQ-000937	1.17e-06	14	0.00	14	0	0
332	SEQ-000940	3.32e-08	8	0.00	8	0	0
333	SEQ-000941	3.32e-08	8	0.00	8	0	0
334	SEQ-000944	6.29e-08	4	0.00	4	0	0
335	SEQ-000945	6.29e-08	4	0.00	4	0	0
336	SEQ-000948	6.29e-08	4	4.99e-13	4	0	0
337	SEQ-000949	6.29e-08	4	1.77e-10	4	0	0
338	SEQ-000952	7.98e-09	4	7.18e-13	4	0	0
339	SEQ-000953	7.98e-09	4	2.49e-11	4	0	0
340	SEQ-000956	1.16e-07	8	7.12e-13	8	0	0
341	SEQ-000957	1.16e-07	8	2.53e-10	8	0	0
342	SEQ-000960	1.27e-06	14	0.00	14	0	0
343	SEQ-000961	1.27e-06	14	0.00	14	0	0
344	SEQ-000964	3.60e-08	8	0.00	8	0	0
345	SEQ-000965	3.60e-08	8	0.00	8	0	0
346	SEQ-000968	6.81e-08	4	0.00	4	0	0
347	SEQ-000969	6.81e-08	4	0.00	4	0	0
348	SEQ-000972	6.81e-08	4	5.41e-13	4	0	0
349	SEQ-000973	6.81e-08	4	1.92e-10	4	0	0
350	SEQ-000976	8.64e-09	4	7.60e-14	4	0	0

Table 12.2.7 Results from Quantification of E1B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
351	SEQ-000977	8.64e-09	4	2.70e-11	4	0	0
352	SEQ-000980	1.26e-07	8	7.72e-13	8	0	0
353	SEQ-000981	1.26e-07	8	2.74e-10	8	0	0
354	SEQ-001047	1.27e-06	2	0.00	2	0	0
355	SEQ-001048	3.26e-08	2	0.00	2	0	0
356	SEQ-001191	1.42e-08	2	0.00	2	0	0
357	SEQ-001263	1.42e-08	2	6.07e-14	2	0	0
358	SEQ-001479	1.38e-06	2	0.00	2	0	0
359	SEQ-001480	3.54e-08	2	0.00	2	0	0
360	SEQ-001623	1.53e-08	2	0.00	2	0	0
361	SEQ-001695	1.53e-08	2	1.83e-10	2	0	0
362	SEQ-001944	2.69e-06	54	1.44e-11	54	0	0
363	SEQ-001945	2.72e-06	78	5.32e-09	78	0	0
364	SEQ-001968	2.92e-06	54	1.56e-11	54	0	0
365	SEQ-001969	2.94e-06	78	5.77e-09	78	0	0
366	SEQ-002912	9.44e-06	24	3.95e-14	24	0	0
367	SEQ-002913	9.52e-06	36	1.40e-11	36	0	0
368	SEQ-002916	5.65e-08	8	0.00	8	0	0
369	SEQ-002917	5.65e-08	8	0.00	8	0	0
370	SEQ-002920	1.07e-07	4	0.00	4	0	0
371	SEQ-002921	1.07e-07	4	0.00	4	0	0
372	SEQ-002924	1.07e-07	4	8.50e-13	4	0	0
373	SEQ-002925	1.07e-07	4	3.43e-09	4	0	0
374	SEQ-002928	2.19e-08	8	1.35e-13	8	0	0
375	SEQ-002929	2.19e-08	8	4.79e-11	8	0	0

Table 12.2.7 Results from Quantification of E1B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
376	SEQ-002932	1.97e-07	8	1.21e-12	8	0	0
377	SEQ-002933	1.97e-07	8	4.31e-10	8	0	0
378	SEQ-002936	2.16e-06	14	0.00	14	0	0
379	SEQ-002937	2.16e-06	14	0.00	14	0	0
380	SEQ-002940	6.13e-08	8	0.00	8	0	0
381	SEQ-002941	6.13e-08	8	0.00	8	0	0
382	SEQ-002944	1.06e-08	1	0.00	1	0	0
383	SEQ-002945	1.06e-08	1	0.00	1	0	0
384	SEQ-002948	1.06e-08	1	9.52e-13	1	0	0
385	SEQ-002949	1.06e-08	1	0.00	1	0	0
386	SEQ-002952	2.37e-08	8	1.46e-13	8	0	0
387	SEQ-002953	2.37e-08	8	5.19e-11	8	0	0
388	SEQ-002956	2.14e-07	8	1.31e-12	8	0	0
389	SEQ-002957	2.14e-07	8	4.67e-10	8	0	0
390	SEQ-003023	2.17e-06	2	0.00	2	0	0
391	SEQ-003024	5.56e-08	2	0.00	2	0	0
392	SEQ-003167	2.41e-08	2	0.00	2	0	0
393	SEQ-003239	2.41e-08	2	2.87e-10	2	0	0
394	SEQ-003383	4.54e-08	4	1.13e-08	4	0	0
395	SEQ-003455	2.35e-06	2	0.00	2	0	0
396	SEQ-003456	6.02e-08	2	0.00	2	0	0
397	SEQ-003599	2.61e-08	2	0.00	2	0	0
398	SEQ-003671	2.61e-08	2	6.53e-09	2	0	0
399	SEQ-003815	4.92e-08	4	5.85e-10	4	0	0
400	SEQ-6A0000	9.82e-07	8	1.17e-08	8	0	0

Table 12.2.7 Results from Quantification of E1B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
401	SEQ-6A0001	2.37e-08	4	1.13e-09	4	0	0
402	SEQ-700000	8.88e-08	2	0.00	2	0	0
403	SEQ-700001	1.50e-08	4	0.00	4	0	0
404	SEQ-700026	4.15e-09	2	0.00	2	0	0
405	SEQ-700039	4.15e-09	2	1.48e-10	2	0	0
406	SEQ-700065	7.42e-09	4	1.81e-10	4	0	0
407	SEQ-700078	9.62e-08	2	0.00	2	0	0
408	SEQ-700079	1.62e-08	4	0.00	4	0	0
409	SEQ-700104	4.50e-09	2	0.00	2	0	0
410	SEQ-700117	4.50e-09	2	1.61e-10	2	0	0
411	SEQ-700143	8.04e-09	4	2.01e-09	4	0	0
412	SEQ-700221	2.85e-07	16	6.77e-09	16	0	0
413	SEQ-700222	6.91e-09	8	6.75e-10	8	0	0
414	SEQ-700299	2.94e-08	8	7.34e-09	8	0	0
415	SEQ-700300	7.32e-10	4	1.83e-10	4	0	0
416	SEQ-700312	1.51e-07	2	0.00	2	0	0
417	SEQ-700313	2.55e-08	4	0.00	4	0	0
418	SEQ-700338	1.11e-08	4	0.00	4	0	0
419	SEQ-700351	9.76e-10	2	2.44e-10	2	0	0
420	SEQ-700377	1.39e-09	4	3.48e-10	4	0	0
421	SEQ-700390	1.64e-07	2	0.00	2	0	0
422	SEQ-700391	2.76e-08	4	0.00	4	0	0
423	SEQ-700416	1.20e-08	4	0.00	4	0	0
424	SEQ-700455	1.51e-09	4	3.77e-10	4	0	0
Totals		5.847E-04	5,125	6.541E-06	5,125	2.612E-08	2

Sequence Quantification

Table 12.2.8 Results from Quantification of E2B Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	05-02-04-01	1.97e-06	2	1.97e-09	2	0	0
2	05-02-04-02	3.95e-06	5	3.95e-09	5	0	0
3	05-02-04-05	3.94e-06	8	1.28e-07	8	0	0
4	05-02-04-35-01	2.03e-07	2	2.03e-10	2	0	0
5	05-02-04-35-03	2.03e-07	2	5.09e-08	2	0	0
6	05-02-05-01	3.63e-07	3	3.63e-10	3	0	0
7	05-02-05-02	7.25e-07	6	7.25e-10	6	0	0
8	05-02-05-05	6.95e-07	8	2.26e-08	8	0	0
9	05-02-05-35-01	3.59e-08	2	3.59e-11	2	0	0
10	05-02-05-35-03	3.59e-08	2	8.98e-09	2	0	0
11	05-02-06-01	6.44e-07	1	6.44e-10	1	0	0
12	05-02-06-02	1.29e-06	2	1.29e-09	2	0	0
13	05-02-06-05	1.29e-06	4	4.19e-08	4	0	0
14	05-02-06-35-01	6.66e-08	1	6.66e-11	1	0	0
15	05-02-06-35-03	6.66e-08	1	1.66e-08	1	0	0
16	05-02-08-01	1.97e-06	2	1.97e-09	2	0	0
17	05-02-08-02	1.20e-04	8	5.21e-12	8	0	0
18	05-02-08-05	1.20e-04	14	1.16e-08	14	0	0
19	05-02-08-35-01	2.03e-07	2	2.03e-10	2	0	0
20	05-02-08-35-03	6.19e-06	3	0.00	3	0	0
21	05-02-08-35-04	1.53e-07	1	0.00	1	0	0
22	05-02-09-01	3.63e-07	3	0.00	3	0	0
23	05-02-09-02	1.45e-06	12	0.00	12	0	0
24	05-02-09-05	1.39e-06	16	0.00	16	0	0
25	05-02-09-35-01	3.59e-08	2	0.00	2	0	0

Table 12.2.8 Results from Quantification of E2B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
26	05-02-09-35-03	7.18e-08	4	0.00	4	0	0
27	05-02-10-01	6.44e-07	1	0.00	1	0	0
28	05-02-10-02	2.58e-06	4	0.00	4	0	0
29	05-02-10-05	2.58e-06	8	0.00	8	0	0
30	05-02-10-35-01	6.66e-08	1	0.00	1	0	0
31	05-02-10-35-03	1.33e-07	2	0.00	2	0	0
32	05-02-12-01	2.06e-08	1	2.06e-11	1	0	0
33	05-02-12-02	1.33e-06	4	6.65e-10	4	0	0
34	05-02-12-05	1.31e-06	6	4.27e-08	6	0	0
35	05-02-12-35-03	6.66e-08	1	1.66e-08	1	0	0
36	05-02-39	6.73e-05	1	4.51e-09	1	0	0
37	05-02-40-01	2.29e-06	2	2.29e-09	2	0	0
38	05-02-40-02	1.39e-04	8	2.14e-10	8	0	0
39	05-02-40-05	1.39e-04	15	1.63e-07	15	0	0
40	05-02-40-35-01	2.37e-07	2	2.37e-10	2	0	0
41	05-02-40-35-03	2.37e-07	2	5.91e-08	2	0	0
42	05-02-41-01	4.22e-07	3	4.22e-10	3	0	0
43	05-02-41-02	1.27e-06	9	4.22e-10	9	0	0
44	05-02-41-05	1.50e-06	18	2.70e-08	18	0	0
45	05-02-41-35-01	4.17e-08	2	4.17e-11	2	0	0
46	05-02-41-35-03	4.17e-08	2	1.04e-08	2	0	0
47	05-02-42-01	7.49e-07	1	7.49e-10	1	0	0
48	05-02-42-02	2.25e-06	3	7.49e-10	3	0	0
49	05-02-42-05	2.70e-06	7	4.87e-08	7	0	0
50	05-02-42-35-01	7.74e-08	1	7.74e-11	1	0	0

Sequence Quantification

Table 12.2.8 Results from Quantification of E2B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
51	05-02-42-35-03	7.74e-08	1	1.93e-08	1	0	0
52	05-02-67	6.06e-04	1	4.06e-08	1	4.06e-08	1
53	05-02-68-01	2.07e-05	3	1.86e-09	3	0	0
54	05-02-68-02	1.25e-03	31	1.99e-09	31	0	0
55	05-02-68-05	1.25e-03	47	1.55e-06	47	1.11e-07	4
56	05-02-68-35-01	2.13e-06	2	2.13e-09	2	0	0
57	05-02-68-35-03	2.21e-06	4	5.52e-07	4	7.87e-08	2
58	05-02-68-35-04	5.14e-08	1	5.14e-08	1	5.14e-08	1
59	05-02-69-01	3.91e-06	5	3.91e-09	5	0	0
60	05-02-69-02	1.18e-05	18	4.00e-09	18	0	0
61	05-02-69-05	1.41e-05	37	2.54e-07	37	0	0
62	05-02-69-35-01	3.92e-07	3	3.92e-10	3	0	0
63	05-02-69-35-03	3.92e-07	3	9.81e-08	3	0	0
64	05-02-70-01	6.74e-06	1	6.74e-09	1	0	0
65	05-02-70-02	2.03e-05	7	2.03e-08	7	0	0
66	05-02-70-05	2.44e-05	13	4.47e-07	13	2.83e-08	2
67	05-02-70-35-01	6.97e-07	1	6.97e-10	1	0	0
68	05-02-70-35-03	6.97e-07	1	1.74e-07	1	0	0
69	05-02-70-35-04	1.79e-08	1	1.79e-08	1	1.79e-08	1
70	05-05-21-01	1.49e-05	31	1.49e-08	31	0	0
71	05-05-21-02	4.48e-05	99	4.48e-08	99	0	0
72	05-05-21-05	5.37e-05	221	9.86e-07	221	0	0
73	05-05-21-35-01	1.45e-06	17	1.45e-09	17	0	0
74	05-05-21-35-03	4.35e-06	51	3.62e-07	51	0	0
75	05-07-04-01	2.13e-06	2	2.13e-09	2	0	0

Table 12.2.8 Results from Quantification of E2B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
76	05-07-04-02	4.28e-06	5	4.28e-09	5	0	0
77	05-07-04-05	4.27e-06	8	1.39e-07	8	0	0
78	05-07-04-35-01	2.20e-07	2	2.20e-10	2	0	0
79	05-07-04-35-03	2.20e-07	2	5.51e-08	2	0	0
80	05-07-05-01	3.93e-07	3	3.93e-10	3	0	0
81	05-07-05-02	7.86e-07	6	7.86e-10	6	0	0
82	05-07-05-05	7.53e-07	8	2.45e-08	8	0	0
83	05-07-05-35-01	3.89e-08	2	3.89e-11	2	0	0
84	05-07-05-35-03	3.89e-08	2	9.72e-09	2	0	0
85	05-07-06-01	6.98e-07	1	6.98e-10	1	0	0
86	05-07-06-02	1.40e-06	2	1.40e-09	2	0	0
87	05-07-06-05	1.40e-06	4	4.53e-08	4	0	0
88	05-07-06-35-01	7.21e-08	1	7.21e-11	1	0	0
89	05-07-06-35-03	7.21e-08	1	1.80e-08	1	0	0
90	05-07-08-01	2.13e-06	2	2.13e-09	2	0	0
91	05-07-08-02	1.30e-04	8	5.65e-12	8	0	0
92	05-07-08-05	1.30e-04	14	1.25e-08	14	0	0
93	05-07-08-35-01	2.20e-07	2	2.20e-10	2	0	0
94	05-07-08-35-03	6.70e-06	3	0.00	3	0	0
95	05-07-08-35-04	1.66e-07	1	0.00	1	0	0
96	05-07-09-01	3.93e-07	3	3.93e-10	3	0	0
97	05-07-09-02	1.57e-06	12	1.57e-09	12	0	0
98	05-07-09-05	1.51e-06	16	0.00	16	0	0
99	05-07-09-35-01	3.89e-08	2	3.89e-11	2	0	0
100	05-07-09-35-03	7.78e-08	4	0.00	4	0	0

Sequence Quantification

Table 12.2.8 Results from Quantification of E2B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
101	05-07-10-01	6.98e-07	1	6.98e-10	1	0	0
102	05-07-10-02	2.79e-06	4	2.79e-09	4	0	0
103	05-07-10-05	2.79e-06	8	0.00	8	0	0
104	05-07-10-35-01	7.21e-08	1	7.21e-11	1	0	0
105	05-07-10-35-03	1.44e-07	2	0.00	2	0	0
106	05-07-12-01	2.23e-08	1	2.23e-11	1	0	0
107	05-07-12-02	1.44e-06	4	1.44e-09	4	0	0
108	05-07-12-05	1.13e-06	6	8.71e-10	6	0	0
109	05-07-12-35-03	7.21e-08	1	1.80e-08	1	0	0
110	05-07-39	7.29e-05	1	4.89e-09	1	0	0
111	05-07-40-01	2.48e-06	2	2.48e-09	2	0	0
112	05-07-40-02	1.51e-04	8	7.79e-08	8	0	0
113	05-07-40-05	1.51e-04	15	1.77e-07	15	0	0
114	05-07-40-35-01	2.56e-07	2	2.56e-10	2	0	0
115	05-07-40-35-03	2.56e-07	2	6.41e-08	2	0	0
116	05-07-41-01	4.57e-07	3	4.57e-10	3	0	0
117	05-07-41-02	1.37e-06	9	1.37e-09	9	0	0
118	05-07-41-05	1.62e-06	18	2.92e-08	18	0	0
119	05-07-41-35-01	4.52e-08	2	4.52e-11	2	0	0
120	05-07-41-35-03	4.52e-08	2	1.13e-08	2	0	0
121	05-07-42-01	8.11e-07	1	8.11e-10	1	0	0
122	05-07-42-02	2.43e-06	3	2.43e-09	3	0	0
123	05-07-42-05	2.92e-06	7	5.27e-08	7	0	0
124	05-07-42-35-01	8.38e-08	1	8.38e-11	1	0	0
125	05-07-42-35-03	8.38e-08	1	2.10e-08	1	0	0

Table 12.2.8 Results from Quantification of E2B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
126	05-07-67	6.56e-04	1	4.40e-08	1	4.40e-08	1
127	05-07-68-01	2.24e-05	3	2.01e-09	3	0	0
128	05-07-68-02	1.35e-03	32	2.16e-09	32	0	0
129	05-07-68-05	1.35e-03	48	1.70e-06	48	1.20e-07	4
130	05-07-68-35-01	2.31e-06	2	2.31e-09	2	0	0
131	05-07-68-35-03	2.39e-06	4	5.98e-07	4	8.52e-08	2
132	05-07-68-35-04	5.57e-08	1	5.57e-08	1	5.57e-08	1
133	05-07-69-01	4.24e-06	5	4.24e-09	5	0	0
134	05-07-69-02	1.28e-05	18	1.28e-08	18	0	0
135	05-07-69-05	1.53e-05	37	2.92e-07	37	0	0
136	05-07-69-35-01	4.25e-07	3	4.25e-10	3	0	0
137	05-07-69-35-03	4.25e-07	3	1.06e-07	3	0	0
138	05-07-70-01	7.30e-06	1	7.30e-09	1	0	0
139	05-07-70-02	2.20e-05	7	2.20e-08	7	0	0
140	05-07-70-05	2.64e-05	13	4.84e-07	13	3.07e-08	2
141	05-07-70-35-01	7.55e-07	1	7.55e-10	1	0	0
142	05-07-70-35-03	7.55e-07	1	1.89e-07	1	0	0
143	05-07-70-35-04	1.93e-08	1	1.93e-08	1	1.93e-08	1
144	05-10-21-01	1.61e-05	31	1.61e-08	31	0	0
145	05-10-21-02	4.86e-05	99	4.86e-08	99	0	0
146	05-10-21-05	5.82e-05	221	1.05e-06	221	0	0
147	05-10-21-35-01	1.57e-06	17	1.57e-09	17	0	0
148	05-10-21-35-03	4.71e-06	51	1.02e-07	51	0	0
149	05-11-21-01	1.56e-05	1	1.40e-09	1	0	0
150	05-11-21-02	4.71e-05	15	1.43e-09	15	0	0

Sequence Quantification

Table 12.2.8 Results from Quantification of E2B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
151	05-11-21-05	5.64e-05	21	1.05e-06	21	6.54e-08	2
152	05-11-21-35-01	1.61e-06	1	1.45e-10	1	0	0
153	05-11-21-35-03	4.84e-06	4	4.06e-07	4	0	0
154	05-11-21-35-04	4.13e-08	1	4.13e-08	1	4.13e-08	1
155	05-13-04-01	3.29e-08	2	2.96e-12	2	0	0
156	05-13-04-02	6.58e-08	4	2.96e-12	4	0	0
157	05-13-08-01	3.29e-08	2	2.96e-12	2	0	0
158	05-13-08-02	2.12e-06	8	2.96e-12	8	0	0
159	05-13-08-05	2.06e-06	8	0.00	8	0	0
160	05-13-08-35-03	1.06e-07	2	0.00	2	0	0
161	05-13-39	1.20e-06	2	1.20e-09	2	0	0
162	05-13-40-01	3.83e-08	2	3.44e-12	2	0	0
163	05-13-40-02	2.47e-06	8	3.44e-12	8	0	0
164	05-13-40-05	2.44e-06	12	1.49e-09	12	0	0
165	05-13-67	1.09e-05	4	1.09e-08	4	0	0
166	05-13-68-01	3.66e-07	4	3.29e-11	4	0	0
167	05-13-68-02	2.28e-05	20	3.29e-11	20	0	0
168	05-13-68-05	2.27e-05	32	2.24e-08	32	0	0
169	05-13-68-35-01	3.56e-08	2	3.20e-12	2	0	0
170	05-13-68-35-03	3.56e-08	2	8.90e-09	2	0	0
171	05-13-69-01	6.46e-08	4	5.81e-12	4	0	0
172	05-13-69-02	1.94e-07	12	3.52e-11	12	0	0
173	05-13-70-01	1.20e-07	2	1.08e-11	2	0	0
174	05-13-70-02	3.59e-07	6	1.08e-11	6	0	0
175	05-13-70-05	4.31e-07	14	7.78e-09	14	0	0

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Table 12.2.8 Results from Quantification of E2B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
176	05-16-21-01	1.97e-07	10	1.77e-11	10	0	0
177	05-16-21-02	5.91e-07	30	1.77e-11	30	0	0
178	05-16-21-05	4.73e-07	40	7.69e-09	40	0	0
179	05-18-04-01	0.00	2	0.00	2	0	0
180	05-18-04-02	0.00	4	0.00	4	0	0
181	05-18-08-01	0.00	2	0.00	2	0	0
182	05-18-08-02	0.00	4	0.00	4	0	0
183	05-18-08-05	0.00	4	0.00	4	0	0
184	05-18-08-35-03	1.15e-07	2	0.00	2	0	0
185	05-18-39	1.30e-06	2	1.30e-09	2	0	0
186	05-18-40-01	4.15e-08	2	3.73e-12	2	0	0
187	05-18-40-02	2.67e-06	8	3.73e-12	8	0	0
188	05-18-40-05	2.64e-06	12	1.62e-09	12	0	0
189	05-18-67	1.18e-05	4	1.18e-08	4	0	0
190	05-18-68-01	3.96e-07	4	3.57e-11	4	0	0
191	05-18-68-02	2.47e-05	20	3.57e-11	20	0	0
192	05-18-68-05	2.46e-05	32	2.42e-08	32	0	0
193	05-18-68-35-01	3.86e-08	2	3.86e-11	2	0	0
194	05-18-68-35-03	3.86e-08	2	9.64e-09	2	0	0
195	05-18-69-01	7.00e-08	4	7.00e-11	4	0	0
196	05-18-69-02	2.10e-07	12	6.30e-12	12	0	0
197	05-18-69-05	1.68e-07	16	2.73e-09	16	0	0
198	05-18-70-01	1.30e-07	2	1.30e-10	2	0	0
199	05-18-70-02	3.89e-07	6	1.17e-11	6	0	0
200	05-18-70-05	4.67e-07	14	8.43e-09	14	0	0

Table 12.2.8 Results from Quantification of E2B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
201	05-21-21-01	2.14e-07	10	2.14e-10	10	0	0
202	05-21-21-02	6.41e-07	30	1.92e-11	30	0	0
203	05-21-21-05	5.13e-07	40	8.33e-09	40	0	0
204	05-22-21-01	2.77e-07	2	2.77e-10	2	0	0
205	05-22-21-02	8.30e-07	6	2.49e-11	6	0	0
206	05-22-21-05	9.96e-07	14	1.80e-08	14	0	0
207	05-22-21-35-01	2.86e-08	2	2.57e-12	2	0	0
208	05-22-21-35-03	8.57e-08	6	7.15e-09	6	0	0
209	05-23-12-05	3.18e-06	2	3.18e-06	2	0	0
210	05-23-35-05	3.37e-07	2	3.37e-07	2	0	0
211	05-24-01	3.53e-06	4	3.53e-09	4	0	0
212	05-24-02	1.07e-05	20	3.20e-10	20	0	0
213	05-24-03	1.27e-05	32	3.54e-09	32	0	0
214	05-24-05	1.41e-05	34	2.32e-07	34	0	0
215	05-24-12-05	4.01e-07	2	4.01e-07	2	0	0
216	05-24-35-01	3.60e-07	2	3.60e-10	2	0	0
217	05-24-35-03	1.08e-06	6	9.01e-08	6	0	0
218	05-24-35-05	4.07e-08	1	4.07e-08	1	0	0
219	05-50-1-01	1.49e-05	1	1.34e-09	1	0	0
220	05-50-1-02	4.52e-05	15	1.38e-09	15	0	0
221	05-50-1-05	5.41e-05	21	1.00e-06	21	0	0
222	05-50-1-35-01	1.54e-06	1	1.54e-09	1	0	0
223	05-50-1-35-03	4.65e-06	4	3.89e-07	4	0	0
224	05-50-1-35-04	3.96e-08	1	3.96e-08	1	0	0
225	05-50-2	7.86e-07	1	7.86e-07	1	4.17e-07	1

Table 12.2.8 Results from Quantification of E2B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
226	05-51-35-01	5.51e-05	1	4.96e-09	1	0	0
227	05-51-35-03	1.66e-04	31	1.41e-05	31	0	0
228	05-51-35-04	1.41e-06	1	1.41e-06	1	1.06e-08	1
229	05-51-35-05	1.30e-07	2	1.30e-07	2	0	0
230	05-51-35-06	1.49e-08	1	1.49e-08	1	1.49e-08	1
231	05-51-35-13	1.49e-08	1	1.49e-11	1	0	0
232	05-51-35-15	4.46e-08	3	3.72e-09	3	0	0
233	05-51-36	5.70e-07	1	5.70e-07	1	3.02e-08	1
234	06-02-08-02	4.40e-08	1	0.00	1	0	0
235	06-02-08-05	4.40e-08	2	0.00	2	0	0
236	06-02-39	5.12e-08	1	3.43e-12	1	0	0
237	06-02-67	4.60e-07	1	3.09e-11	1	0	0
238	06-02-68-01	1.47e-08	1	1.47e-11	1	0	0
239	06-02-68-02	1.47e-08	1	1.33e-12	1	0	0
240	06-07-08-02	4.77e-08	1	0.00	1	0	0
241	06-07-08-05	4.77e-08	2	0.00	2	0	0
242	06-07-39	5.54e-08	1	3.71e-12	1	0	0
243	06-07-67	4.99e-07	1	3.34e-11	1	0	0
244	06-07-68-01	1.60e-08	1	1.60e-11	1	0	0
245	06-07-68-02	1.60e-08	1	1.44e-12	1	0	0
246	06-11-21-01	1.18e-08	1	1.18e-11	1	0	0
247	06-11-21-02	3.55e-08	3	1.07e-12	3	0	0
248	06-50-1-01	1.14e-08	1	1.14e-11	1	0	0
249	06-50-1-02	3.41e-08	3	1.02e-12	3	0	0
250	06-51-35-01	1.85e-07	1	1.85e-10	1	0	0

Sequence Quantification

Table 12.2.8 Results from Quantification of E2B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
251	06-51-35-03	5.54e-07	3	4.62e-08	3	0	0
252	08-02-39	2.61e-08	1	2.61e-11	1	0	0
253	08-02-67	2.35e-07	1	2.35e-10	1	0	0
254	08-07-39	2.83e-08	1	2.83e-11	1	0	0
255	08-07-67	2.54e-07	1	2.54e-10	1	0	0
256	08-51-29-03	2.20e-08	1	5.51e-09	1	0	0
257	10-01-23	1.02e-08	1	1.02e-11	1	0	0
258	10-04-23	1.10e-08	1	1.10e-11	1	0	0
Totals		8.090E-03	2,408	3.531E-05	2,408	8.870E-07	29

Table 12.2.9 Results from Quantification of E1D Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	03-05-02-67	2.57e-07	8	2.57e-10	8	0	0
2	03-05-07-67	2.79e-07	8	2.79e-10	8	0	0
3	03-05-81-35-03	1.09e-07	7	2.72e-08	7	1.04e-08	1
4	03-37-28-02-67	9.37e-08	12	9.37e-11	12	0	0
5	03-37-28-07-67	1.01e-07	12	1.01e-10	12	0	0
6	03-38-02-67	4.39e-07	12	4.39e-10	12	0	0
7	03-38-07-67	4.75e-07	12	4.75e-10	12	0	0
8	03-38-81-35-03	1.85e-07	7	4.64e-08	7	2.96e-08	2
9	04-32-03-08-05	1.13e-06	2	1.13e-14	2	0	0
10	04-32-03-08-05	1.13e-06	2	3.61e-16	2	0	0
11	04-32-08-08-03	1.23e-06	2	1.23e-14	2	0	0
12	04-32-08-08-05	1.23e-06	2	3.92e-16	2	0	0
13	04-48-03-10-03	1.29e-08	1	1.27e-16	1	0	0
14	04-48-03-10-05	1.29e-08	1	6.33e-18	1	0	0
15	04-48-03-12-03	1.29e-08	1	1.27e-16	1	0	0
16	04-48-03-12-05	1.29e-08	1	6.33e-18	1	0	0
17	04-48-03-68-03	1.21e-08	1	1.21e-11	1	0	0
18	04-48-03-68-05	1.21e-08	1	3.87e-10	1	0	0
19	04-48-08-08-03	2.09e-06	2	2.09e-14	2	0	0
20	04-48-08-08-05	2.09e-06	2	6.64e-16	2	0	0
21	04-48-08-10-03	1.39e-08	1	1.39e-16	1	0	0
22	04-48-08-10-05	1.39e-08	1	6.33e-18	1	0	0
23	04-48-08-12-03	1.39e-08	1	1.39e-16	1	0	0
24	04-48-08-12-05	1.39e-08	1	6.33e-18	1	0	0
25	04-48-08-68-03	1.31e-08	1	1.31e-11	1	0	0

Table 12.2.9 Results from Quantification of E1D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
26	04-48-08-68-05	1.31e-08	1	4.20e-10	1	0	0
27	06-03-39	3.26e-08	2	3.26e-11	2	0	0
28	06-03-67	3.19e-07	4	3.19e-10	4	0	0
29	06-04-01-27	5.12e-08	2	4.61e-09	2	0	0
30	06-04-03-05	1.66e-07	12	5.39e-09	12	0	0
31	06-08-39	3.53e-08	2	3.53e-11	2	0	0
32	06-08-67	3.46e-07	4	3.46e-10	4	0	0
33	06-09-01-27	5.54e-08	2	4.99e-09	2	0	0
34	06-09-03-05	1.80e-07	12	5.84e-09	12	0	0
35	06-81-35-01	4.61e-08	2	4.61e-11	2	0	0
36	06-81-35-03	7.43e-07	36	9.87e-08	36	0	0
37	10-03-67	1.75e-07	14	1.75e-10	14	0	0
38	10-08-67	1.89e-07	14	1.89e-10	14	0	0
39	12-81-35-01	6.28e-06	1	6.28e-09	1	0	0
40	12-81-35-03	1.27e-05	6	1.60e-06	6	1.26e-08	1
41	12-81-35-04	1.61e-07	1	1.61e-07	1	4.03e-08	1
42	12-81-35-05	1.42e-08	1	1.42e-08	1	0	0
43	12-81-36	6.51e-08	1	6.51e-08	1	1.63e-08	1
44	16-03-67	1.90e-08	1	1.90e-11	1	0	0
45	16-08-67	2.05e-08	1	2.05e-11	1	0	0
46	SEQ-000000	1.03e-06	2	1.03e-14	2	0	0
47	SEQ-000001	1.03e-06	2	3.29e-16	2	0	0
48	SEQ-000003	1.18e-08	1	1.20e-16	1	0	0
49	SEQ-000004	1.18e-08	1	6.33e-18	1	0	0
50	SEQ-000006	1.18e-08	1	1.20e-16	1	0	0

Table 12.2.9 Results from Quantification of E1D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
51	SEQ-000007	1.18e-08	1	6.33e-18	1	0	0
52	SEQ-000009	1.11e-08	1	1.11e-11	1	0	0
53	SEQ-000010	1.11e-08	1	3.56e-10	1	0	0
54	SEQ-000012	1.11e-06	2	1.12e-14	2	0	0
55	SEQ-000013	1.11e-06	2	1.12e-14	2	0	0
56	SEQ-000015	1.28e-08	1	1.27e-16	1	0	0
57	SEQ-000016	1.28e-08	1	6.33e-18	1	0	0
58	SEQ-000018	1.28e-08	1	1.27e-16	1	0	0
59	SEQ-000019	1.28e-08	1	1.27e-16	1	0	0
60	SEQ-000021	1.21e-08	1	1.21e-11	1	0	0
61	SEQ-000022	1.21e-08	1	3.86e-10	1	0	0
62	SEQ-000070	2.44e-07	1	2.44e-15	1	0	0
63	SEQ-000306	1.27e-07	1	1.27e-15	1	0	0
64	SEQ-000496	1.75e-06	2	1.75e-14	2	0	0
65	SEQ-000497	5.44e-07	2	5.57e-16	2	0	0
66	SEQ-000499	1.95e-08	2	1.96e-16	2	0	0
67	SEQ-000500	1.95e-08	2	1.33e-16	2	0	0
68	SEQ-000502	1.95e-08	2	1.96e-16	2	0	0
69	SEQ-000503	1.95e-08	2	1.33e-16	2	0	0
70	SEQ-000505	1.83e-08	2	1.83e-11	2	0	0
71	SEQ-000506	1.83e-08	2	5.87e-10	2	0	0
72	SEQ-000508	1.90e-06	2	1.90e-14	2	0	0
73	SEQ-000509	1.90e-06	2	6.08e-16	2	0	0
74	SEQ-000511	2.11e-08	2	2.09e-16	2	0	0
75	SEQ-000512	2.11e-08	2	2.09e-16	2	0	0

Sequence Quantification

Table 12.2.9 Results from Quantification of E1D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
76	SEQ-000514	2.11e-08	2	2.09e-16	2	0	0
77	SEQ-000515	2.11e-08	2	2.09e-16	2	0	0
78	SEQ-000517	1.99e-08	2	1.99e-11	2	0	0
79	SEQ-000518	1.99e-08	2	6.36e-10	2	0	0
80	SEQ-000566	1.99e-07	1	1.99e-15	1	0	0
81	SEQ-000802	2.16e-07	1	2.16e-15	1	0	0
82	SEQ-700000	1.06e-07	2	1.06e-15	2	0	0
83	SEQ-700013	1.15e-07	2	1.15e-15	2	0	0
84	SEQ-700026	1.81e-07	2	1.81e-15	2	0	0
85	SEQ-700039	1.96e-07	2	1.96e-15	2	0	0
Totals		4.496E-05	284	2.040E-06	284	1.090E-07	6

Table 12.2.10 Results from Quantification of E2D Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	04-05-03-67	4.63e-08	2	3.10e-12	2	0	0
2	04-05-08-67	5.02e-08	2	3.36e-12	2	0	0
3	04-37-28-03-67	1.03e-07	7	6.93e-12	7	0	0
4	04-37-28-08-67	1.12e-07	7	7.51e-12	7	0	0
5	04-38-09-03-02	1.08e-08	1	0.00	1	0	0
6	04-38-81-35-03	2.70e-08	2	6.74e-09	2	0	0
7	04-48-08-68-03	9.23e-10	1	9.23e-13	1	0	0
8	04-48-08-68-05	1.03e-08	1	3.28e-10	1	0	0
9	06-03-39	2.72e-07	15	1.82e-11	15	0	0
10	06-03-67	2.85e-06	32	1.91e-10	32	0	0
11	06-04-01-27	4.20e-07	14	3.78e-08	14	0	0
12	06-04-03-01-19	4.41e-07	16	0	0	0	0
13	06-04-03-02-19	8.81e-07	32	0	0	0	0
14	06-04-03-05	2.94e-07	15	1.78e-08	15	0	0
15	06-08-08-03	1.14e-07	11	0.00	11	0	0
16	06-08-08-05	1.46e-07	14	1.41e-15	14	0	0
17	06-08-39	3.04e-07	16	2.04e-11	16	0	0
18	06-08-67	3.09e-06	32	2.07e-10	32	0	0
19	06-09-01-27	4.55e-07	14	4.09e-08	14	0	0
20	06-09-03-01-19	4.77e-07	16	1.44e-10	19	0	0
21	06-09-03-02-19	9.55e-07	32	0	0	0	0
22	06-09-03-05	3.19e-07	15	1.21e-08	15	0	0
23	06-81-35-01	3.97e-07	16	3.97e-10	16	0	0
24	06-81-35-03	1.19e-06	64	2.99e-07	64	0	0
25	07-81-35-01	7.16e-06	1	7.16e-09	1	0	0

Sequence Quantification

Table 12.2.10 Results from Quantification of E2D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
26	07-81-35-03	2.16e-05	7	5.40e-06	7	1.43e-08	1
27	07-81-35-04	1.84e-07	1	1.84e-07	1	4.59e-08	1
28	07-81-35-05	1.62e-08	1	1.62e-08	1	0	0
29	07-81-36	7.42e-08	1	7.42e-08	1	1.86e-08	1
30	10-03-67	2.16e-08	1	1.45e-12	1	0	0
31	10-08-67	2.34e-08	1	1.57e-12	1	0	0
32	SEQ-000000	2.02e-06	2	2.16e-17	2	0	0
33	SEQ-000001	2.02e-06	2	2.02e-14	2	0	0
34	SEQ-000003	1.35e-08	1	0.00	1	0	0
35	SEQ-000004	1.35e-08	1	1.37e-16	1	0	0
36	SEQ-000006	1.22e-09	1	1.22e-12	1	0	0
37	SEQ-000007	1.35e-08	1	8.78e-10	1	0	0
38	SEQ-000009	1.14e-09	1	1.14e-12	1	0	0
39	SEQ-000010	1.27e-08	1	4.06e-10	1	0	0
40	SEQ-000012	2.19e-06	2	2.16e-17	2	0	0
41	SEQ-000013	2.19e-06	2	2.19e-14	2	0	0
42	SEQ-000015	1.46e-08	1	0.00	1	0	0
43	SEQ-000016	1.46e-08	1	1.44e-16	1	0	0
44	SEQ-000018	1.32e-09	1	1.32e-12	1	0	0
45	SEQ-000019	1.46e-08	1	9.51e-10	1	0	0
46	SEQ-000021	1.24e-09	1	1.24e-12	1	0	0
47	SEQ-000022	1.38e-08	1	4.40e-10	1	0	0
48	SEQ-000024	3.44e-06	2	3.61e-17	2	0	0
49	SEQ-000025	3.44e-06	2	3.44e-14	2	0	0
50	SEQ-000027	3.83e-08	2	0.00	2	0	0

Table 12.2.10 Results from Quantification of E2D Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
51	SEQ-000028	3.83e-08	2	3.82e-16	2	0	0
52	SEQ-000030	3.45e-09	2	3.45e-12	2	0	0
53	SEQ-000031	3.83e-08	2	1.23e-09	2	0	0
54	SEQ-000033	3.24e-09	2	3.24e-12	2	0	0
55	SEQ-000034	3.60e-08	2	1.15e-09	2	0	0
56	SEQ-000036	3.73e-06	2	3.61e-17	2	0	0
57	SEQ-000037	3.73e-06	2	3.73e-14	2	0	0
58	SEQ-000039	4.15e-08	2	0.00	2	0	0
59	SEQ-000040	4.15e-08	2	4.19e-16	2	0	0
60	SEQ-000042	3.74e-09	2	3.74e-12	2	0	0
61	SEQ-000043	4.15e-08	2	4.19e-16	2	0	0
62	SEQ-000045	3.51e-09	2	3.51e-12	2	0	0
63	SEQ-000046	3.91e-08	2	1.25e-09	2	0	0
64	SEQ-700000	2.09e-07	2	2.09e-15	2	0	0
65	SEQ-700013	2.27e-07	2	2.27e-15	2	0	0
66	SEQ-700026	3.56e-07	2	3.56e-15	2	0	0
67	SEQ-700039	3.86e-07	2	3.86e-15	2	0	0
Totals		6.645E-05	450	6.106E-06	373	7.879E-08	3

Table 12.2.11 Results from Quantification of T5B Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	05-02-39	3.47e-08	2	3.47e-11	2	0	0
2	05-02-67	7.43e-07	20	7.43e-10	20	0	0
3	05-02-69-05	1.92e-08	1	1.92e-16	1	0	0
4	05-05-03-05	2.50e-07	4	5.01e-08	4	0	0
5	05-05-03-35-03	2.03e-08	1	5.08e-09	1	0	0
6	05-05-21-05	2.43e-08	1	4.85e-09	1	0	0
7	05-07-39	3.75e-08	2	3.75e-11	2	0	0
8	05-07-67	8.05e-07	20	8.05e-10	20	0	0
9	05-07-69-05	2.08e-08	1	2.08e-16	1	0	0
10	05-10-03-05	2.71e-07	4	5.42e-08	4	0	0
11	05-10-03-35-03	2.20e-08	1	5.51e-09	1	0	0
12	05-10-21-05	2.63e-08	1	5.26e-09	1	0	0
13	05-11-21-03	2.09e-08	1	2.09e-11	1	0	0
14	05-51-35-03	3.55e-08	1	8.88e-09	1	0	0
15	07-08-02-67	8.26e-08	6	4.13e-12	6	0	0
16	07-08-07-67	8.94e-08	6	4.47e-12	6	0	0
17	07-15-02-67	1.41e-07	6	7.03e-12	6	0	0
18	07-15-07-67	1.52e-07	6	7.61e-12	6	0	0
19	09-02-67	1.04e-06	12	5.20e-11	12	0	0
20	09-07-39	1.25e-07	12	6.26e-12	12	0	0
21	09-07-67	1.13e-06	12	5.63e-11	12	0	0
22	18-32-02-12-03	2.02e-08	2	1.06e-11	2	0	0
23	18-32-02-12-05	2.02e-08	2	3.40e-10	2	0	0
24	18-32-02-39	1.57e-06	4	7.87e-11	4	0	0
25	18-32-02-40-03	2.33e-08	2	1.16e-12	2	0	0

Table 12.2.11 Results from Quantification of T5B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
26	18-32-02-40-05	2.33e-08	2	1.16e-09	2	0	0
27	18-32-02-67	7.16e-06	9	4.18e-10	9	0	0
28	18-32-02-68-03	2.09e-07	2	1.05e-11	2	0	0
29	18-32-02-68-05	2.09e-07	2	3.35e-10	2	0	0
30	18-32-02-70-03	7.28e-08	2	3.64e-12	2	0	0
31	18-32-02-70-05	7.28e-08	2	1.16e-10	2	0	0
32	18-32-07-12-03	2.19e-08	2	1.15e-11	2	0	0
33	18-32-07-12-05	2.19e-08	2	3.68e-10	2	0	0
34	18-32-07-39	8.53e-07	2	4.26e-11	2	0	0
35	18-32-07-40-03	2.52e-08	2	1.26e-12	2	0	0
36	18-32-07-40-05	2.52e-08	2	1.26e-09	2	0	0
37	18-32-07-67	7.75e-06	9	4.53e-10	9	0	0
38	18-32-07-68-03	2.27e-07	2	1.13e-11	2	0	0
39	18-32-07-68-05	2.27e-07	2	3.63e-10	2	0	0
40	18-32-07-69-03	4.25e-08	4	2.13e-12	4	0	0
41	18-32-07-69-05	4.25e-08	4	2.13e-09	4	0	0
42	18-32-07-70-03	7.88e-08	2	3.94e-12	2	0	0
43	18-32-07-70-05	7.88e-08	2	1.26e-10	2	0	0
44	18-32-11-01-27	7.79e-08	1	7.01e-09	1	0	0
45	18-32-11-21-03	1.16e-08	1	1.16e-11	1	0	0
46	18-32-11-21-05	1.16e-08	1	3.71e-10	1	0	0
47	18-32-13-67	1.26e-07	4	6.29e-12	4	0	0
48	18-32-18-67	1.36e-07	4	6.81e-12	4	0	0
49	18-32-23-12-05	1.64e-08	1	1.64e-08	1	0	0
50	18-32-80-1-03	8.07e-08	1	8.07e-11	1	0	0

Table 12.2.11 Results from Quantification of T5B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
51	18-32-80-1-05	8.07e-08	1	2.58e-09	1	0	0
52	18-32-81-35-03	5.75e-07	1	1.44e-07	1	0	0
53	18-32-81-35-04	1.47e-08	1	1.47e-08	1	0	0
54	18-48-02-12-03	3.44e-08	2	1.81e-11	2	0	0
55	18-48-02-12-05	3.44e-08	2	5.79e-10	2	0	0
56	18-48-02-39	1.34e-06	2	6.70e-11	2	0	0
57	18-48-02-40-03	3.96e-08	2	1.98e-12	2	0	0
58	18-48-02-40-05	3.96e-08	2	1.98e-09	2	0	0
59	18-48-02-67	1.22e-05	9	7.13e-10	9	0	0
60	18-48-02-68-03	3.56e-07	2	1.78e-11	2	0	0
61	18-48-02-68-05	3.56e-07	2	5.70e-10	2	0	0
62	18-48-02-69-03	6.68e-08	4	3.34e-12	4	0	0
63	18-48-02-69-05	6.68e-08	4	3.34e-09	4	0	0
64	18-48-02-70-03	1.24e-07	2	6.19e-12	2	0	0
65	18-48-02-70-05	1.24e-07	2	1.98e-10	2	0	0
66	18-48-07-12-03	3.73e-08	2	1.96e-11	2	0	0
67	18-48-07-12-05	3.73e-08	2	6.27e-10	2	0	0
68	18-48-07-39	1.45e-06	2	7.26e-11	2	0	0
69	18-48-07-40-03	4.29e-08	2	2.15e-12	2	0	0
70	18-48-07-40-05	4.29e-08	2	2.15e-09	2	0	0
71	18-48-07-67	1.32e-05	9	7.72e-10	9	0	0
72	18-48-07-68-03	3.86e-07	2	1.93e-11	2	0	0
73	18-48-07-68-05	3.86e-07	2	6.18e-10	2	0	0
74	18-48-07-69-03	7.24e-08	4	3.62e-12	4	0	0
75	18-48-07-69-05	7.24e-08	4	3.62e-09	4	0	0

Table 12.2.11 Results from Quantification of T5B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
76	18-48-07-70-03	1.34e-07	2	6.71e-12	2	0	0
77	18-48-07-70-05	1.34e-07	2	2.15e-10	2	0	0
78	18-48-11-01-18	1.47e-08	1	1.47e-11	1	0	0
79	18-48-11-01-27	1.33e-07	1	1.19e-08	1	1.19e-08	1
80	18-48-11-21-03	1.98e-08	1	1.98e-11	1	0	0
81	18-48-11-21-05	1.98e-08	1	6.32e-10	1	0	0
82	18-48-13-67	2.14e-07	4	1.07e-11	4	0	0
83	18-48-18-67	2.32e-07	4	1.16e-11	4	0	0
84	18-48-23-12-05	2.80e-08	1	2.80e-08	1	0	0
85	18-48-39-03	3.21e-08	2	3.21e-11	2	0	0
86	18-48-39-05	6.41e-08	4	2.05e-09	4	0	0
87	18-48-80-1-03	1.37e-07	1	1.37e-10	1	0	0
88	18-48-80-1-05	1.37e-07	1	4.40e-09	1	0	0
89	18-48-80-1-35-03	1.59e-08	1	3.97e-09	1	0	0
90	18-48-81-35-03	9.79e-07	1	2.45e-07	1	0	0
91	18-48-81-35-04	2.51e-08	1	2.51e-08	1	0	0
92	18-48-81-36	1.01e-08	1	1.01e-08	1	0	0
93	20-02-67	1.17e-06	22	7.91e-10	22	0	0
94	20-05-03-05	2.09e-07	4	4.18e-08	4	0	0
95	20-07-67	2.76e-06	46	1.64e-09	46	0	0
96	20-10-03-05	2.27e-07	4	4.53e-08	4	0	0
97	33-5-5	8.18e-08	1	8.18e-08	1	0	0
98	SEQ-000013	2.42e-08	2	1.21e-09	2	0	0
99	SEQ-000065	2.62e-08	2	1.31e-09	2	0	0
100	SEQ-000130	4.12e-08	2	2.06e-09	2	0	0

Sequence Quantification

Table 12.2.11 Results from Quantification of T5B Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
101	SEQ-000182	4.46e-08	2	2.23e-09	2	0	0
102	SEQ-700014	1.10e-07	6	5.51e-12	6	0	0
103	SEQ-700032	1.19e-07	6	5.97e-12	6	0	0
Totals		6.262E-05	392	8.525E-07	392	1.028E-08	1

Table 12.2.12 Results from Quantification of T5C Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	05-02-39	3.47e-08	2	3.47e-11	2	0	0
2	05-02-67	7.43e-07	20	7.43e-10	20	0	0
3	05-02-69-05	1.92e-08	1	1.92e-16	1	0	0
4	05-05-03-05	2.50e-07	4	5.01e-08	4	0	0
5	05-05-03-35-03	2.03e-08	1	5.08e-09	1	0	0
6	05-05-21-05	2.43e-08	1	4.85e-09	1	0	0
7	05-07-39	3.75e-08	2	3.75e-11	2	0	0
8	05-07-67	8.05e-07	20	8.05e-10	20	0	0
9	05-07-69-05	2.08e-08	1	2.08e-16	1	0	0
10	05-10-03-05	2.71e-07	4	5.42e-08	4	0	0
11	05-10-03-35-03	2.20e-08	1	5.51e-09	1	0	0
12	05-10-21-05	2.63e-08	1	5.26e-09	1	0	0
13	05-11-21-03	2.09e-08	1	2.09e-11	1	0	0
14	05-51-35-03	3.55e-08	1	8.88e-09	1	0	0
15	07-08-02-67	8.26e-08	6	4.13e-12	6	0	0
16	07-08-07-67	8.94e-08	6	4.47e-12	6	0	0
17	07-15-02-67	1.41e-07	6	7.03e-12	6	0	0
18	07-15-07-67	1.52e-07	6	7.61e-12	6	0	0
19	09-02-67	1.04e-06	12	5.20e-11	12	0	0
20	09-07-39	1.25e-07	12	6.26e-12	12	0	0
21	09-07-67	1.13e-06	12	5.63e-11	12	0	0
22	18-32-02-12-03	2.02e-08	2	1.06e-11	2	0	0
23	18-32-02-12-05	2.02e-08	2	3.40e-10	2	0	0
24	18-32-02-39	1.57e-06	4	7.87e-11	4	0	0
25	18-32-02-40-03	2.33e-08	2	1.16e-12	2	0	0

Table 12.2.12 Results from Quantification of T5C Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
26	18-32-02-40-05	2.33e-08	2	1.16e-09	2	0	0
27	18-32-02-67	7.16e-06	9	4.18e-10	9	0	0
28	18-32-02-68-03	2.09e-07	2	1.05e-11	2	0	0
29	18-32-02-68-05	2.09e-07	2	3.35e-10	2	0	0
30	18-32-02-70-03	7.28e-08	2	3.64e-12	2	0	0
31	18-32-02-70-05	7.28e-08	2	1.16e-10	2	0	0
32	18-32-07-12-03	2.19e-08	2	1.15e-11	2	0	0
33	18-32-07-12-05	2.19e-08	2	3.68e-10	2	0	0
34	18-32-07-39	8.53e-07	2	4.26e-11	2	0	0
35	18-32-07-40-03	2.52e-08	2	1.26e-12	2	0	0
36	18-32-07-40-05	2.52e-08	2	1.26e-09	2	0	0
37	18-32-07-67	7.75e-06	9	4.53e-10	9	0	0
38	18-32-07-68-03	2.27e-07	2	1.13e-11	2	0	0
39	18-32-07-68-05	2.27e-07	2	3.63e-10	2	0	0
40	18-32-07-69-03	4.25e-08	4	2.13e-12	4	0	0
41	18-32-07-69-05	4.25e-08	4	2.13e-09	4	0	0
42	18-32-07-70-03	7.88e-08	2	3.94e-12	2	0	0
43	18-32-07-70-05	7.88e-08	2	1.26e-10	2	0	0
44	18-32-11-01-27	7.79e-08	1	7.01e-09	1	0	0
45	18-32-11-21-03	1.16e-08	1	1.16e-11	1	0	0
46	18-32-11-21-05	1.16e-08	1	3.71e-10	1	0	0
47	18-32-13-67	1.26e-07	4	6.29e-12	4	0	0
48	18-32-18-67	1.36e-07	4	6.81e-12	4	0	0
49	18-32-23-12-05	1.64e-08	1	1.64e-08	1	0	0
50	18-32-80-1-03	8.07e-08	1	8.07e-11	1	0	0
51	18-32-80-1-05	8.07e-08	1	2.58e-09	1	0	0
52	18-32-81-35-03	5.75e-07	1	1.44e-07	1	0	0

Table 12.2.12 Results from Quantification of T5C Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
53	18-32-81-35-04	1.47e-08	1	1.47e-08	1	0	0
54	18-48-02-12-03	3.44e-08	2	1.81e-11	2	0	0
55	18-48-02-12-05	3.44e-08	2	5.79e-10	2	0	0
56	18-48-02-39	1.34e-06	2	6.70e-11	2	0	0
57	18-48-02-40-03	3.96e-08	2	1.98e-12	2	0	0
58	18-48-02-40-05	3.96e-08	2	1.98e-09	2	0	0
59	18-48-02-67	1.22e-05	9	7.13e-10	9	0	0
60	18-48-02-68-03	3.56e-07	2	1.78e-11	2	0	0
61	18-48-02-68-05	3.56e-07	2	5.70e-10	2	0	0
62	18-48-02-69-03	6.68e-08	4	3.34e-12	4	0	0
63	18-48-02-69-05	6.68e-08	4	3.34e-09	4	0	0
64	18-48-02-70-03	1.24e-07	2	6.19e-12	2	0	0
65	18-48-02-70-05	1.24e-07	2	1.98e-10	2	0	0
66	18-48-07-12-03	3.73e-08	2	1.96e-11	2	0	0
67	18-48-07-12-05	3.73e-08	2	6.27e-10	2	0	0
68	18-48-07-39	1.45e-06	2	7.26e-11	2	0	0
69	18-48-07-40-03	4.29e-08	2	2.15e-12	2	0	0
70	18-48-07-40-05	4.29e-08	2	2.15e-09	2	0	0
71	18-48-07-67	1.32e-05	9	7.72e-10	9	0	0
72	18-48-07-68-03	3.86e-07	2	1.93e-11	2	0	0
73	18-48-07-68-05	3.86e-07	2	6.18e-10	2	0	0
74	18-48-07-69-03	7.24e-08	4	3.62e-12	4	0	0
75	18-48-07-69-05	7.24e-08	4	3.62e-09	4	0	0
76	18-48-07-70-03	1.34e-07	2	6.71e-12	2	0	0
77	18-48-07-70-05	1.34e-07	2	2.15e-10	2	0	0
78	18-48-11-01-18	1.47e-08	1	1.47e-11	1	0	0
79	18-48-11-01-27	1.33e-07	1	1.19e-08	1	1.03e-08	1

Sequence Quantification

Table 12.2.12 Results from Quantification of T5C Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
80	18-48-11-21-03	1.98e-08	1	1.98e-11	1	0	0
81	18-48-11-21-05	1.98e-08	1	6.32e-10	1	0	0
82	18-48-13-67	2.14e-07	4	1.07e-11	4	0	0
83	18-48-18-67	2.32e-07	4	1.16e-11	4	0	0
84	18-48-23-12-05	2.80e-08	1	2.80e-08	1	0	0
85	18-48-39-03	3.21e-08	2	3.21e-11	2	0	0
86	18-48-39-05	6.41e-08	4	2.05e-09	4	0	0
87	18-48-80-1-03	1.37e-07	1	1.37e-10	1	0	0
88	18-48-80-1-05	1.37e-07	1	4.40e-09	1	0	0
89	18-48-80-1-35-03	1.59e-08	1	3.97e-09	1	0	0
90	18-48-81-35-03	9.79e-07	1	2.45e-07	1	0	0
91	18-48-81-35-04	2.51e-08	1	2.51e-08	1	0	0
92	18-48-81-36	1.01e-08	1	1.01e-08	1	0	0
93	20-02-67	1.17e-06	22	7.91e-10	22	0	0
94	20-05-03-05	2.09e-07	4	4.18e-08	4	0	0
95	20-07-67	2.76e-06	46	1.64e-09	46	0	0
96	20-10-03-05	2.27e-07	4	4.53e-08	4	0	0
97	33-5-5	8.18e-08	1	8.18e-08	1	0	0
98	SEQ-000013	2.42e-08	2	1.21e-09	2	0	0
99	SEQ-000065	2.62e-08	2	1.31e-09	2	0	0
100	SEQ-000130	4.12e-08	2	2.06e-09	2	0	0
101	SEQ-000182	4.46e-08	2	2.23e-09	2	0	0
102	SEQ-700014	1.10e-07	6	5.51e-12	6	0	0
103	SEQ-700032	1.19e-07	6	5.97e-12	6	0	0
Totals		6.262E-05	392	8.525E-07	392	1.028E-08	1

Table 12.2.13 Results from Quantification of A5 Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	02-06-01-18	7.59e-08	1	7.59e-11	1	0	0
2	02-06-01-27	6.83e-07	1	6.15e-08	1	7.73e-07	1
3	02-06-19	7.47e-08	1	7.47e-08	1	0	0
4	04-01-02-39	3.72e-08	1	3.72e-11	1	0	0
5	04-01-02-67	3.35e-07	1	2.24e-11	1	0	0
6	04-01-07-39	4.03e-08	1	4.03e-11	1	0	0
7	04-01-07-67	3.63e-07	1	2.43e-11	1	0	0
8	04-01-07-68-05	1.04e-08	1	6.75e-10	1	0	0
9	06-06-01-27	6.75e-08	1	6.08e-09	1	7.29e-08	1
10	SEQ-000001	1.04e-08	1	9.34e-13	1	0	0
11	SEQ-000003	1.04e-08	1	9.34e-13	1	0	0
12	SEQ-000246	3.12e-08	1	2.81e-12	1	0	0
Totals		1.738E-06	12	1.430E-07	12	8.101E-07	2

Sequence Quantification

Table 12.2.14 Results from Quantification of S2H Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	10-1-05-01-18	1.84e-08	1	1.66e-12	1	0	0
2	10-1-05-01-27	1.66e-07	1	1.49e-08	1	1.49e-08	1
3	10-1-08-01-27	1.59e-08	1	1.43e-09	1	0	0
4	10-3-3-02-39	1.75e-08	1	1.17e-12	1	0	0
5	10-3-3-02-67	1.57e-07	1	1.05e-11	1	0	0
6	10-3-3-07-39	1.89e-08	1	1.27e-12	1	0	0
7	10-3-3-07-67	1.70e-07	1	1.14e-11	1	0	0
8	SEQ-000001	1.46e-08	1	1.32e-12	1	0	0
Totals		5.778E-07	8	1.634E-08	8	1.489E-08	1

Table 12.2.15 Results from Quantification of A5HY Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	3-07-01-18	3.84e-08	1	3.84e-11	1	0	0
2	3-07-01-27	3.46e-07	1	3.11e-08	1	3.49e-07	1
Totals		3.841E-07	2	3.115E-08	2	3.492E-07	1

Table 12.2.16 Results from Quantification of S1H-5 Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	3-09-01-18	3.83e-08	1	3.83e-11	1	0	0
2	3-09-01-27	3.44e-07	1	3.10e-08	1	3.44e-07	1
Totals		3.825E-07	2	3.102E-08	2	3.443E-07	1

Table 12.2.17 Results from Quantification of S2-5 Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	11-1-01-02-43	3.54e-08	2	2.37e-12	2	0	0
2	11-1-02-01-18	3.92e-08	1	3.92e-11	1	0	0
3	11-1-02-01-27	3.53e-07	1	2.86e-09	1	0	0
4	11-1-02-23	1.32e-08	1	1.32e-08	1	1.32e-08	1
5	11-1-05-01-27	3.38e-08	1	3.04e-09	1	0	0
6	11-3-01-02-39	3.72e-08	1	3.72e-11	1	0	0
7	11-3-01-02-67	3.35e-07	1	2.24e-11	1	0	0
8	11-3-01-07-39	4.03e-08	1	4.03e-11	1	0	0
9	11-3-01-07-67	3.63e-07	1	2.43e-11	1	0	0
10	11-3-01-07-68-05	1.04e-08	1	6.75e-10	1	0	0
11	22-1-02-01-27	3.49e-08	1	3.14e-09	1	0	0
12	SEQ-000003	1.04e-08	1	9.34e-13	1	0	0
13	SEQ-000007	1.04e-08	1	9.34e-13	1	0	0
14	SEQ-000011	1.04e-08	1	9.34e-13	1	0	0
15	SEQ-000736	3.12e-08	1	2.81e-12	1	0	0
Totals		1.357E-06	16	2.312E-08	16	1.323E-08	1

Sequence Quantification

Table 12.2.18 Results from Quantification of S3-5 Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	32-1-02-01-27	1.27e-08	1	1.14e-09	1	0	0
Total		1.270E-08	1	1.143E-09	1	0	0

Table 12.2.19 Results from Quantification of S1-5 Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	02-06-01-18	8.16e-08	1	8.16e-11	1	0	0
2	02-06-01-27	7.34e-07	1	6.61e-08	1	7.34e-07	1
3	04-01-02-39	3.72e-08	1	3.72e-11	1	0	0
4	04-01-02-67	3.35e-07	1	2.24e-11	1	0	0
5	04-01-07-39	4.03e-08	1	4.03e-11	1	0	0
6	04-01-07-67	3.63e-07	1	2.43e-11	1	0	0
7	04-01-07-68-05	1.04e-08	1	6.75e-10	1	0	0
8	06-06-01-27	7.26e-08	1	6.54e-09	1	7.26e-08	1
9	SEQ-000003	1.04e-08	1	9.34e-13	1	0	0
10	SEQ-000007	1.04e-08	1	9.34e-13	1	0	0
11	SEQ-000011	1.04e-08	1	9.34e-13	1	0	0
12	SEQ-000736	3.12e-08	1	2.81e-12	1	0	0
TOTAL		1.74e-06	12	7.35e-08	12	8.069E-07	2

Table 12.2.20 Results from Quantification of TIOP Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	02-03-02-67	2.08e-08	2	1.40e-12	2	0	0
2	02-03-07-67	2.26e-08	2	1.51e-12	2	0	0
3	SEQ-000005	1.02e-08	1	9.19e-13	1	0	0
4	SEQ-000007	2.04e-08	2	1.84e-12	2	0	0
Totals		7.403E-08	7	5.663E-12	7	0	0

Table 12.2.21 Results from Quantification of E2T Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	04-02-04-05	5.13e-08	2	3.34e-09	2	0	0
2	04-02-06-05	1.07e-08	1	6.96e-10	1	0	0
3	04-02-39	5.88e-06	28	5.88e-09	28	0	0
4	04-02-40-01-10	1.19e-07	2	1.19e-10	2	0	0
5	04-02-40-02-10	1.19e-07	2	1.19e-10	2	0	0
6	04-02-40-03-10	1.19e-07	4	1.19e-10	4	0	0
7	04-02-40-05	1.19e-07	4	7.76e-09	4	0	0
8	04-02-42-01-10	4.15e-08	2	4.15e-11	2	0	0
9	04-02-42-02-10	4.15e-08	2	4.15e-11	2	0	0
10	04-02-42-03-10	2.49e-08	2	2.49e-11	2	0	0
11	04-02-42-05	2.49e-08	2	1.62e-09	2	0	0
12	04-02-67	5.39e-05	53	3.62e-09	53	0	0
13	04-02-68-01-19	1.54e-06	17	1.38e-10	17	0	0
14	04-02-68-02-19	1.54e-06	17	1.38e-10	17	0	0
15	04-02-68-03-19	1.47e-06	30	1.32e-10	30	0	0
16	04-02-68-05	1.65e-06	42	1.05e-07	42	0	0
17	04-02-69-01-19	2.01e-07	4	1.81e-11	4	0	0
18	04-02-69-02-19	2.01e-07	4	1.81e-11	4	0	0
19	04-02-69-03-19	2.01e-07	8	1.81e-11	8	0	0
20	04-02-69-05	2.32e-07	10	1.46e-08	10	0	0
21	04-02-70-01-19	5.11e-07	15	4.60e-11	15	0	0
22	04-02-70-02-19	5.11e-07	15	4.60e-11	15	0	0
23	04-02-70-03-19	3.73e-07	4	3.36e-11	4	0	0
24	04-02-70-05	3.73e-07	4	2.43e-08	4	0	0
25	04-05-01-18	1.31e-08	1	1.31e-11	1	0	0

Table 12.2.21 Results from Quantification of E2T Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
26	04-05-01-27	1.42e-07	2	1.28e-08	2	0	0
27	04-05-03-01-10	3.42e-07	4	3.42e-10	4	0	0
28	04-05-03-01-19	3.43e-06	12	3.09e-10	12	0	0
29	04-05-03-02-10	3.42e-07	4	3.42e-10	4	0	0
30	04-05-03-02-19	3.43e-06	12	3.09e-10	12	0	0
31	04-05-03-05	4.24e-06	28	2.75e-07	28	0	0
32	04-05-21-01-10	4.42e-08	3	4.42e-11	3	0	0
33	04-05-21-01-19	4.67e-07	7	4.21e-11	7	0	0
34	04-05-21-02-10	4.42e-08	3	4.42e-11	3	0	0
35	04-05-21-02-19	4.67e-07	7	4.21e-11	7	0	0
36	04-05-21-05	5.29e-07	9	3.44e-08	9	0	0
37	04-07-04-05	5.56e-08	2	3.61e-09	2	0	0
38	04-07-06-05	1.16e-08	1	7.54e-10	1	0	0
39	04-07-39	6.38e-06	29	6.38e-09	29	0	0
40	04-07-40-01-10	1.29e-07	2	1.29e-10	2	0	0
41	04-07-40-02-10	1.29e-07	2	1.29e-10	2	0	0
42	04-07-40-03-10	1.29e-07	4	1.29e-10	4	0	0
43	04-07-40-05	1.29e-07	4	8.40e-09	4	0	0
44	04-07-42-01-10	4.49e-08	2	4.49e-11	2	0	0
45	04-07-42-02-10	4.49e-08	2	4.49e-11	2	0	0
46	04-07-42-03-10	2.70e-08	2	2.70e-11	2	0	0
47	04-07-42-05	2.70e-08	2	1.75e-09	2	0	0
48	04-07-67	5.84e-05	53	3.92e-09	53	0	0
49	04-07-68-01-19	1.66e-06	17	1.50e-10	17	0	0
50	04-07-68-02-19	1.66e-06	17	1.50e-10	17	0	0

Sequence Quantification

Table 12.2.21 Results from Quantification of E2T Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
51	04-07-68-03-19	1.59e-06	30	1.43e-10	30	0	0
52	04-07-68-05	1.79e-06	42	1.14e-07	42	0	0
53	04-07-69-01-19	2.18e-07	4	1.96e-11	4	0	0
54	04-07-69-02-19	2.18e-07	4	1.96e-11	4	0	0
55	04-07-69-03-19	2.18e-07	8	1.96e-11	8	0	0
56	04-07-69-05	2.51e-07	10	1.58e-08	10	0	0
57	04-07-70-01-19	5.53e-07	15	4.98e-11	15	0	0
58	04-07-70-02-19	5.53e-07	15	4.98e-11	15	0	0
59	04-07-70-03-19	4.04e-07	4	3.64e-11	4	0	0
60	04-07-70-05	4.04e-07	4	2.63e-08	4	0	0
61	04-10-01-18	1.42e-08	1	1.42e-11	1	0	0
62	04-10-01-27	1.54e-07	2	1.39e-08	2	0	0
63	04-10-03-01-10	3.91e-07	6	3.91e-10	6	0	0
64	04-10-03-01-19	3.72e-06	12	3.35e-10	12	0	0
65	04-10-03-02-10	3.91e-07	6	3.91e-10	6	0	0
66	04-10-03-02-19	3.72e-06	12	3.35e-10	12	0	0
67	04-10-03-05	4.60e-06	28	2.98e-07	28	0	0
68	04-10-21-01-10	4.79e-08	3	4.79e-11	3	0	0
69	04-10-21-01-19	5.06e-07	7	4.56e-11	7	0	0
70	04-10-21-02-10	4.79e-08	3	4.79e-11	3	0	0
71	04-10-21-02-19	5.06e-07	7	4.56e-11	7	0	0
72	04-10-21-05	5.73e-07	9	3.73e-08	9	0	0
73	04-11-01-27	7.54e-06	1	6.78e-07	1	5.85e-07	1
74	04-11-03-01-19	6.00e-08	3	5.40e-12	3	0	0
75	04-11-03-02-19	6.00e-08	3	5.40e-12	3	0	0

Table 12.2.21 Results from Quantification of E2T Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
76	04-11-03-05	8.70e-08	6	5.66e-09	6	0	0
77	04-11-21-01-19	9.86e-08	2	8.87e-12	2	0	0
78	04-11-21-02-19	9.86e-08	2	8.87e-12	2	0	0
79	04-11-21-03-19	9.86e-08	4	8.87e-12	4	0	0
80	04-11-21-05	1.12e-06	2	7.30e-08	2	0	0
81	04-13-39	7.41e-08	4	7.41e-11	4	0	0
82	04-13-67	6.67e-07	4	4.47e-11	4	0	0
83	04-18-39	8.03e-08	4	8.03e-11	4	0	0
84	04-18-67	9.88e-07	30	6.62e-11	30	0	0
85	04-23-12-05	1.66e-06	2	1.66e-06	2	0	0
86	04-23-35-05	1.89e-07	1	1.89e-07	1	0	0
87	04-24-01-19	1.60e-07	4	1.44e-11	4	0	0
88	04-24-02-19	1.60e-07	4	1.44e-11	4	0	0
89	04-24-03-19	1.60e-07	8	1.44e-11	8	0	0
90	04-24-05	1.82e-06	4	1.18e-07	4	0	0
91	04-24-12-05	2.01e-07	1	2.01e-07	1	0	0
92	04-24-35-05	2.38e-08	1	2.38e-08	1	0	0
93	04-50-1-01-10	1.07e-05	33	1.07e-08	33	0	0
94	04-50-1-01-19	9.74e-05	53	8.78e-09	53	0	0
95	04-50-1-02-10	1.08e-05	39	1.08e-08	39	0	0
96	04-50-1-02-19	9.91e-05	88	8.93e-09	88	0	0
97	04-50-1-03-10	9.90e-06	40	9.90e-09	40	0	0
98	04-50-1-03-19	9.22e-05	126	8.31e-09	126	0	0
99	04-50-1-05	8.06e-04	110	5.21e-05	110	0	0
100	04-50-1-12-05	1.78e-06	2	1.78e-06	2	0	0

Sequence Quantification

Table 12.2.21 Results from Quantification of E2T Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
101	04-50-1-35-01-10	1.19e-06	15	1.19e-09	15	0	0
102	04-50-1-35-01-19	1.12e-05	40	1.01e-09	40	0	0
103	04-50-1-35-03	2.01e-06	12	5.03e-07	12	0	0
104	04-50-1-35-04	2.29e-06	1	2.29e-06	1	0	0
105	04-50-1-35-05	2.02e-07	1	2.02e-07	1	0	0
106	04-50-2	4.60e-07	1	4.60e-07	1	2.44e-08	1
107	04-51-35-01-10	3.14e-07	2	3.14e-10	2	0	0
108	04-51-35-01-19	3.90e-06	17	3.51e-10	17	0	0
109	04-51-35-03	7.25e-07	12	1.81e-07	12	0	0
110	04-51-35-04	8.25e-07	1	8.25e-07	1	0	0
111	04-51-35-05	7.26e-08	1	7.26e-08	1	0	0
112	04-51-36	3.34e-07	1	3.34e-07	1	1.77e-08	1
113	05-02-67	2.85e-08	2	1.91e-12	2	0	0
114	05-07-67	3.09e-08	2	2.07e-12	2	0	0
115	SEQ-000001	1.24e-07	2	1.12e-11	2	0	0
116	SEQ-000005	4.32e-08	2	3.88e-12	2	0	0
117	SEQ-000008	3.66e-08	3	3.66e-11	3	0	0
118	SEQ-000009	3.56e-07	4	3.21e-11	4	0	0
119	SEQ-000013	4.60e-08	3	4.14e-12	3	0	0
120	SEQ-000017	1.35e-07	2	1.21e-11	2	0	0
121	SEQ-000021	4.68e-08	2	4.21e-12	2	0	0
122	SEQ-000024	3.97e-08	3	3.97e-11	3	0	0
123	SEQ-000025	4.07e-07	6	3.66e-11	6	0	0
124	SEQ-000029	4.98e-08	3	4.48e-12	3	0	0
TOTAL		1.34e-03	1456	6.28e-05	1456	6.267E-07	3

Table 12.2.22 Results from Quantification of E2V Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	04-02-39	5.39e-07	15	5.39e-10	15	0	0
2	04-02-67	4.92e-06	19	3.30e-10	19	0	0
3	04-02-68-01-19	1.01e-07	2	9.13e-12	2	0	0
4	04-02-68-02-19	1.01e-07	2	9.13e-12	2	0	0
5	04-02-68-03-19	1.01e-07	4	9.13e-12	4	0	0
6	04-02-68-05	1.01e-07	4	6.59e-09	4	0	0
7	04-02-70-01-19	3.53e-08	2	3.17e-12	2	0	0
8	04-02-70-02-19	3.53e-08	2	3.17e-12	2	0	0
9	04-02-70-03-19	2.12e-08	2	1.90e-12	2	0	0
10	04-02-70-05	2.12e-08	2	1.38e-09	2	0	0
11	04-05-01-27	1.12e-08	1	1.00e-09	1	0	0
12	04-05-03-01-19	2.91e-07	4	2.62e-11	4	0	0
13	04-05-03-02-19	2.91e-07	4	2.62e-11	4	0	0
14	04-05-03-05	3.51e-07	8	2.28e-08	8	0	0
15	04-05-03-35-03	3.76e-08	3	9.40e-09	3	0	0
16	04-05-21-01-19	3.76e-08	3	3.38e-12	3	0	0
17	04-05-21-02-19	3.76e-08	3	3.38e-12	3	0	0
18	04-07-39	5.84e-07	15	5.84e-10	15	0	0
19	04-07-67	5.33e-06	19	3.57e-10	19	0	0
20	04-07-68-01-19	1.10e-07	2	9.89e-12	2	0	0
21	04-07-68-02-19	1.10e-07	2	9.89e-12	2	0	0
22	04-07-68-03-19	1.10e-07	4	9.89e-12	4	0	0
23	04-07-68-05	1.10e-07	4	7.14e-09	4	0	0
24	04-07-70-01-19	3.82e-08	2	3.44e-12	2	0	0
25	04-07-70-02-19	3.82e-08	2	3.44e-12	2	0	0
26	04-07-70-03-19	2.29e-08	2	2.06e-12	2	0	0

Sequence Quantification

Table 12.2.22 Results from Quantification of E2V Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
27	04-07-70-05	2.29e-08	2	1.49e-09	2	0	0
28	04-10-01-27	1.21e-08	1	1.09e-09	1	0	0
29	04-10-03-01-10	3.24e-08	3	3.24e-11	3	0	0
30	04-10-03-01-19	3.15e-07	4	2.84e-11	4	0	0
31	04-10-03-02-10	3.24e-08	3	3.24e-11	3	0	0
32	04-10-03-02-19	3.15e-07	4	2.84e-11	4	0	0
33	04-10-03-05	3.81e-07	8	2.47e-08	8	0	0
34	04-10-03-35-03	4.08e-08	3	1.02e-08	3	0	0
35	04-10-21-01-19	4.07e-08	3	3.66e-12	3	0	0
36	04-10-21-02-19	4.07e-08	3	3.66e-12	3	0	0
37	04-11-01-18	7.91e-08	1	7.91e-11	1	0	0
38	04-11-01-27	7.12e-07	1	6.41e-08	1	5.52e-08	1
39	04-11-21-05	1.06e-07	2	6.89e-09	2	0	0
40	04-11-21-35-03	1.23e-08	1	3.07e-09	1	0	0
41	04-13-67	6.30e-08	4	4.22e-12	4	0	0
42	04-18-67	6.82e-08	4	4.57e-12	4	0	0
43	04-23-12-05	1.50e-07	1	1.50e-07	1	0	0
44	04-23-35-05	1.78e-08	1	1.78e-08	1	0	0
45	04-39-05	1.72e-07	4	1.12e-08	4	0	0
46	04-80-1-01-10	9.74e-07	15	9.74e-10	15	0	0
47	04-80-1-01-19	9.06e-06	30	8.16e-10	30	0	0
48	04-80-1-02-10	9.74e-07	15	9.74e-10	15	0	0
49	04-80-1-02-19	9.12e-06	32	8.20e-10	32	0	0
50	04-80-1-03-10	8.33e-07	14	8.33e-10	14	0	0
51	04-80-1-03-19	8.34e-06	32	7.51e-10	32	0	0
52	04-80-1-05	7.63e-05	46	4.91e-06	46	0	0
53	04-80-1-35-01-10	8.23e-08	2	8.23e-11	2	0	0

Table 12.2.22 Results from Quantification of E2V Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
54	04-80-1-35-01-19	1.01e-06	15	9.12e-11	15	0	0
55	04-80-1-35-03	8.58e-06	5	2.14e-06	5	0	0
56	04-80-1-35-04	2.16e-07	1	2.16e-07	1	0	0
57	04-80-1-35-05	1.90e-08	1	1.90e-08	1	0	0
58	04-80-2	4.34e-08	1	4.34e-08	1	1.09e-08	1
59	04-81-35-01-10	2.96e-08	2	2.96e-11	2	0	0
60	04-81-35-01-19	2.67e-07	2	2.40e-11	2	0	0
61	04-81-35-03	3.06e-06	2	7.66e-07	2	0	0
62	04-81-35-04	7.79e-08	1	7.79e-08	1	1.95e-08	1
63	04-81-36	3.15e-08	1	3.15e-08	1	0	0
64	05-02-67	1.53e-07	2	1.02e-11	2	0	0
65	05-07-67	1.65e-07	2	1.11e-11	2	0	0
66	05-11-01-27	3.07e-08	1	2.76e-09	1	0	0
67	05-80-1-01-10	3.07e-08	2	3.07e-11	2	0	0
68	05-80-1-01-19	2.76e-07	2	2.48e-11	2	0	0
69	05-80-1-02-10	3.07e-08	2	3.07e-11	2	0	0
70	05-80-1-02-19	2.76e-07	2	2.48e-11	2	0	0
71	05-80-1-03-19	2.76e-07	4	2.48e-11	4	0	0
72	05-80-1-05	3.17e-06	4	2.05e-07	4	0	0
73	05-80-1-35-01-19	3.19e-08	2	2.87e-12	2	0	0
74	05-80-1-35-03	3.64e-07	1	9.09e-08	1	0	0
75	05-81-35-01-19	5.07e-08	2	4.57e-12	2	0	0
76	05-81-35-03	5.78e-07	1	1.44e-07	1	0	0
77	05-81-35-04	1.48e-08	1	1.48e-08	1	0	0
78	SEQ-000001	3.11e-08	3	2.80e-12	3	0	0
79	SEQ-000009	3.37e-08	3	3.04e-12	3	0	0
TOTAL		1.41e-04	436	9.01e-06	436	8.555E-08	3

Sequence Quantification

Table 12.2.23 Results from Quantification of TLM Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	03-01-04-01-18	2.44e-08	1	2.44e-11	1	0	0
2	03-01-04-01-27	2.19e-07	1	1.97e-08	1	1.70e-08	1
3	03-01-04-03-05	4.73e-08	3	2.32e-09	3	0	0
4	03-01-04-21-05	1.31e-08	1	4.18e-10	1	0	0
5	03-01-05-02-39	1.46e-07	3	1.46e-10	3	0	0
6	03-01-05-02-67	1.66e-06	17	1.11e-10	17	0	0
7	03-01-05-07-39	1.58e-07	3	1.58e-10	3	0	0
8	03-01-05-07-67	1.79e-06	17	1.20e-10	17	0	0
9	03-01-05-24-05	2.42e-07	4	7.76e-09	4	0	0
10	03-01-05-50-1-05	1.84e-05	17	6.15e-07	17	0	0
11	03-01-05-50-2	1.07e-08	1	1.07e-08	1	0	0
12	03-01-05-51-36	1.43e-07	1	1.43e-07	1	0	0
13	03-01-38-02-39	4.96e-07	6	4.96e-10	6	0	0
14	03-01-38-02-67	5.18e-06	23	3.47e-10	23	0	0
15	03-01-38-07-39	5.37e-07	6	5.37e-10	6	0	0
16	03-01-38-07-67	5.61e-06	23	3.76e-10	23	0	0
17	03-01-38-24-05	4.13e-07	4	1.32e-08	4	0	0
18	03-01-38-50-1-05	3.13e-05	17	1.01e-06	17	0	0
19	03-01-38-50-2	1.82e-08	1	1.82e-08	1	0	0
20	03-01-38-51-36	2.43e-07	1	2.43e-07	1	1.29e-08	1
21	03-03-02-67	1.97e-07	10	1.32e-11	10	0	0
22	03-03-02-68-05	9.60e-08	4	3.89e-09	4	0	0
23	03-03-05-03-05	5.80e-08	2	2.84e-09	2	0	0
24	03-03-07-67	2.13e-07	10	1.43e-11	10	0	0
25	03-03-07-68-05	1.14e-07	5	4.55e-09	5	0	0

Table 12.2.23 Results from Quantification of TLM Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
26	03-03-10-03-05	2.51e-08	1	1.23e-09	1	0	0
27	05-01-05-02-67	1.30e-07	3	8.68e-12	3	0	0
28	05-01-05-07-67	1.40e-07	3	9.41e-12	3	0	0
29	05-01-05-80-1-05	7.12e-07	1	2.28e-08	1	0	0
30	05-01-05-81-36	1.41e-08	1	1.41e-08	1	0	0
31	05-01-38-02-67	2.21e-07	3	1.48e-11	3	0	0
32	05-01-38-07-67	2.39e-07	3	1.60e-11	3	0	0
33	05-01-38-80-1-05	1.21e-06	1	3.88e-08	1	0	0
34	05-01-38-81-36	2.40e-08	1	2.40e-08	1	0	0
35	07-2-04-01-27	1.19e-08	1	1.07e-09	1	0	0
36	07-2-05-02-67	2.01e-07	4	1.35e-11	4	0	0
37	07-2-05-02-68-05	1.35e-07	6	4.31e-09	6	0	0
38	07-2-05-07-67	2.18e-07	4	1.46e-11	4	0	0
39	07-2-05-07-68-05	1.46e-07	6	4.67e-09	6	0	0
40	07-2-05-51-35-03	2.02e-08	1	5.04e-09	1	0	0
41	07-2-37-27-01-27	2.82e-08	2	2.53e-09	2	0	0
42	07-2-38-02-67	3.42e-07	4	2.29e-11	4	0	0
43	07-2-38-02-68-05	2.30e-07	6	7.34e-09	6	0	0
44	07-2-38-07-39	4.12e-08	4	4.12e-11	4	0	0
45	07-2-38-07-67	3.71e-07	4	2.48e-11	4	0	0
46	07-2-38-07-68-05	2.49e-07	6	7.96e-09	6	0	0
47	07-2-38-51-35-03	3.43e-08	1	8.58e-09	1	0	0
48	SEQ-600302	3.73e-08	2	1.19e-09	2	0	0
49	SEQ-600317	8.68e-08	4	2.78e-09	4	0	0
50	SEQ-600327	9.53e-07	17	3.12e-08	17	0	0

Sequence Quantification

Table 12.2.23 Results from Quantification of TLM Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
51	SEQ-600354	4.04e-08	2	1.29e-09	2	0	0
52	SEQ-600369	9.40e-08	4	3.01e-09	4	0	0
53	SEQ-600379	1.03e-06	17	3.38e-08	17	0	0
54	SEQ-600404	1.95e-08	1	1.95e-11	1	0	0
55	SEQ-600405	1.75e-07	1	1.58e-08	1	1.36e-08	1
56	SEQ-600413	2.61e-08	2	8.36e-10	2	0	0
57	SEQ-600562	2.67e-08	1	2.67e-08	1	0	0
58	SEQ-600573	2.80e-08	2	7.00e-09	2	0	0
59	SEQ-600663	1.38e-05	1	3.44e-06	1	1.03e-07	1
60	SEQ-600664	3.53e-07	1	3.53e-07	1	0	0
61	SEQ-600665	3.11e-08	1	3.11e-08	1	0	0
62	SEQ-601415	1.38e-08	1	3.44e-09	1	0	0
63	SEQ-601466	6.35e-08	2	2.03e-09	2	0	0
64	SEQ-601481	1.48e-07	4	4.73e-09	4	0	0
65	SEQ-601491	1.82e-06	30	6.01e-08	30	0	0
66	SEQ-601518	6.88e-08	2	2.20e-09	2	0	0
67	SEQ-601533	1.60e-07	4	5.12e-09	4	0	0
68	SEQ-601543	1.97e-06	30	6.51e-08	30	0	0
69	SEQ-601568	3.32e-08	1	3.32e-11	1	0	0
70	SEQ-601569	2.99e-07	1	2.69e-08	1	2.32e-08	1
71	SEQ-601577	4.45e-08	2	1.42e-09	2	0	0
72	SEQ-601661	1.81e-08	2	1.63e-12	2	0	0
73	SEQ-601726	4.54e-08	1	4.54e-08	1	0	0
74	SEQ-601737	4.77e-08	2	1.19e-08	2	0	0
75	SEQ-601827	2.34e-05	1	5.86e-06	1	1.76e-07	1

Table 12.2.23 Results from Quantification of TLM Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
76	SEQ-601828	6.01e-07	1	6.01e-07	1	0	0
77	SEQ-601829	5.29e-08	1	5.29e-08	1	0	0
78	SEQ-602203	5.72e-08	3	1.43e-08	3	0	0
79	SEQ-603057	4.81e-08	1	4.32e-12	1	0	0
80	SEQ-604077	5.21e-08	1	4.69e-12	1	0	0
81	SEQ-610247	3.09e-08	2	9.89e-10	2	0	0
82	SEQ-610287	3.35e-08	2	1.07e-09	2	0	0
83	SEQ-610301	1.73e-08	1	1.56e-09	1	0	0
84	SEQ-610479	1.36e-06	1	3.40e-07	1	3.40e-07	1
85	SEQ-610480	3.49e-08	1	3.49e-08	1	0	0
86	SEQ-610519	5.26e-08	2	1.68e-09	2	0	0
87	SEQ-610559	5.70e-08	2	1.82e-09	2	0	0
88	SEQ-610573	2.95e-08	1	2.66e-09	1	0	0
89	SEQ-610751	2.32e-06	1	5.80e-07	1	5.80e-07	1
90	SEQ-610752	5.94e-08	1	5.94e-08	1	1.49e-08	1
91	SEQ-700053	4.34e-08	1	4.34e-11	1	0	0
92	SEQ-700055	4.34e-08	2	4.34e-11	2	0	0
93	SEQ-700107	6.56e-07	13	5.90e-11	13	0	0
94	SEQ-700109	5.10e-07	11	4.59e-11	11	0	0
95	SEQ-700133	9.03e-08	2	2.26e-08	2	0	0
96	SEQ-700212	4.70e-08	1	4.70e-11	1	0	0
97	SEQ-700214	4.70e-08	2	4.70e-11	2	0	0
98	SEQ-700266	7.10e-07	13	6.39e-11	13	0	0
99	SEQ-700268	5.52e-07	11	4.97e-11	11	0	0
100	SEQ-700292	1.32e-07	2	3.30e-08	2	0	0

Table 12.2.23 Results from Quantification of TLM Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
101	SEQ-700508	8.77e-08	1	8.77e-11	1	0	0
102	SEQ-700509	1.33e-06	13	1.19e-10	13	0	0
103	SEQ-700510	8.77e-08	2	8.77e-11	2	0	0
104	SEQ-700511	1.19e-06	20	1.07e-10	20	0	0
105	SEQ-700520	3.96e-08	1	3.96e-08	1	0	0
106	SEQ-700531	2.08e-06	1	5.20e-07	1	0	0
107	SEQ-700532	5.33e-08	1	5.33e-08	1	0	0
108	SEQ-700597	7.39e-08	1	7.39e-11	1	0	0
109	SEQ-700599	7.39e-08	2	7.39e-11	2	0	0
110	SEQ-700651	1.12e-06	13	1.01e-10	13	0	0
111	SEQ-700653	1.00e-06	20	9.03e-11	20	0	0
112	SEQ-700677	7.69e-08	1	1.92e-08	1	0	0
113	SEQ-700756	8.00e-08	1	8.00e-11	1	0	0
114	SEQ-700758	8.00e-08	2	8.00e-11	2	0	0
115	SEQ-700810	1.21e-06	13	1.09e-10	13	0	0
116	SEQ-700812	1.09e-06	20	9.79e-11	20	0	0
117	SEQ-700836	8.33e-08	1	2.08e-08	1	0	0
118	SEQ-701052	1.49e-07	1	1.49e-10	1	0	0
119	SEQ-701053	2.26e-06	13	2.03e-10	13	0	0
120	SEQ-701054	1.49e-07	2	1.49e-10	2	0	0
121	SEQ-701055	2.03e-06	20	1.83e-10	20	0	0
122	SEQ-701064	6.74e-08	1	6.74e-08	1	0	0
123	SEQ-701075	3.54e-06	1	8.85e-07	1	0	0
124	SEQ-701076	9.08e-08	1	9.08e-08	1	0	0
125	SEQ-701195	7.72e-08	2	6.95e-12	2	0	0

Table 12.2.23 Results from Quantification of TLM Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
126	SEQ-701197	3.09e-08	2	2.78e-12	2	0	0
127	SEQ-701354	8.37e-08	2	7.53e-12	2	0	0
128	SEQ-701356	3.35e-08	2	3.01e-12	2	0	0
129	SEQ-701424	1.56e-07	2	1.41e-11	2	0	0
130	SEQ-701426	6.25e-08	2	5.62e-12	2	0	0
131	SEQ-701446	2.06e-07	1	5.14e-08	1	0	0
132	SEQ-701566	1.32e-07	2	1.18e-11	2	0	0
133	SEQ-701568	5.26e-08	2	4.74e-12	2	0	0
134	SEQ-701725	1.42e-07	2	1.28e-11	2	0	0
135	SEQ-701727	5.70e-08	2	5.13e-12	2	0	0
136	SEQ-701796	2.95e-08	2	2.95e-11	2	0	0
137	SEQ-701797	2.66e-07	2	2.39e-11	2	0	0
138	SEQ-701799	1.06e-07	2	9.57e-12	2	0	0
139	SEQ-701817	3.50e-07	1	8.75e-08	1	0	0
140	SEQ-701937	1.35e-07	3	1.21e-11	3	0	0
141	SEQ-701939	1.35e-07	6	1.21e-11	6	0	0
142	SEQ-702096	1.46e-07	3	1.31e-11	3	0	0
143	SEQ-702098	1.46e-07	6	1.31e-11	6	0	0
144	SEQ-702481	2.30e-07	3	2.07e-11	3	0	0
145	SEQ-702483	2.30e-07	6	2.07e-11	6	0	0
146	SEQ-702640	2.49e-07	3	2.24e-11	3	0	0
147	SEQ-702642	2.49e-07	6	2.24e-11	6	0	0
TOTAL		1.458e-04	681	1.586e-05	681	1.280E-06	9

Table 12.2.24 Results from Quantification of EIT Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	03-04-01-27	1.17e-08	1	1.05e-09	1	0	0
2	03-05-02-39	2.96e-08	2	2.96e-11	2	0	0
3	03-05-02-67	6.36e-07	10	4.26e-11	10	0	0
4	03-05-07-39	5.35e-08	4	5.35e-11	4	0	0
5	03-05-07-67	6.89e-07	10	4.62e-11	10	0	0
6	03-05-11-01-27	1.28e-07	5	1.15e-08	5	0	0
7	03-05-50-1-02-10	8.92e-08	4	8.92e-11	4	0	0
8	03-05-50-1-02-19	1.25e-06	17	1.12e-10	17	0	0
9	03-05-50-1-03-10	2.14e-08	2	2.14e-11	2	0	0
10	03-05-50-1-03-19	4.60e-07	10	4.14e-11	10	0	0
11	03-05-50-1-05	5.38e-06	7	1.72e-07	7	0	0
12	03-05-50-1-12-05	1.21e-08	1	1.21e-08	1	0	0
13	03-05-50-1-35-03	1.55e-06	7	3.89e-07	7	0	0
14	03-05-50-1-35-04	2.71e-08	2	2.71e-08	2	0	0
15	03-05-51-35-03	9.68e-07	7	2.42e-07	7	0	0
16	03-05-51-35-04	1.01e-08	1	1.01e-08	1	0	0
17	03-16-51-35-03	1.42e-08	1	0	1	0	0
18	03-21-51-35-03	3.79e-08	3	9.48e-09	3	0	0
19	03-32-02-68-05	7.94e-08	4	2.54e-09	4	0	0
20	03-32-07-68-05	8.60e-08	4	2.75e-09	4	0	0
21	03-32-11-01-27	1.78e-08	1	1.61e-09	1	0	0
22	03-32-50-1-02-19	1.61e-07	2	1.45e-11	2	0	0
23	03-32-50-1-03-19	1.61e-07	4	1.45e-11	4	0	0
24	03-32-50-1-05	2.01e-06	11	1.13e-06	11	0	0
25	03-32-50-1-35-03	2.11e-07	1	5.29e-08	1	0	0
26	03-32-51-35-03	1.32e-07	1	3.29e-08	1	0	0

Table 12.2.24 Results from Quantification of EIT Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
27	03-37-27-01-27	4.61e-08	2	4.15e-09	2	0	0
28	03-38-02-39	8.40e-08	4	8.40e-11	4	0	0
29	03-38-02-67	1.17e-06	17	7.86e-11	17	0	0
30	03-38-07-39	9.10e-08	4	9.10e-11	4	0	0
31	03-38-07-67	1.27e-06	17	8.51e-11	17	0	0
32	03-38-11-01-18	1.01e-08	1	1.01e-11	1	0	0
33	03-38-11-01-27	2.17e-07	5	1.96e-08	5	0	0
34	03-38-50-1-02-10	2.17e-07	10	2.17e-10	10	0	0
35	03-38-50-1-02-19	2.36e-06	34	2.12e-10	34	0	0
36	03-38-50-1-03-10	6.08e-08	4	6.08e-11	4	0	0
37	03-38-50-1-03-19	7.83e-07	10	7.05e-11	10	0	0
38	03-38-50-1-05	9.98e-06	22	3.20e-07	22	0	0
39	03-38-50-1-12-05	3.43e-08	2	3.43e-08	2	0	0
40	03-38-50-1-35-03	2.85e-06	14	7.14e-07	14	0	0
41	03-38-50-1-35-04	4.62e-08	2	4.62e-08	2	0	0
42	03-38-51-35-03	1.78e-06	14	4.44e-07	14	0	0
43	03-38-51-35-04	2.87e-08	2	2.87e-08	2	0	0
44	03-48-02-68-05	1.35e-07	4	4.33e-09	4	0	0
45	03-48-07-68-05	1.47e-07	4	4.69e-09	4	0	0
46	03-48-11-01-27	3.04e-08	1	2.73e-09	1	0	0
47	03-48-50-1-02-10	3.04e-08	2	3.04e-11	2	0	0
48	03-48-50-1-02-19	2.73e-07	2	2.46e-11	2	0	0
49	03-48-50-1-03-19	2.73e-07	4	2.46e-11	4	0	0
50	03-48-50-1-05	3.43e-06	12	1.15e-07	12	0	0
51	03-48-50-1-35-03	3.60e-07	1	9.00e-08	1	0	0
52	03-48-51-35-03	2.24e-07	1	5.60e-08	1	0	0

Table 12.2.24 Results from Quantification of EIT Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
53	05-02-04-05	8.16e-08	6	5.31e-09	6	0	0
54	05-02-39	8.78e-06	39	8.78e-09	39	0	0
55	05-02-40-01-10	9.49e-08	3	9.49e-11	3	0	0
56	05-02-40-02-10	9.49e-08	3	9.49e-11	3	0	0
57	05-02-40-03-10	9.49e-08	6	9.49e-11	6	0	0
58	05-02-40-05	9.49e-08	6	6.17e-09	6	0	0
59	05-02-42-01-10	3.30e-08	3	3.30e-11	3	0	0
60	05-02-42-02-10	3.30e-08	3	3.30e-11	3	0	0
61	05-02-67	8.02e-05	77	5.37e-09	77	0	0
62	05-02-68-01-19	1.28e-06	25	1.15e-10	25	0	0
63	05-02-68-02-19	1.28e-06	25	1.15e-10	25	0	0
64	05-02-68-03-19	1.05e-06	18	9.42e-11	18	0	0
65	05-02-68-05	1.05e-06	18	6.81e-08	18	0	0
66	05-02-68-35-03	9.88e-08	3	0	3	0	0
67	05-02-69-01-19	1.60e-07	6	1.44e-11	6	0	0
68	05-02-69-02-19	1.60e-07	6	1.44e-11	6	0	0
69	05-02-69-03-19	1.60e-07	12	1.44e-11	12	0	0
70	05-02-69-05	1.60e-07	12	1.04e-08	12	0	0
71	05-02-70-01-19	3.21e-07	4	2.89e-11	4	0	0
72	05-02-70-02-19	3.21e-07	4	2.89e-11	4	0	0
73	05-02-70-03-19	3.11e-07	7	2.80e-11	7	0	0
74	05-02-70-05	3.11e-07	7	2.02e-08	7	0	0
75	05-02-70-35-03	3.43e-08	3	0	3	0	0
76	05-05-01-18	1.23e-07	1	1.23e-10	1	0	0
77	05-05-01-27	1.17e-06	3	1.05e-07	3	8.59e-08	1
78	05-05-03-05	3.95e-05	57	2.56e-06	57	0	0
79	05-05-21-01-10	4.87e-07	7	4.87e-10	7	0	0

Table 12.2.24 Results from Quantification of E1T Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
80	05-05-21-01-19	4.62e-06	13	4.16e-10	13	0	0
81	05-05-21-02-10	4.87e-07	7	4.87e-10	7	0	0
82	05-05-21-02-19	4.62e-06	13	4.16e-10	13	0	0
83	05-05-21-05	5.58e-06	26	3.63e-07	26	0	0
84	05-05-21-35-03	6.11e-07	7	0	7	0	0
85	05-07-04-05	8.85e-08	6	5.75e-09	6	0	0
86	05-07-39	9.51e-06	39	9.51e-09	39	0	0
87	05-07-40-01-10	1.03e-07	3	1.03e-10	3	0	0
88	05-07-40-02-10	1.03e-07	3	1.03e-10	3	0	0
89	05-07-40-03-10	1.03e-07	6	1.03e-10	6	0	0
90	05-07-40-05	1.03e-07	6	6.69e-09	6	0	0
91	05-07-42-01-10	3.57e-08	3	3.57e-11	3	0	0
92	05-07-42-02-10	3.57e-08	3	3.57e-11	3	0	0
93	05-07-67	8.69e-05	77	5.82e-09	77	0	0
94	05-07-68-01-19	1.39e-06	26	1.25e-10	26	0	0
95	05-07-68-02-19	1.39e-06	26	1.25e-10	26	0	0
96	05-07-68-03-19	1.13e-06	18	1.02e-10	18	0	0
97	05-07-68-05	1.13e-06	18	7.37e-08	18	0	0
98	05-07-68-35-03	1.07e-07	3	0	3	0	0
99	05-07-69-01-19	1.74e-07	6	1.56e-11	6	0	0
100	05-07-69-02-19	1.74e-07	6	1.56e-11	6	0	0
101	05-07-69-03-19	1.74e-07	12	1.56e-11	12	0	0
102	05-07-69-05	1.74e-07	12	1.13e-08	12	0	0
103	05-07-70-01-19	3.58e-07	5	3.22e-11	5	0	0
104	05-07-70-02-19	3.58e-07	5	3.22e-11	5	0	0
105	05-07-70-03-19	3.47e-07	8	3.13e-11	8	0	0
106	05-07-70-05	3.47e-07	8	2.26e-08	8	0	0

Sequence Quantification

Table 12.2.24 Results from Quantification of E1T Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
107	05-07-70-35-03	3.72e-08	3	0	3	0	0
108	05-10-01-18	1.33e-07	1	1.33e-10	1	0	0
109	05-10-01-27	1.27e-06	3	1.14e-07	3	9.31e-08	1
110	05-10-03-05	4.28e-05	57	2.77e-06	57	0	0
111	05-10-21-01-10	5.27e-07	7	5.27e-10	7	0	0
112	05-10-21-01-19	5.00e-06	13	4.50e-10	13	0	0
113	05-10-21-02-10	5.27e-07	7	5.27e-10	7	0	0
114	05-10-21-02-19	5.04e-06	16	4.53e-10	16	0	0
115	05-10-21-05	6.04e-06	26	3.93e-07	26	0	0
116	05-10-21-35-03	6.62e-07	7	0	7	0	0
117	05-11-01-18	1.65e-07	7	1.65e-10	7	0	0
118	05-11-01-27	1.70e-06	17	1.53e-07	17	1.15e-07	7
119	05-11-03-05	7.58e-07	10	4.92e-08	10	0	0
120	05-11-21-01-19	1.57e-07	6	1.41e-11	6	0	0
121	05-11-21-02-19	1.57e-07	6	1.41e-11	6	0	0
122	05-11-21-05	3.16e-07	20	2.05e-08	20	0	0
123	05-13-67	1.15e-06	16	7.68e-11	16	0	0
124	05-18-39	1.28e-07	12	1.28e-10	12	0	0
125	05-18-67	1.24e-06	16	8.32e-11	16	0	0
126	05-21-04-27	2.13e-08	2	1.92e-09	2	0	0
127	05-21-06-01-19	5.55e-07	8	5.00e-11	8	0	0
128	05-21-06-02-19	5.55e-07	8	5.00e-11	8	0	0
129	05-21-06-05	6.51e-07	14	4.23e-08	14	0	0
130	05-21-06-35-03	7.18e-08	6	0	6	0	0
131	05-23-12-05	4.68e-07	12	4.68e-07	12	0	0
132	05-24-01-19	2.55e-07	12	2.29e-11	12	0	0
133	05-24-02-19	2.55e-07	12	2.29e-11	12	0	0

Table 12.2.24 Results from Quantification of E1T Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
134	05-24-03-19	7.64e-08	6	6.87e-12	6	0	0
135	05-24-05	5.12e-07	40	3.33e-08	40	0	0
136	05-50-1-01-10	1.64e-05	42	1.64e-08	42	0	0
137	05-50-1-01-19	1.50e-04	88	1.35e-08	88	0	0
138	05-50-1-02-10	1.65e-05	48	1.65e-08	48	0	0
139	05-50-1-02-19	1.52e-04	170	1.37e-08	170	0	0
140	05-50-1-03-10	9.16e-06	60	9.16e-09	60	0	0
141	05-50-1-03-19	8.57e-05	174	7.71e-09	174	0	0
142	05-50-1-05	2.70e-04	297	1.74e-05	297	0	0
143	05-50-1-12-05	5.01e-07	12	5.01e-07	12	0	0
144	05-50-1-35-01-10	1.82e-06	30	1.82e-09	30	0	0
145	05-50-1-35-01-19	1.70e-05	42	1.53e-09	42	0	0
146	05-50-1-35-03	3.07e-05	59	5.02e-08	59	0	0
147	05-50-1-35-04	6.75e-07	12	6.75e-07	12	0	0
148	05-50-2	1.29e-07	10	1.29e-07	10	0	0
149	05-51-35-01-10	5.39e-07	8	5.39e-10	8	0	0
150	05-51-35-01-19	6.14e-06	42	5.52e-10	42	0	0
151	05-51-35-03	1.10e-05	43	0	43	0	0
152	05-51-35-04	2.32e-07	10	2.32e-07	10	0	0
153	07-02-04-05	8.17e-08	4	5.31e-09	4	0	0
154	07-02-08-05	1.36e-07	8	7.98e-09	8	0	0
155	07-02-39	4.92e-06	22	4.92e-09	22	0	0
156	07-02-40-01-10	9.50e-08	2	9.50e-11	2	0	0
157	07-02-40-02-10	1.58e-07	4	1.58e-10	4	0	0
158	07-02-40-03-10	9.50e-08	4	9.50e-11	4	0	0
159	07-02-40-05	1.58e-07	8	9.28e-09	8	0	0
160	07-02-42-01-10	3.30e-08	2	3.30e-11	2	0	0

Table 12.2.24 Results from Quantification of E1T Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
161	07-02-42-02-10	3.30e-08	2	3.30e-11	2	0	0
162	07-02-67	4.64e-05	79	3.11e-09	79	0	0
163	07-02-68-01-19	1.24e-06	19	1.11e-10	19	0	0
164	07-02-68-02-19	1.92e-06	29	1.73e-10	29	0	0
165	07-02-68-03-19	1.08e-06	20	9.71e-11	20	0	0
166	07-02-68-05	1.65e-06	24	9.81e-08	24	0	0
167	07-02-68-35-03	1.65e-07	4	1.65e-08	4	0	0
168	07-02-69-01-19	1.60e-07	4	1.44e-11	4	0	0
169	07-02-69-02-19	1.60e-07	4	1.44e-11	4	0	0
170	07-02-69-03-19	1.60e-07	8	1.44e-11	8	0	0
171	07-02-69-05	1.60e-07	8	1.04e-08	8	0	0
172	07-02-70-01-19	2.97e-07	2	2.68e-11	2	0	0
173	07-02-70-02-19	2.97e-07	2	2.68e-11	2	0	0
174	07-02-70-03-19	2.97e-07	4	2.68e-11	4	0	0
175	07-02-70-05	2.97e-07	4	1.93e-08	4	0	0
176	07-02-70-35-03	3.44e-08	2	0	2	0	0
177	07-05-01-18	1.05e-08	1	1.05e-11	1	0	0
178	07-05-01-27	1.13e-07	2	1.02e-08	2	0	0
179	07-05-03-01-10	2.73e-07	4	2.73e-10	4	0	0
180	07-05-03-01-19	2.89e-06	18	2.60e-10	18	0	0
181	07-05-03-02-10	2.73e-07	4	2.73e-10	4	0	0
182	07-05-03-02-19	2.89e-06	18	2.60e-10	18	0	0
183	07-05-03-05	3.87e-06	38	2.46e-07	38	0	0
184	07-05-03-35-03	3.82e-07	5	9.95e-09	5	0	0
185	07-05-21-01-10	3.52e-08	3	3.52e-11	3	0	0
186	07-05-21-01-19	3.54e-07	5	3.18e-11	5	0	0
187	07-05-21-02-10	3.52e-08	3	3.52e-11	3	0	0

Table 12.2.24 Results from Quantification of E1T Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
188	07-05-21-02-19	3.54e-07	5	3.18e-11	5	0	0
189	07-05-21-05	4.61e-07	10	2.92e-08	10	0	0
190	07-05-21-35-03	4.42e-08	3	0	3	0	0
191	07-07-04-05	8.86e-08	4	5.76e-09	4	0	0
192	07-07-08-05	1.48e-07	8	8.65e-09	8	0	0
193	07-07-39	5.34e-06	23	5.34e-09	23	0	0
194	07-07-40-01-10	1.03e-07	2	1.03e-10	2	0	0
195	07-07-40-02-10	1.72e-07	4	1.72e-10	4	0	0
196	07-07-40-03-10	1.03e-07	4	1.03e-10	4	0	0
197	07-07-40-05	1.72e-07	8	1.01e-08	8	0	0
198	07-07-42-01-10	3.58e-08	2	3.58e-11	2	0	0
199	07-07-42-02-10	3.58e-08	2	3.58e-11	2	0	0
200	07-07-42-03-10	2.15e-08	2	2.15e-11	2	0	0
201	07-07-42-05	2.15e-08	2	1.40e-09	2	0	0
202	07-07-67	5.03e-05	79	3.37e-09	79	0	0
203	07-07-68-01-19	1.34e-06	19	1.21e-10	19	0	0
204	07-07-68-02-19	2.08e-06	29	1.88e-10	29	0	0
205	07-07-68-03-19	1.27e-06	30	1.15e-10	30	0	0
206	07-07-68-05	1.89e-06	34	1.13e-07	34	0	0
207	07-07-68-35-03	1.78e-07	4	1.78e-08	4	0	0
208	07-07-69-01-19	1.74e-07	4	1.56e-11	4	0	0
209	07-07-69-02-19	1.74e-07	4	1.56e-11	4	0	0
210	07-07-69-03-19	1.74e-07	8	1.56e-11	8	0	0
211	07-07-69-05	1.74e-07	8	1.13e-08	8	0	0
212	07-07-70-01-19	3.22e-07	2	2.90e-11	2	0	0
213	07-07-70-02-19	3.22e-07	2	2.90e-11	2	0	0
214	07-07-70-03-19	3.22e-07	4	2.90e-11	4	0	0

Table 12.2.24 Results from Quantification of E1T Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
215	07-07-70-05	3.22e-07	4	2.09e-08	4	0	0
216	07-07-70-35-03	3.72e-08	2	0	2	0	0
217	07-10-01-18	1.13e-08	1	1.13e-11	1	0	0
218	07-10-01-27	1.23e-07	2	1.11e-08	2	0	0
219	07-10-03-01-10	2.95e-07	4	2.95e-10	4	0	0
220	07-10-03-01-19	3.13e-06	18	2.82e-10	18	0	0
221	07-10-03-02-10	2.95e-07	4	2.95e-10	4	0	0
222	07-10-03-02-19	3.13e-06	18	2.82e-10	18	0	0
223	07-10-03-05	4.20e-06	39	4.09e-07	39	0	0
224	07-10-03-35-03	4.34e-07	7	1.08e-08	7	0	0
225	07-10-21-01-10	3.81e-08	3	3.81e-11	3	0	0
226	07-10-21-01-19	4.03e-07	7	3.63e-11	7	0	0
227	07-10-21-02-10	3.81e-08	3	3.81e-11	3	0	0
228	07-10-21-02-19	4.03e-07	7	3.63e-11	7	0	0
229	07-10-21-05	5.00e-07	10	3.16e-08	10	0	0
230	07-10-21-35-03	4.79e-08	3	0	3	0	0
231	07-11-01-18	7.14e-07	3	7.14e-10	3	0	0
232	07-11-01-27	6.44e-06	4	5.80e-07	4	4.96e-07	3
233	07-11-03-01-19	4.78e-08	3	4.30e-12	3	0	0
234	07-11-03-02-19	4.78e-08	3	4.30e-12	3	0	0
235	07-11-03-05	6.93e-08	6	4.50e-09	6	0	0
236	07-11-21-01-19	7.85e-08	2	7.06e-12	2	0	0
237	07-11-21-02-19	7.85e-08	2	7.06e-12	2	0	0
238	07-11-21-03-19	7.85e-08	4	7.06e-12	4	0	0
239	07-11-21-05	9.57e-07	6	6.22e-08	6	0	0
240	07-11-21-35-03	1.03e-07	1	0	1	0	0
241	07-13-39	5.90e-08	4	5.90e-11	4	0	0

Table 12.2.24 Results from Quantification of E1T Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
242	07-13-67	5.31e-07	4	3.56e-11	4	0	0
243	07-18-39	6.39e-08	4	6.39e-11	4	0	0
244	07-18-67	5.75e-07	4	3.85e-11	4	0	0
245	07-22-04-27	1.07e-07	2	9.59e-09	2	0	0
246	07-23-12-05	1.41e-06	4	1.41e-06	4	0	0
247	07-23-35-05	1.50e-07	1	1.50e-07	1	0	0
248	07-24-01-19	1.27e-07	4	1.15e-11	4	0	0
249	07-24-02-19	1.27e-07	4	1.15e-11	4	0	0
250	07-24-03-19	1.27e-07	8	1.15e-11	8	0	0
251	07-24-05	1.55e-06	12	1.01e-07	12	0	0
252	07-24-12-05	1.60e-07	1	1.60e-07	1	0	0
253	07-24-35-03	1.68e-07	2	0	2	0	0
254	07-24-35-05	1.89e-08	1	1.89e-08	1	0	0
255	07-50-1-01-10	9.06e-06	33	9.06e-09	33	0	0
256	07-50-1-01-19	8.44e-05	87	7.59e-09	87	0	0
257	07-50-1-02-10	9.11e-06	35	9.11e-09	35	0	0
258	07-50-1-02-19	8.57e-05	123	7.71e-09	123	0	0
259	07-50-1-03-10	8.39e-06	40	8.39e-09	40	0	0
260	07-50-1-03-19	8.00e-05	186	7.20e-09	186	0	0
261	07-50-1-05	6.96e-04	156	4.47e-05	156	0	0
262	07-50-1-12-05	1.51e-06	4	1.51e-06	4	0	0
263	07-50-1-35-01-10	1.05e-06	20	1.05e-09	20	0	0
264	07-50-1-35-01-19	9.43e-06	33	8.49e-10	33	0	0
265	07-50-1-35-03	7.85e-05	24	5.31e-07	24	0	0
266	07-50-1-35-04	1.95e-06	3	1.95e-06	3	0	3
267	07-50-1-35-05	1.61e-07	1	1.61e-07	1	0	0
268	07-50-2	3.92e-07	3	3.92e-07	3	1.94e-08	1

Sequence Quantification

Table 12.2.24 Results from Quantification of EIT Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
269	07-51-35-01-10	2.50e-07	2	2.50e-10	2	0	0
270	07-51-35-01-19	3.32e-06	22	2.99e-10	22	0	0
271	07-51-35-03	2.83e-05	22	1.88e-07	22	0	0
272	07-51-35-04	7.04e-07	3	7.04e-07	3	0	0
273	07-51-35-05	5.78e-08	1	5.78e-08	1	0	0
274	07-51-36	2.66e-07	1	2.66e-07	1	1.41e-08	1
275	09-02-39	2.97e-08	2	2.97e-11	2	0	0
276	09-02-67	2.67e-07	2	1.79e-11	2	0	0
277	09-07-39	3.22e-08	2	3.22e-11	2	0	0
278	09-07-67	2.90e-07	2	1.94e-11	2	0	0
279	09-11-01-27	5.37e-08	1	4.83e-09	1	0	0
280	09-23-12-05	1.13e-08	1	1.13e-08	1	0	0
281	09-50-1-01-10	5.37e-08	2	5.37e-11	2	0	0
282	09-50-1-01-19	6.61e-07	15	5.95e-11	15	0	0
283	09-50-1-02-10	5.37e-08	2	5.37e-11	2	0	0
284	09-50-1-02-19	6.61e-07	15	5.95e-11	15	0	0
285	09-50-1-03-10	5.37e-08	4	5.37e-11	4	0	0
286	09-50-1-03-19	4.83e-07	4	4.35e-11	4	0	0
287	09-50-1-05	5.55e-06	4	3.59e-07	4	0	0
288	09-50-1-12-05	1.21e-08	1	1.21e-08	1	0	0
289	09-50-1-35-01-19	6.25e-08	2	5.63e-12	2	0	0
290	09-50-1-35-03	6.36e-07	1	0	1	0	0
291	09-50-1-35-04	1.63e-08	1	1.63e-08	1	0	0
292	09-51-35-01-19	8.88e-08	2	7.99e-12	2	0	0
293	09-51-35-03	1.01e-06	1	0	1	0	0
294	09-51-35-04	2.59e-08	1	2.59e-08	1	0	0
295	09-51-36	1.05e-08	1	1.05e-08	1	0	0

Table 12.2.24 Results from Quantification of E1T Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
296	10-08-02-67	2.44e-08	2	1.63e-12	2	0	0
297	10-08-02-68-04	2.09e-09	6	6.70e-11	6	0	0
298	10-08-07-67	2.64e-08	2	1.77e-12	2	0	0
299	10-08-07-68-04	2.27e-09	6	7.25e-11	6	0	0
300	10-08-51-29-03	3.61e-08	1	9.03e-09	1	0	0
301	10-15-02-67	4.15e-08	2	2.78e-12	2	0	0
302	10-15-02-68-04	3.56e-09	6	1.14e-10	6	0	0
303	10-15-07-67	4.50e-08	2	3.01e-12	2	0	0
304	10-15-07-68-04	3.86e-09	6	1.24e-10	6	0	0
305	10-15-51-29-03	6.15e-08	1	1.54e-08	1	0	0
306	14-02-67	1.36e-07	2	9.13e-12	2	0	0
307	14-07-67	1.48e-07	2	9.89e-12	2	0	0
308	14-11-01-27	2.83e-08	1	2.54e-09	1	0	0
309	14-50-1-02-10	2.83e-08	2	2.83e-11	2	0	0
310	14-50-1-02-19	2.76e-07	4	2.48e-11	4	0	0
311	14-50-1-04	3.14e-06	2	1.01e-07	2	0	0
312	14-50-1-29-03	3.64e-07	2	9.09e-08	2	0	0
313	14-51-29-03	1.31e-07	2	3.27e-08	2	0	0
314	17-52-23	3.81e-08	2	3.81e-08	2	0	0
315	SEQ-001919	7.94e-08	2	7.15e-12	2	0	0
316	SEQ-001921	7.94e-08	4	7.15e-12	4	0	0
317	SEQ-002199	8.60e-08	2	7.74e-12	2	0	0
318	SEQ-002201	8.60e-08	4	7.74e-12	4	0	0
319	SEQ-003835	1.35e-07	2	1.22e-11	2	0	0
320	SEQ-003837	1.35e-07	4	1.22e-11	4	0	0
321	SEQ-004115	1.47e-07	2	1.32e-11	2	0	0
322	SEQ-004117	1.47e-07	4	1.32e-11	4	0	0

Sequence Quantification

Table 12.2.24 Results from Quantification of E1T Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
323	SEQ-004793	9.88e-08	3	8.89e-12	3	0	0
324	SEQ-004799	3.43e-08	3	3.09e-12	3	0	0
325	SEQ-004816	4.79e-08	3	4.79e-11	3	0	0
326	SEQ-004817	5.06e-07	7	4.56e-11	7	0	0
327	SEQ-004823	1.07e-07	3	9.63e-12	3	0	0
328	SEQ-004829	3.72e-08	3	3.35e-12	3	0	0
329	SEQ-004846	5.18e-08	3	5.18e-11	3	0	0
330	SEQ-004847	5.48e-07	7	4.94e-11	7	0	0
331	SEQ-004895	9.89e-08	2	8.90e-12	2	0	0
332	SEQ-004901	3.44e-08	2	3.09e-12	2	0	0
333	SEQ-004907	2.84e-07	4	2.55e-11	4	0	0
334	SEQ-004919	3.45e-07	3	3.11e-11	3	0	0
335	SEQ-004925	1.07e-07	2	9.64e-12	2	0	0
336	SEQ-004931	3.72e-08	2	3.35e-12	2	0	0
337	SEQ-004936	3.16e-08	3	3.16e-11	3	0	0
338	SEQ-004937	3.07e-07	4	2.77e-11	4	0	0
339	SEQ-004949	3.97e-08	3	3.57e-12	3	0	0
340	SEQ-005097	6.54e-08	6	5.88e-12	6	0	0
341	SEQ-005103	7.08e-08	6	6.37e-12	6	0	0
342	SEQ-005109	1.11e-07	6	1.00e-11	6	0	0
343	SEQ-005115	1.21e-07	6	1.09e-11	6	0	0
Totals		2.42e-03	4483	8.53e-05	4483	8.259E-07	14

Table 12.2.25 Results from Quantification of E1V Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	03-05-81-35-03	6.79e-07	5	1.70e-07	5	1.70e-07	5
2	03-16-81-35-03	1.02e-08	1	2.56e-09	1	0	0
3	03-37-28-02-67	2.49e-08	2	1.67e-12	2	0	0
4	03-37-28-07-67	2.70e-08	2	1.81e-12	2	0	0
5	03-38-02-67	2.50e-08	2	1.68e-12	2	0	0
6	03-38-07-67	2.71e-08	2	1.82e-12	2	0	0
7	03-38-81-35-03	1.20e-06	9	3.01e-07	9	2.89e-07	5
8	03-38-81-35-04	1.24e-08	1	1.24e-08	1	0	0
9	04-32-81-35-03	1.26e-08	1	3.14e-09	1	0	0
10	04-48-81-35-03	2.12e-08	1	5.29e-09	1	0	0
11	06-02-67	8.93e-06	53	1.66e-11	53	0	0
12	06-05-01-27	5.13e-08	1	4.62e-09	1	0	0
13	06-05-03-01-19	7.57e-08	3	6.82e-12	3	0	0
14	06-05-03-02-19	7.57e-08	3	6.82e-12	3	0	0
15	06-05-03-05	9.15e-08	6	5.94e-09	6	0	0
16	06-07-67	9.68e-06	53	1.80e-11	53	0	0
17	06-10-01-27	5.56e-08	1	5.01e-09	1	0	0
18	06-10-03-01-19	8.20e-08	3	7.38e-12	3	0	0
19	06-10-03-02-19	8.20e-08	3	7.38e-12	3	0	0
20	06-10-03-05	9.91e-08	6	6.44e-09	6	0	0
21	08-02-39	3.14e-07	2	3.14e-10	2	0	0
22	08-02-67	4.18e-06	22	2.80e-10	22	0	0
23	08-02-68-01-19	8.08e-08	2	7.27e-12	2	0	0
24	08-02-68-02-19	1.35e-07	4	1.21e-11	4	0	0
25	08-02-68-03-19	8.08e-08	4	7.27e-12	4	0	0
26	08-02-68-05	1.35e-07	8	7.89e-09	8	0	0
27	08-02-70-01-19	2.81e-08	2	2.53e-12	2	0	0

Sequence Quantification

Table 12.2.25 Results from Quantification of E1V Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
28	08-02-70-02-19	2.81e-08	2	2.53e-12	2	0	0
29	08-05-03-01-19	2.32e-07	4	2.09e-11	4	0	0
30	08-05-03-02-19	2.59e-07	5	2.33e-11	5	0	0
31	08-05-03-05	3.04e-07	9	1.92e-08	9	0	0
32	08-07-39	3.40e-07	2	3.40e-10	2	0	0
33	08-07-67	4.53e-06	22	3.04e-10	22	0	0
34	08-07-68-01-19	8.75e-08	2	7.88e-12	2	0	0
35	08-07-68-02-19	1.46e-07	4	1.31e-11	4	0	0
36	08-07-68-03-19	8.75e-08	4	7.88e-12	4	0	0
37	08-07-68-05	1.46e-07	8	8.54e-09	8	0	0
38	08-07-70-01-19	3.04e-08	2	2.74e-12	2	0	0
39	08-07-70-02-19	3.04e-08	2	2.74e-12	2	0	0
40	08-10-03-01-19	2.51e-07	4	2.26e-11	4	0	0
41	08-10-03-02-19	2.80e-07	5	2.52e-11	5	0	0
42	08-10-03-05	3.29e-07	9	2.08e-08	9	0	0
43	08-10-03-35-03	3.25e-08	3	0	3	0	0
44	08-10-21-01-19	3.24e-08	3	2.92e-12	3	0	0
45	08-10-21-02-19	3.24e-08	3	2.92e-12	3	0	0
46	08-11-01-18	6.30e-08	1	6.30e-11	1	0	0
47	08-11-01-27	6.07e-07	3	5.46e-08	3	4.40e-08	1
48	08-11-21-05	8.45e-08	2	5.49e-09	2	0	0
49	08-13-67	5.01e-08	4	3.36e-12	4	0	0
50	08-18-67	5.43e-08	4	3.64e-12	4	0	0
51	08-39-05	1.37e-07	4	8.91e-09	4	0	0
52	08-80-1-01-10	8.32e-07	20	8.32e-10	20	0	0
53	08-80-1-01-19	7.72e-06	34	6.94e-10	34	0	0
54	08-80-1-02-10	8.32e-07	20	8.32e-10	20	0	0

Table 12.2.25 Results from Quantification of E1V Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
55	08-80-1-02-19	7.76e-06	36	6.98e-10	36	0	0
56	08-80-1-03-10	5.67e-07	4	5.67e-10	4	0	0
57	08-80-1-03-19	7.12e-06	38	6.40e-10	38	0	0
58	08-80-1-05	6.55e-05	62	4.20e-06	62	0	0
59	08-80-1-35-01-10	6.55e-08	2	6.55e-11	2	0	0
60	08-80-1-35-01-19	8.66e-07	20	7.79e-11	20	0	0
61	08-80-1-35-03	7.30e-06	8	2.18e-08	8	0	0
62	08-80-1-35-04	1.72e-07	1	1.72e-07	1	0	0
63	08-80-1-35-05	1.52e-08	1	1.52e-08	1	0	0
64	08-80-2	3.46e-08	1	3.46e-08	1	0	0
65	08-81-35-01-10	2.36e-08	2	2.36e-11	2	0	0
66	08-81-35-01-19	2.12e-07	2	1.91e-11	2	0	0
67	08-81-35-03	2.61e-06	4	4.84e-09	4	0	0
68	08-81-35-04	6.21e-08	1	6.21e-08	1	1.55e-08	1
69	08-81-36	2.51e-08	1	2.51e-08	1	0	0
70	10-02-39	1.59e-07	2	1.59e-10	2	0	0
71	10-02-67	1.96e-06	15	1.31e-10	15	0	0
72	10-02-68-01-19	4.09e-08	2	3.68e-12	2	0	0
73	10-02-68-02-19	4.09e-08	2	3.68e-12	2	0	0
74	10-02-68-03-19	2.46e-08	2	2.21e-12	2	0	0
75	10-02-68-05	2.46e-08	2	1.60e-09	2	0	0
76	10-05-03-01-19	1.09e-07	3	9.78e-12	3	0	0
77	10-05-03-02-19	1.09e-07	3	9.78e-12	3	0	0
78	10-05-03-05	1.31e-07	6	8.53e-09	6	0	0
79	10-07-39	1.72e-07	2	1.72e-10	2	0	0
80	10-07-67	2.14e-06	17	1.43e-10	17	0	0
81	10-07-68-01-19	4.43e-08	2	3.99e-12	2	0	0
82	10-07-68-02-19	4.43e-08	2	3.99e-12	2	0	0

Sequence Quantification

Table 12.2.25 Results from Quantification of E1V Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
83	10-07-68-03-19	2.66e-08	2	2.39e-12	2	0	0
84	10-07-68-05	2.66e-08	2	1.73e-09	2	0	0
85	10-10-03-01-19	1.18e-07	3	1.06e-11	3	0	0
86	10-10-03-02-19	1.18e-07	3	1.06e-11	3	0	0
87	10-10-03-05	1.42e-07	6	9.25e-09	6	0	0
88	10-11-01-18	3.19e-08	1	3.19e-11	1	0	0
89	10-11-01-27	2.87e-07	1	2.58e-08	1	2.23e-08	1
90	10-11-21-05	4.28e-08	2	2.78e-09	2	0	0
91	10-23-12-05	6.06e-08	1	6.06e-08	1	0	0
92	10-39-05	6.95e-08	4	4.52e-09	4	0	0
93	10-80-1-01-10	2.87e-07	2	2.87e-10	2	0	0
94	10-80-1-01-19	3.57e-06	17	3.21e-10	17	0	0
95	10-80-1-02-10	2.87e-07	2	2.87e-10	2	0	0
96	10-80-1-02-19	3.59e-06	19	3.23e-10	19	0	0
97	10-80-1-03-10	2.87e-07	4	2.87e-10	4	0	0
98	10-80-1-03-19	3.33e-06	25	3.00e-10	25	0	0
99	10-80-1-05	3.07e-05	37	1.98e-06	37	0	0
100	10-80-1-35-03	3.45e-06	4	3.24e-08	4	0	0
101	10-80-1-35-04	8.73e-08	1	8.73e-08	1	0	0
102	10-80-2	1.75e-08	1	1.75e-08	1	0	0
103	10-81-35-01-10	5.28e-08	2	5.28e-11	2	0	0
104	10-81-35-01-19	6.50e-07	15	5.85e-11	15	0	0
105	10-81-35-03	5.50e-06	5	2.17e-08	5	1.08e-08	1
106	10-81-35-04	1.39e-07	1	1.39e-07	1	3.47e-08	1
107	10-81-35-05	1.22e-08	1	1.22e-08	1	0	0
108	10-81-36	5.61e-08	1	5.61e-08	1	1.40e-08	1
109	15-81-29-03	1.03e-07	9	8.55e-09	9	0	0
Totals		1.94e-04	801	7.65e-06	801	6.000E-07	16

Table 12.2.26 Results from Quantification of TIHP Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	02-03-02-39	2.02e-08	2	2.02e-11	2	0	0
2	02-03-02-67	3.70e-07	13	2.48e-11	13	0	0
3	02-03-05-03-05	1.13e-07	3	7.35e-09	3	0	0
4	02-03-07-39	2.19e-08	2	2.19e-11	2	0	0
5	02-03-07-67	4.00e-07	13	2.68e-11	13	0	0
6	02-03-10-03-05	1.23e-07	3	7.97e-09	3	0	0
7	06-1-02-67	4.00e-08	2	2.68e-12	2	0	0
8	06-1-07-67	4.33e-08	2	2.90e-12	2	0	0
9	06-1-51-05	3.73e-08	2	2.43e-09	2	0	0
10	11-2-02-67	7.46e-08	2	5.00e-12	2	0	0
11	11-2-07-67	8.09e-08	2	5.42e-12	2	0	0
12	SEQ-000007	1.05e-08	1	9.48e-13	1	0	0
13	SEQ-000028	1.73e-07	5	4.31e-08	5	0	0
14	SEQ-000073	2.41e-08	1	6.02e-09	1	0	0
15	SEQ-000118	2.94e-07	5	7.34e-08	5	0	0
16	SEQ-000163	4.10e-08	1	1.03e-08	1	0	0
17	SEQ-000187	1.12e-08	1	1.01e-12	1	0	0
18	SEQ-000210	1.00e-07	2	9.01e-12	2	0	0
19	SEQ-000214	1.11e-07	3	1.00e-11	3	0	0
20	SEQ-000237	1.17e-08	1	1.06e-12	1	0	0
21	SEQ-000241	1.17e-08	1	1.06e-12	1	0	0
22	SEQ-000268	1.21e-08	1	1.09e-12	1	0	0
23	SEQ-000289	1.01e-08	1	1.01e-11	1	0	0
24	SEQ-000291	1.08e-07	2	9.76e-12	2	0	0
25	SEQ-000293	1.01e-08	1	1.01e-11	1	0	0
26	SEQ-000295	1.21e-07	3	1.09e-11	3	0	0
27	SEQ-000318	1.27e-08	1	1.14e-12	1	0	0
28	SEQ-000322	1.27e-08	1	1.14e-12	1	0	0
TOTAL		2.40e-06	77	1.51e-07	77	0	0

Sequence Quantification

Table 12.2.27 Results from Quantification of TIOF Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	02-03-02-39	2.84e-08	2	2.84e-11	2	0	0
2	02-03-02-67	6.09e-07	20	4.08e-11	20	0	0
3	02-03-05-03-05	1.81e-07	5	1.21e-08	5	0	0
4	02-03-05-21-05	1.19e-08	1	7.76e-10	1	0	0
5	02-03-07-39	3.08e-08	2	3.08e-11	2	0	0
6	02-03-07-67	6.59e-07	20	4.42e-11	20	0	0
7	02-03-07-69-05	1.02e-08	1	1.02e-08	1	0	0
8	02-03-10-03-05	1.96e-07	5	1.31e-08	5	0	0
9	02-03-10-21-05	1.29e-08	1	8.40e-10	1	0	0
10	03-01-38-07-67	2.15e-08	2	1.44e-12	2	0	0
11	04-02-39	2.55e-07	2	2.55e-10	2	0	0
12	04-02-67	3.17e-06	17	2.12e-10	17	0	0
13	04-02-68-01-19	6.50e-08	2	5.85e-12	2	0	0
14	04-02-68-02-19	6.50e-08	2	5.85e-12	2	0	0
15	04-02-68-03-19	6.50e-08	4	5.85e-12	4	0	0
16	04-02-68-05	6.50e-08	4	4.22e-09	4	0	0
17	04-02-70-01-19	2.26e-08	2	2.03e-12	2	0	0
18	04-02-70-02-19	2.26e-08	2	2.03e-12	2	0	0
19	04-05-03-01-19	1.88e-07	4	1.69e-11	4	0	0
20	04-05-03-02-19	1.88e-07	4	1.69e-11	4	0	0
21	04-05-03-05	2.21e-07	7	9.27e-10	7	0	0
22	04-07-39	2.76e-07	2	2.76e-10	2	0	0
23	04-07-67	3.43e-06	17	2.96e-10	17	0	0
24	04-07-68-01-19	7.04e-08	2	6.34e-12	2	0	0
25	04-07-68-02-19	7.04e-08	2	6.34e-12	2	0	0
26	04-07-68-03-19	7.04e-08	4	6.34e-12	4	0	0
27	04-07-68-05	7.04e-08	4	4.58e-09	4	0	0

Table 12.2.27 Results from Quantification of TIOF Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
28	04-07-70-01-19	2.45e-08	2	2.20e-12	2	0	0
29	04-07-70-02-19	2.45e-08	2	2.20e-12	2	0	0
30	04-10-03-01-19	2.04e-07	4	1.84e-11	4	0	0
31	04-10-03-02-19	2.04e-07	4	1.84e-11	4	0	0
32	04-10-03-05	2.39e-07	7	1.00e-09	7	0	0
33	04-11-01-18	5.07e-08	1	5.07e-11	1	0	0
34	04-11-01-27	4.56e-07	1	4.10e-08	1	0	0
35	04-11-21-05	6.79e-08	2	4.42e-09	2	0	0
36	04-23-12-05	7.56e-08	1	7.56e-08	1	0	0
37	04-24-05	2.97e-07	4	1.25e-09	4	0	0
38	04-24-12-05	3.27e-08	1	3.27e-08	1	0	0
39	04-51-01-10	2.21e-08	2	2.21e-11	2	0	0
40	04-51-01-19	1.99e-07	2	1.79e-11	2	0	0
41	04-51-02-10	2.21e-08	2	2.21e-11	2	0	0
42	04-51-02-19	1.99e-07	2	1.79e-11	2	0	0
43	04-51-03-19	1.99e-07	4	1.79e-11	4	0	0
44	04-51-05	2.28e-06	3	1.48e-07	3	0	0
45	09-1-13-10	9.15e-08	2	9.15e-11	2	0	0
46	09-1-13-19	8.67e-07	4	7.80e-11	4	0	0
47	09-1-14-10	9.15e-08	2	9.15e-11	2	0	0
48	09-1-14-19	8.67e-07	4	7.80e-11	4	0	0
49	09-1-15-10	9.15e-08	4	9.15e-11	4	0	0
50	09-1-15-19	8.49e-07	6	7.64e-11	6	0	0
51	09-1-17	4.97e-07	2	2.09e-09	2	0	0
52	09-1-36	5.89e-08	1	5.89e-08	1	0	0
53	09-2	2.93e-08	1	2.93e-08	1	0	0
54	14-2-02-39	4.85e-07	4	4.85e-10	4	0	0
55	14-2-02-67	4.36e-06	4	2.92e-10	4	0	0

Sequence Quantification

Table 12.2.27 Results from Quantification of TIOF Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
56	14-2-02-68-01-19	1.21e-07	2	1.09e-11	2	0	0
57	14-2-02-68-02-19	1.21e-07	2	1.09e-11	2	0	0
58	14-2-02-68-03-19	1.21e-07	4	1.09e-11	4	0	0
59	14-2-02-68-05	1.21e-07	4	7.88e-09	4	0	0
60	14-2-02-70-01-19	4.21e-08	2	3.79e-12	2	0	0
61	14-2-02-70-02-19	4.21e-08	2	3.79e-12	2	0	0
62	14-2-02-70-03-19	2.53e-08	2	2.28e-12	2	0	0
63	14-2-02-70-05	2.53e-08	2	1.64e-09	2	0	0
64	14-2-07-39	5.25e-07	4	5.25e-10	4	0	0
65	14-2-07-67	4.73e-06	4	3.17e-10	4	0	0
66	14-2-07-68-01-19	1.31e-07	2	1.18e-11	2	0	0
67	14-2-07-68-02-19	1.31e-07	2	1.18e-11	2	0	0
68	14-2-07-68-03-19	1.31e-07	4	1.18e-11	4	0	0
69	14-2-07-68-05	1.31e-07	4	8.54e-09	4	0	0
70	14-2-07-70-01-19	4.57e-08	2	4.11e-12	2	0	0
71	14-2-07-70-02-19	4.57e-08	2	4.11e-12	2	0	0
72	14-2-07-70-03-19	2.74e-08	2	2.47e-12	2	0	0
73	14-2-07-70-05	2.74e-08	2	1.78e-09	2	0	0
74	14-2-11-01-27	4.51e-08	1	4.06e-09	1	0	0
75	14-2-18-67	6.27e-08	4	4.20e-12	4	0	0
76	14-2-39-01-19	4.87e-08	4	4.38e-12	4	0	0
77	14-2-39-02-19	4.87e-08	4	4.38e-12	4	0	0
78	14-2-81-01-10	4.13e-08	2	4.13e-11	2	0	0
79	14-2-81-01-19	3.72e-07	2	3.34e-11	2	0	0
80	14-2-81-02-10	4.13e-08	2	4.13e-11	2	0	0
81	14-2-81-02-19	3.72e-07	2	3.34e-11	2	0	0
82	14-2-81-03-10	2.48e-08	2	2.48e-11	2	0	0
83	14-2-81-03-19	3.72e-07	4	3.34e-11	4	0	0

Table 12.2.27 Results from Quantification of TIOF Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
84	14-2-81-05	2.24e-07	2	1.46e-08	2	0	0
85	19-1-13-19	8.14e-08	2	7.33e-12	2	0	0
86	19-1-14-19	8.14e-08	2	7.33e-12	2	0	0
87	19-1-15-19	8.14e-08	4	7.33e-12	4	0	0
88	19-1-17	4.92e-08	2	3.20e-09	2	0	0
89	SEQ-000003	1.37e-08	1	1.23e-12	1	0	0
90	SEQ-000007	1.48e-08	1	1.33e-12	1	0	0
91	SEQ-000076	2.42e-07	5	6.06e-08	5	0	0
92	SEQ-000169	3.38e-08	1	8.46e-09	1	0	0
93	SEQ-000262	4.13e-07	5	1.03e-07	5	0	0
94	SEQ-000355	5.76e-08	1	1.44e-08	1	0	0
95	SEQ-000406	1.57e-08	1	1.42e-12	1	0	0
96	SEQ-000454	1.31e-08	1	1.31e-11	1	0	0
97	SEQ-000456	1.52e-07	3	1.37e-11	3	0	0
98	SEQ-000458	1.31e-08	1	1.31e-11	1	0	0
99	SEQ-000460	1.68e-07	4	1.51e-11	4	0	0
100	SEQ-000483	1.65e-08	1	1.48e-12	1	0	0
101	SEQ-000487	1.65e-08	1	1.48e-12	1	0	0
102	SEQ-000541	1.70e-08	1	1.53e-12	1	0	0
103	SEQ-000589	1.42e-08	1	1.42e-11	1	0	0
104	SEQ-000591	1.65e-07	3	1.49e-11	3	0	0
105	SEQ-000593	1.42e-08	1	1.42e-11	1	0	0
106	SEQ-000595	1.82e-07	4	1.64e-11	4	0	0
107	SEQ-000618	1.78e-08	1	1.61e-12	1	0	0
108	SEQ-000622	1.78e-08	1	1.61e-12	1	0	0
109	SEQ-000779	1.00e-08	1	2.51e-09	1	0	0
110	SEQ-000867	2.85e-08	2	7.12e-09	2	0	0
TOTALS		3.31e-05	346	6.83e-07	346	0	0

Sequence Quantification

Table 12.2.28 Results from Quantification of T1 Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	3-05-07-27-01-18	1.50e-07	3		3	0	0
2	3-05-07-27-01-27	1.45e-06	11		11	0	0
3	3-05-07-27-21-04	2.01e-07	3		3	0	0
4	3-05-08-02-12-04	2.82e-08	1		1	0	0
5	3-05-08-02-39	2.63e-06	9		9	0	0
6	3-05-08-02-40-04	6.49e-08	2		2	0	0
7	3-05-08-02-42-04	2.25e-08	2		2	0	0
8	3-05-08-02-67	2.39e-05	15		15	0	0
9	3-05-08-02-68-04	6.99e-07	9		9	0	0
10	3-05-08-02-70-04	2.03e-07	2		2	0	0
11	3-05-08-05-01-27	1.31e-08	1		1	0	0
12	3-05-08-05-03-04	3.37e-08	1		1	0	0
13	3-05-08-07-12-04	3.06e-08	1		1	0	0
14	3-05-08-07-14-04	1.06e-08	1		1	0	0
15	3-05-08-07-39	2.85e-06	9		9	0	0
16	3-05-08-07-40-04	7.03e-08	2		2	0	0
17	3-05-08-07-42-04	2.44e-08	2		2	0	0
18	3-05-08-07-67	2.59e-05	15		15	0	0
19	3-05-08-07-68-04	7.58e-07	9		9	0	0
20	3-05-08-07-70-04	2.20e-07	2		2	0	0
21	3-05-08-10-01-27	1.42e-08	1		1	0	0
22	3-05-08-10-03-04	3.65e-08	1		1	0	0
23	3-05-08-11-01-18	4.55e-07	1		1	0	0
24	3-05-08-11-01-27	4.10e-06	1		1	1.53e-8	1
25	3-05-08-11-03-04	3.94e-08	3		3	0	0
26	3-05-08-11-21-04	6.10e-07	1		1	0	0
27	3-05-08-13-67	2.76e-07	4		4	0	0

Table 12.2.28 Results from Quantification of T1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
28	3-05-08-18-67	2.99e-07	4		4	0	0
29	3-05-08-22-04-27	5.72e-08	2		2	0	0
30	3-05-08-23-10-05	7.10e-07	2		2	0	0
31	3-05-08-23-29-05	8.05e-08	1		1	0	0
32	3-05-08-24-02-19	2.34e-07	4		4	0	0
33	3-05-08-24-04	2.74e-06	6		6	0	0
34	3-05-08-24-10-05	3.07e-07	2		2	0	0
35	3-05-08-24-29-03	3.09e-07	2		2	0	0
36	3-05-08-24-29-05	3.48e-08	1		1	0	0
37	3-05-08-50-1-04	4.24e-04	7		7	0	0
38	3-05-08-50-2	2.50e-07	1		1	0	0
39	3-05-08-51-29-03	7.72e-05	1		1	0	0
40	3-05-08-51-29-04	1.98e-06	1		1	0	0
41	3-05-08-51-29-05	1.74e-07	1		1	0	0
42	3-05-08-51-29-06	2.58e-07	2		2	1.78e-8	1
43	3-05-08-51-29-15	2.08e-08	1		1	0	0
44	3-05-08-51-30	8.00e-07	1		1	0	0
45	3-05-14-11-03-04	1.46e-08	1		1	0	0
46	3-05-14-22-03-04	1.58e-08	1		1	0	0
47	3-05-14-27-01-18	2.56e-07	3		3	0	0
48	3-05-14-27-01-27	2.49e-06	13		13	0	0
49	3-05-14-27-04-27	2.45e-08	2		2	0	0
50	3-05-14-27-21-04	3.43e-07	3		3	0	0
51	3-05-15-02-12-04	4.80e-08	1		1	0	0
52	3-05-15-02-14-04	1.67e-08	1		1	0	0
53	3-05-15-02-39	4.48e-06	9		9	0	0
54	3-05-15-02-40-04	1.10e-07	2		2	0	0

Sequence Quantification

Table 12.2.28 Results from Quantification of T1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
55	3-05-15-02-42-04	3.84e-08	2		2	0	0
56	3-05-15-02-67	4.07e-05	15		15	0	0
57	3-05-15-02-68-04	1.19e-06	9		9	0	0
58	3-05-15-02-70-04	3.45e-07	2		2	0	0
59	3-05-15-05-01-27	2.24e-08	1		1	0	0
60	3-05-15-05-03-04	5.74e-08	1		1	0	0
61	3-05-15-07-12-04	5.20e-08	1		1	0	0
62	3-05-15-07-14-04	1.81e-08	1		1	0	0
63	3-05-15-07-39	4.89e-06	13		13	0	0
64	3-05-15-07-40-04	1.20e-07	2		2	0	0
65	3-05-15-07-42-04	4.16e-08	2		2	0	0
66	3-05-15-07-67	4.41e-05	15		15	0	0
67	3-05-15-07-68-04	1.29e-06	9		9	0	0
68	3-05-15-07-70-04	4.48e-07	9		9	0	0
69	3-05-15-10-01-27	2.42e-08	1		1	0	0
70	3-05-15-10-03-04	6.22e-08	1		1	0	0
71	3-05-15-11-01-18	7.75e-07	1		1	0	0
72	3-05-15-11-01-27	6.97e-06	1		1	2.60e-8	1
73	3-05-15-11-03-04	6.71e-08	3		3	0	0
74	3-05-15-11-21-04	1.04e-06	1		1	0	0
75	3-05-15-13-39	5.22e-08	4		4	0	0
76	3-05-15-13-67	4.69e-07	4		4	0	0
77	3-05-15-18-39	5.65e-08	4		4	0	0
78	3-05-15-18-67	5.09e-07	4		4	0	0
79	3-05-15-22-04-27	9.74e-08	2		2	0	0
80	3-05-15-23-10-05	1.21e-06	2		2	0	0
81	3-05-15-23-29-05	1.37e-07	1		1	0	0

Table 12.2.28 Results from Quantification of T1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
82	3-05-15-24-02-10	4.44e-08	4		4	0	0
83	3-05-15-24-02-19	3.99e-07	4		4	0	0
84	3-05-15-24-04	4.66e-06	6		6	0	0
85	3-05-15-24-10-05	5.23e-07	2		2	0	0
86	3-05-15-24-29-03	5.26e-07	2		2	0	0
87	3-05-15-24-29-05	5.93e-08	1		1	0	0
88	3-05-15-50-1-04	7.22e-04	7		7	0	0
89	3-05-15-50-2	4.25e-07	1		1	0	0
90	3-05-15-51-29-03	1.31e-04	1		1	4.04e-08	1
91	3-05-15-51-29-04	3.37e-06	1		1	0	0
92	3-05-15-51-29-05	3.10e-07	2		2	0	0
93	3-05-15-51-29-06	4.40e-07	2		2	3.03e-8	1
94	3-05-15-51-29-15	3.55e-08	1		1	0	0
95	3-05-15-51-30	1.36e-06	1		1	0	0
96	3-07-02-12-04	2.68e-07	10		10	0	0
97	3-07-02-12-29-03	2.05e-08	1		1	0	0
98	3-07-02-14-04	6.17e-08	1		1	0	0
99	3-07-02-39	1.62e-03	209		209	0	0
100	3-07-02-40-02-10	5.24e-07	12		12	0	0
101	3-07-02-40-04	5.24e-07	12		12	0	0
102	3-07-02-40-29-03	4.72e-08	2		2	0	0
103	3-07-02-42-02-10	1.42e-07	2		2	0	0
104	3-07-02-42-04	1.42e-07	2		2	0	0
105	3-07-02-67	1.39e-02	320		320	0	0
106	3-07-02-68-02-19	4.75e-06	14		14	0	0
107	3-07-02-68-04	4.75e-06	14		14	0	0
108	3-07-02-68-29-03	5.45e-07	12		12	0	0

Sequence Quantification

Table 12.2.28 Results from Quantification of T1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
109	3-07-02-68-29-06	1.23e-08	1		1	0	0
110	3-07-02-70-02-19	1.64e-06	12		12	0	0
111	3-07-02-70-04	1.64e-06	12		12	0	0
112	3-07-02-70-29-03	1.48e-07	2		2	0	0
113	3-07-05-01-18	4.49e-08	1		1	0	0
114	3-07-05-01-27	6.20e-07	14		14	0	0
115	3-07-05-03-04	1.03e-06	18		18	0	0
116	3-07-05-03-29-03	3.91e-08	2		2	0	0
117	3-07-05-03-29-06	1.49e-08	1		1	0	0
118	3-07-05-21-02-19	4.99e-08	1		1	0	0
119	3-07-05-21-04	1.20e-07	4		4	0	0
120	3-07-07-12-04	2.90e-07	10		10	0	0
121	3-07-07-12-29-03	2.22e-08	1		1	0	0
122	3-07-07-14-04	6.69e-08	1		1	0	0
123	3-07-07-39	1.75e-03	215		215	0	0
124	3-07-07-40-04	5.68e-07	12		12	0	0
125	3-07-07-40-29-03	5.12e-08	2		2	0	0
126	3-07-07-42-04	1.54e-07	2		2	0	0
127	3-07-07-67	1.50e-02	320		320	0	0
128	3-07-07-68-04	5.15e-06	14		14	0	0
129	3-07-07-68-29-03	5.91e-07	12		12	0	0
130	3-07-07-68-29-06	1.34e-08	1		1	0	0
131	3-07-07-70-04	1.78e-06	12		12	0	0
132	3-07-07-70-29-03	1.60e-07	2		2	0	0
133	3-07-10-01-18	4.87e-08	1		1	0	0
134	3-07-10-01-27	6.71e-07	14		14	0	0
135	3-07-10-03-04	1.12e-06	18		18	0	0

Table 12.2.28 Results from Quantification of T1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
136	3-07-10-03-29-03	4.23e-08	2		2	0	0
137	3-07-10-03-29-06	1.62e-08	1		1	0	0
138	3-07-10-21-02-19	5.41e-08	1		1	0	0
139	3-07-10-21-04	1.30e-07	4		4	0	0
140	3-07-11-01-18	2.87e-06	1		1	0	0
141	3-07-11-01-27	2.64e-05	9		9	0	0
142	3-07-11-21-02-10	3.75e-08	2		2	0	0
143	3-07-11-21-02-19	3.37e-07	2		2	0	0
144	3-07-11-21-04	3.96e-06	11		11	0	0
145	3-07-11-21-29-03	4.44e-07	1		1	0	0
146	3-07-11-21-29-04	1.14e-08	1		1	0	0
147	3-07-13-39	2.92e-05	126		126	0	0
148	3-07-13-67	2.66e-04	294		294	0	0
149	3-07-13-68-02-19	6.53e-08	4		4	0	0
150	3-07-13-68-04	6.53e-08	4		4	0	0
151	3-07-18-39	3.16e-05	126		126	0	0
152	3-07-18-67	2.88e-04	294		294	0	0
153	3-07-18-68-02-19	7.07e-08	4		4	0	0
154	3-07-18-68-04	7.07e-08	4		4	0	0
155	3-07-22-04-18	5.09e-08	2		2	0	0
156	3-07-22-04-27	4.58e-07	2		2	0	0
157	3-07-22-06-04	4.95e-07	2		2	0	0
158	3-07-22-21-04	6.83e-08	2		2	0	0
159	3-07-23-10-05	5.80e-06	9		9	0	0
160	3-07-23-10-06	1.63e-08	1		1	0	0
161	3-07-23-29-05	5.19e-06	2		2	0	0
162	3-07-24-04	6.39e-06	6		6	0	0

Sequence Quantification

Table 12.2.28 Results from Quantification of T1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
163	3-07-24-10-05	7.17e-07	2		2	0	0
164	3-07-24-29-03	7.21e-07	2		2	0	0
165	3-07-24-29-05	8.14e-08	1		1	0	0
166	3-07-50-1-02-19	3.46e-04	82		82	0	0
167	3-07-50-1-10-05	6.21e-06	9		9	0	0
168	3-07-50-1-10-06	1.75e-08	1		1	0	0
169	3-07-50-1-29-03	3.14e-04	35		35	0	0
170	3-07-50-1-29-04	8.01e-06	8		8	0	0
171	3-07-50-1-29-05	7.22e-07	2		2	0	0
172	3-07-50-1-29-06	1.11e-06	5		5	0	0
173	3-07-50-1-29-09	7.74e-08	1		1	0	0
174	3-07-50-2	1.57e-06	1		1	0	0
175	3-07-51-29-03	1.13e-04	33		33	0	0
176	3-07-51-29-04	2.82e-06	1		1	0	0
177	3-07-51-29-05	2.60e-07	2		2	0	0
178	3-07-51-29-06	4.34e-07	8		8	0	0
179	3-07-51-29-15	2.97e-08	1		1	0	0
180	3-07-51-30	1.14e-06	1		1	0	0
181	3-08-02-39	1.22e-06	21		21	0	0
182	3-08-02-67	1.10e-05	21		21	0	0
183	3-08-02-68-04	2.79e-09	2		2	0	0
184	3-08-07-39	1.32e-06	21		21	0	0
185	3-08-07-67	1.19e-05	21		21	0	0
186	3-08-07-68-04	3.03e-09	2		2	0	0
187	3-08-11-01-27	1.96e-08	1		1	0	0
188	3-08-11-03-04	2.12e-08	1		1	0	0
189	3-08-50-1-02	2.03e-08	1		1	0	0

Table 12.2.28 Results from Quantification of T1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
190	3-08-50-1-02-19	1.76e-07	2		2	0	0
191	3-08-51-29-03	3.70e-07	1		1	0	0
192	3-09-01-02-23	3.12e-07	7		7	0	0
193	3-09-01-03-23	9.09e-08	2		2	0	0
194	3-09-01-12	1.15e-05	22		22	0	0
195	3-09-01-13-23	3.58e-07	7		7	0	0
196	3-09-01-14-23	1.04e-07	2		2	0	0
197	3-09-01-23	1.04e-04	27		27	0	0
198	3-09-01-24-23	3.36e-06	11		11	3.98e-8	2
199	3-09-01-25-23	1.15e-06	9		9	0	0
200	3-09-02-21-03	1.00e-06	14		14	0	0
201	3-09-02-21-23	1.05e-07	8		8	0	0
202	3-09-04-02-23	3.38e-07	7		7	0	0
203	3-09-04-03-23	9.84e-08	2		2	0	0
204	3-09-04-12	1.24e-05	22		22	0	0
205	3-09-04-13-23	3.88e-07	7		7	0	0
206	3-09-04-14-23	1.13e-07	2		2	0	0
207	3-09-04-23	1.12e-04	27		27	0	0
208	3-09-04-24-23	3.64e-06	11		11	4.31e-8	2
209	3-09-04-25-23	1.25e-06	9		9	1.01e-8	1
210	3-09-05-21-03	1.09e-06	14		14	0	0
211	3-09-05-21-23	1.14e-07	8		8	0	0
212	3-09-07-21-23	2.30e-07	2		2	0	0
213	3-09-08-12	1.27e-07	4		4	0	0
214	3-09-08-23	1.39e-06	16		16	0	0
215	3-09-08-24-23	2.32e-08	2		2	0	0
216	3-09-11-12	1.38e-07	4		4	0	0

Sequence Quantification

Table 12.2.28 Results from Quantification of T1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
217	3-09-11-23	1.50e-06	16		16	0	0
218	3-09-11-24-23	2.52e-08	2		2	0	0
219	3-09-15-04	2.98e-07	2		2	0	0
220	3-09-16-04	1.29e-07	2		2	0	0
221	3-09-16-23	1.39e-07	4		4	0	0
222	3-09-34-12	9.18e-08	2		2	0	0
223	3-09-34-23	1.01e-06	9		9	0	0
224	3-09-34-24-26	2.73e-08	2		2	0	0
225	3-09-37-12	9.95e-08	2		2	0	0
226	3-09-37-23	1.10e-06	9		9	0	0
227	3-09-37-24-14-24	2.65e-08	2		2	0	0
228	3-09-37-24-26	2.96e-08	2		2	0	0
229	3-09-52-23	4.41e-05	26		26	1.79e-6	12
230	3-09-52-26	4.19e-07	7		7	0	0
231	3-12-02-67	1.08e-06	42		42	0	0
232	3-12-05-67	1.17e-06	42		42	0	0
233	3-13-35-01-10	4.75e-09	8		8	0	0
234	3-13-35-01-19	4.60e-08	16		16	0	0
235	3-13-35-03	3.87e-07	7		7	0	0
236	3-13-35-23-01	3.75e-08	2		2	0	0
237	3-14	8.82e-05	114		114	3.21e-6	28
238	5-06-07-27-01-18	1.08e-08	1		1	0	0
239	5-06-07-27-01-27	1.27e-07	3		3	0	0
240	5-06-07-27-21-04	1.45e-08	1		1	0	0
241	5-06-08-02-39	3.39e-07	3		3	0	0
242	5-06-08-02-67	3.45e-06	10		10	0	0
243	5-06-08-02-68-04	6.01e-08	2		2	0	0

Table 12.2.28 Results from Quantification of T1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
244	5-06-08-02-70-04	2.09e-08	2		2	0	0
245	5-06-08-07-39	3.67e-07	3		3	0	0
246	5-06-08-07-67	3.74e-06	10		10	0	0
247	5-06-08-07-68-04	6.51e-08	2		2	0	0
248	5-06-08-07-70-04	2.26e-08	2		2	0	0
249	5-06-08-11-01-18	4.69e-08	1		1	0	0
250	5-06-08-11-01-27	4.22e-07	1		1	0	0
251	5-06-08-11-21-04	6.29e-08	1		1	0	0
252	5-06-08-23-10-05	8.90e-08	1		1	0	0
253	5-06-08-23-29-05	1.06e-08	1		1	0	0
254	5-06-08-39-04	1.02e-07	2		2	0	0
255	5-06-08-39-10-05	1.12e-08	1		1	0	0
256	5-06-08-80-1-04	4.37e-05	4		4	0	0
257	5-06-08-80-2	2.57e-08	1		1	0	0
258	5-06-08-81-29-03	3.11e-06	1		1	3.19e-8	1
259	5-06-08-81-29-04	7.99e-08	1		1	0	0
260	5-06-14-27-01-18	1.84e-08	1		1	0	0
261	5-06-14-27-01-27	2.17e-07	3		3	0	0
262	5-06-14-27-21-04	2.46e-08	1		1	0	0
263	5-06-15-02-68-04	1.02e-07	2		2	0	0
264	5-06-15-02-70-04	3.56e-08	2		2	0	0
265	5-06-15-07-68-04	1.11e-07	2		2	0	0
266	5-06-15-07-70-04	3.85e-08	2		2	0	0
267	5-06-15-11-01-18	7.98e-08	1		1	0	0
268	5-06-15-11-01-27	7.18e-07	1		1	0	0
269	5-06-15-11-21-04	1.07e-07	1		1	0	0
270	5-06-15-23-10-05	1.52e-07	1		1	0	0

Sequence Quantification

Table 12.2.28 Results from Quantification of T1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
271	5-06-15-23-29-05	1.80e-08	1		1	0	0
272	5-06-15-39-04	1.74e-07	2		2	0	0
273	5-06-15-39-10-05	1.91e-08	1		1	0	0
274	5-06-15-39-29-03	2.01e-08	2		2	0	0
275	5-06-15-80-1-04	7.44e-05	5		5	0	0
276	5-06-15-80-2	4.38e-08	1		1	0	0
277	5-06-15-81-29-03	5.30e-06	1		1	5.44e-1	1
278	5-06-15-81-29-04	1.36e-07	1		1	0	0
279	5-06-15-81-29-05	1.20e-08	1		1	0	0
280	5-06-15-81-29-06	1.63e-08	1		1	0	0
281	5-06-15-81-30	5.49e-08	1		1	0	0
282	5-08-02-39	8.73e-07	61		61	0	0
283	5-08-02-67	9.75e-07	134		134	0	0
284	5-08-05-01-27	3.56e-08	1		1	0	0
285	5-08-05-03-04	1.11e-08	1		1	0	0
286	5-08-07-39	9.46e-07	61		61	0	0
287	5-08-07-67	9.53e-06	137		137	0	0
288	5-08-10-01-27	3.86e-08	1		1	0	0
289	5-08-10-03-04	1.20e-08	1		1	0	0
290	5-08-81-29-03	6.72e-07	9		9	0	0
291	5-09-81-29-03	1.43e-06	1		1	1.47e-8	1
292	5-09-81-29-04	3.68e-08	1		1	0	0
293	5-09-81-30	1.48e-07	1		1	0	0
294	5-10-83-10	3.25e-05	27		27	1.73e-6	10
295	5-15	8.66e-06	49		49	3.89e-7	12
296	7-6-4-2-08-02-67	1.40e-07	6		6	0	0
297	7-6-4-2-08-07-67	1.52e-07	6		6	0	0

Table 12.2.28 Results from Quantification of T1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
298	7-6-4-4-02-39	8.99e-08	6		6	0	0
299	7-6-4-4-02-67	8.09e-07	6		6	0	0
300	7-6-4-4-07-39	9.74e-08	6		6	0	0
301	7-6-4-4-07-67	8.76e-07	6		6	0	0
302	7-6-4-4-11-01-27	5.59e-08	1		1	0	0
303	7-6-4-4-51-29-03	2.39e-07	1		1	0	0
304	7-6-5	4.43e-07	1		1	0	0
305	7-7-3	4.47e-05	28		28	1.05e-7	2
306	7-7-4-01-12	1.22e-08	1		1	0	0
307	7-7-4-01-23	1.78e-07	2		2	0	0
308	7-7-4-04-12	1.32e-08	1		1	0	0
309	7-7-4-04-23	1.93e-07	2		2	0	0
310	7-7-4-52-23	7.56e-08	2		2	0	0
311	7-7-5	3.46e-08	2		2	0	0
312	7-9	1.19e-05	49		49	9.55e-8	3
313	SEQ-000004	1.49e-06	11		11	0	0
314	SEQ-000027	1.77e-08	1		1	0	0
315	SEQ-000102	6.49e-08	2		2	0	0
316	SEQ-000133	2.25e-08	2		2	0	0
317	SEQ-000165	6.99e-07	9		9	0	0
318	SEQ-000182	6.75e-08	2		2	0	0
319	SEQ-000196	2.03e-07	2		2	0	0
320	SEQ-000213	2.35e-08	2		2	0	0
321	SEQ-000288	7.03e-08	2		2	0	0
322	SEQ-000319	2.44e-08	2		2	0	0
323	SEQ-000351	7.58e-07	9		9	0	0
324	SEQ-000368	7.31e-08	2		2	0	0

Sequence Quantification

Table 12.2.28 Results from Quantification of T1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
325	SEQ-000382	2.20e-07	2		2	0	0
326	SEQ-000399	2.54e-08	2		2	0	0
327	SEQ-000422	5.36e-08	2		2	0	0
328	SEQ-000439	7.06e-08	1		1	0	0
329	SEQ-000452	4.95e-06	13		13	0	0
330	SEQ-000453	4.46e-05	15		15	0	0
331	SEQ-000456	9.66e-07	2		2	0	0
332	SEQ-000467	4.86e-05	1		1	0	0
333	SEQ-000468	1.25e-06	1		1	0	0
334	SEQ-000469	1.10e-07	1		1	0	0
335	SEQ-000470	1.63e-07	2		2	0	0
336	SEQ-000471	1.23e-08	1		1	0	0
337	SEQ-000488	2.55e-06	13		13	0	0
338	SEQ-000493	2.29e-08	2		2	0	0
339	SEQ-000510	3.02e-08	1		1	0	0
340	SEQ-000585	1.10e-07	2		2	0	0
341	SEQ-000616	3.84e-08	2		2	0	0
342	SEQ-000648	1.19e-06	9		9	0	0
343	SEQ-000665	1.15e-07	2		2	0	0
344	SEQ-000679	3.45e-07	2		2	0	0
345	SEQ-000696	3.99e-08	2		2	0	0
346	SEQ-000771	1.20e-07	2		2	0	0
347	SEQ-000802	4.16e-08	2		2	0	0
348	SEQ-000834	1.29e-06	9		9	0	0
349	SEQ-000851	1.24e-07	2		2	0	0
350	SEQ-000865	4.48e-07	9		9	0	0
351	SEQ-000882	4.33e-08	2		2	0	0

Table 12.2.28 Results from Quantification of T1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
352	SEQ-000905	9.12e-08	2		2	0	0
353	SEQ-000922	1.20e-07	1		1	0	0
354	SEQ-000935	8.44e-06	14		14	0	0
355	SEQ-000936	7.60e-05	15		15	0	0
356	SEQ-000939	1.65e-06	2		2	0	0
357	SEQ-000950	8.27e-05	1		1	0	0
358	SEQ-000951	2.12e-06	1		1	0	0
359	SEQ-000952	1.87e-07	1		1	0	0
360	SEQ-000953	2.77e-07	2		2	0	0
361	SEQ-000954	2.09e-08	1		1	0	0
362	SEQ-001131	6.01e-08	2		2	0	0
363	SEQ-001162	2.09e-08	2		2	0	0
364	SEQ-001317	6.51e-08	2		2	0	0
365	SEQ-001348	2.26e-08	2		2	0	0
366	SEQ-001389	4.94e-07	8		8	0	0
367	SEQ-001390	4.44e-06	8		8	0	0
368	SEQ-001393	9.52e-08	1		1	0	0
369	SEQ-001404	5.00e-06	1		1	0	0
370	SEQ-001405	1.28e-07	1		1	0	0
371	SEQ-001406	1.13e-08	1		1	0	0
372	SEQ-001407	1.54e-08	1		1	0	0
373	SEQ-001614	1.02e-07	2		2	0	0
374	SEQ-001645	3.56e-08	2		2	0	0
375	SEQ-001800	1.11e-07	2		2	0	0
376	SEQ-001831	3.85e-08	2		2	0	0
377	SEQ-001888	1.24e-08	1		1	0	0
378	SEQ-001901	8.41e-07	8		8	0	0

Sequence Quantification

Table 12.2.28 Results from Quantification of T1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
379	SEQ-001902	7.63e-06	12		12	0	0
380	SEQ-001905	1.62e-07	1		1	0	0
381	SEQ-001916	8.52e-06	1		1	0	0
382	SEQ-001917	2.18e-07	1		1	0	0
383	SEQ-001918	1.92e-08	1		1	0	0
384	SEQ-001919	2.62e-08	1		1	0	0
385	SEQ-800003	9.27e-08	2		2	0	0
386	SEQ-800033	1.88e-07	4		4	0	0
387	SEQ-800061	4.29e-09	1		1	0	0
388	SEQ-800067	1.61e-08	1		1	0	0
TOTALS		3.64e-02	4379		4379	7.663E-06	81

Table 12.2.29 Results from Quantification of H1 Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	03-01-02-04-05	1.08e-07	2	4.53e-10	2	0	0
2	03-01-02-06-05	3.75e-08	2	1.58e-10	2	0	0
3	03-01-02-08-05	2.16e-07	4	0.00	4	0	0
4	03-01-02-10-05	7.50e-08	4	0.00	4	0	0
5	03-01-02-39	1.12e-05	31	1.12e-08	31	0	0
6	03-01-02-40-05	2.51e-07	4	1.05e-09	4	0	0
7	03-01-02-42-05	8.73e-08	4	3.66e-10	4	0	0
8	03-01-02-67	1.02e-04	43	6.82e-09	43	0	0
9	03-01-02-68-05	2.90e-06	24	1.22e-08	24	0	0
10	03-01-02-69-05	4.24e-07	8	1.78e-09	8	0	0
11	03-01-02-70-05	9.19e-07	14	3.86e-09	14	0	0
12	03-01-05-01-18	2.76e-08	1	2.76e-11	1	0	0
13	03-01-05-01-27	2.99e-07	2	2.70e-08	2	1.93e-08	1
14	03-01-05-03-05	8.96e-06	31	4.11e-08	31	0	0
15	03-01-05-21-05	1.20e-06	15	5.03e-09	15	0	0
16	03-01-07-04-05	1.17e-07	2	4.91e-10	2	0	0
17	03-01-07-06-05	4.06e-08	2	1.71e-10	2	0	0
18	03-01-07-08-05	2.34e-07	4	0.00	4	0	0
19	03-01-07-10-05	8.13e-08	4	0.00	4	0	0
20	03-01-07-39	1.22e-05	31	1.22e-08	31	0	0
21	03-01-07-40-05	2.72e-07	4	1.14e-09	4	0	0
22	03-01-07-42-05	9.45e-08	4	3.97e-10	4	0	0
23	03-01-07-67	1.10e-04	43	7.39e-09	43	0	0
24	03-01-07-68-05	3.14e-06	24	1.32e-08	24	0	0
25	03-01-07-69-05	4.59e-07	8	1.93e-09	8	0	0
26	03-01-07-70-05	9.95e-07	14	4.18e-09	14	0	0
27	03-01-10-03-05	9.71e-06	31	4.45e-08	31	0	0

Sequence Quantification

Table 12.2.29 Results from Quantification of H1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
28	03-01-10-21-05	1.30e-06	15	5.45e-09	15	0	0
29	03-01-11-01-18	1.76e-06	1	1.76e-09	1	0	0
30	03-01-11-01-27	1.59e-05	1	1.43e-06	1	1.25e-06	1
31	03-01-11-03-05	3.05e-07	12	1.28e-09	12	0	0
32	03-01-11-21-05	2.37e-06	3	9.97e-09	3	0	0
33	03-01-13-39	1.56e-07	4	1.56e-10	4	0	0
34	03-01-13-67	1.80e-06	24	1.21e-10	24	0	0
35	03-01-16-06-05	8.00e-08	6	3.36e-10	6	0	0
36	03-01-18-39	1.69e-07	4	1.69e-10	4	0	0
37	03-01-18-67	1.96e-06	24	1.31e-10	24	0	0
38	03-01-21-06-05	8.67e-08	6	3.64e-10	6	0	0
39	03-01-22-04-18	3.24e-08	2	3.24e-11	2	0	0
40	03-01-22-04-27	2.92e-07	2	2.63e-08	2	2.26e-08	2
41	03-01-22-21-05	2.61e-08	2	1.10e-10	2	0	0
42	03-01-23-12-05	3.62e-06	2	3.46e-09	2	0	0
43	03-01-24-01-19	2.40e-07	4	2.16e-11	4	0	0
44	03-01-24-02-19	2.40e-07	4	2.16e-11	4	0	0
45	03-01-24-03-19	2.40e-07	8	2.16e-11	8	0	0
46	03-01-24-05	2.74e-06	4	1.15e-08	4	0	0
47	03-01-24-12-05	3.15e-07	2	3.01e-10	2	0	0
48	03-01-24-35-03	3.17e-07	2	0.00	2	0	0
49	03-01-24-35-05	3.57e-08	1	3.57e-11	1	0	0
50	03-01-50-1-01-10	1.60e-07	2	1.60e-10	2	0	0
51	03-01-50-1-01-19	1.97e-06	15	1.97e-09	15	0	0
52	03-01-50-1-02-10	1.60e-07	2	1.60e-10	2	0	0
53	03-01-50-1-02-19	1.97e-06	15	1.97e-09	15	0	0
54	03-01-50-1-03-10	1.60e-07	4	1.60e-10	4	0	0
55	03-01-50-1-03-19	1.85e-06	24	1.85e-09	24	0	0

Table 12.2.29 Results from Quantification of H1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
56	03-01-50-1-05	1.71e-05	25	7.16e-08	25	0	0
57	03-01-50-1-12-05	3.61e-08	1	3.61e-11	1	0	0
58	03-01-50-1-35-03	1.91e-06	2	3.80e-09	2	0	0
59	03-01-50-1-35-04	4.87e-08	1	1.22e-08	1	0	0
60	03-01-50-2	9.67e-07	1	9.67e-07	1	5.12e-08	1
61	03-01-51-35-03	8.58e-05	13	4.72e-07	13	0	0
62	03-01-51-35-04	2.15e-06	1	5.38e-07	1	1.61e-08	1
63	03-01-51-35-05	1.89e-07	1	1.89e-10	1	0	0
64	03-01-51-35-09	2.26e-08	1	0.00	1	0	0
65	03-01-51-36	8.69e-07	1	8.69e-07	1	4.61e-08	1
66	04-01-31	2.10e-08	1	2.10e-11	1	0	0
67	04-01-53	1.89e-07	1	1.27e-11	1	0	0
68	04-15-53	3.78e-08	1	2.53e-12	1	0	0
69	04-19-31	2.27e-08	1	2.27e-11	1	0	0
70	04-19-53	2.05e-07	1	1.37e-11	1	0	0
71	04-24-53	1.04e-08	1	6.99e-13	1	0	0
72	04-33-53	4.09e-08	1	2.74e-12	1	0	0
73	07-02-02-67	3.06e-08	2	2.05e-12	2	0	0
74	07-02-07-67	3.31e-08	2	2.22e-12	2	0	0
75	07-02-51-29-03	3.36e-08	1	8.39e-09	1	0	0
76	13-06-02-39	1.08e-06	12	1.08e-09	12	0	0
77	13-06-02-67	9.93e-06	23	6.66e-10	23	0	0
78	13-06-02-68-05	2.23e-07	4	9.38e-10	4	0	0
79	13-06-02-70-05	7.77e-08	4	3.26e-10	4	0	0
80	13-06-05-01-27	3.67e-08	2	3.30e-09	2	0	0
81	13-06-05-03-05	7.99e-07	10	3.36e-09	10	0	0
82	13-06-05-21-05	9.99e-08	6	4.20e-10	6	0	0
83	13-06-07-39	1.17e-06	12	1.17e-09	12	0	0

Sequence Quantification

Table 12.2.29 Results from Quantification of H1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
84	13-06-07-67	1.08e-05	29	7.25e-10	29	0	0
85	13-06-07-68-05	2.42e-07	4	1.02e-09	4	0	0
86	13-06-07-70-05	8.41e-08	4	3.53e-10	4	0	0
87	13-06-10-01-27	3.97e-08	2	3.57e-09	2	0	0
88	13-06-10-03-05	8.66e-07	10	3.64e-09	10	0	0
89	13-06-10-21-05	1.08e-07	6	4.55e-10	6	0	0
90	13-06-11-01-18	1.74e-07	1	1.74e-10	1	0	0
91	13-06-11-01-27	1.57e-06	1	1.41e-07	1	1.22e-07	1
92	13-06-11-21-05	2.34e-07	2	9.81e-10	2	0	0
93	13-06-39-05	2.71e-07	4	1.14e-09	4	0	0
94	13-06-39-12-05	2.98e-08	1	2.98e-11	1	0	0
95	13-06-39-35-03	3.13e-08	2	0.00	2	0	0
96	13-06-80-1-01-19	1.43e-07	2	1.43e-10	2	0	0
97	13-06-80-1-02-19	1.43e-07	2	1.43e-10	2	0	0
98	13-06-80-1-03-19	1.43e-07	4	1.43e-10	4	0	0
99	13-06-80-1-05	1.62e-06	2	6.82e-09	2	0	0
100	13-06-80-1-35-03	1.88e-07	1	0.00	1	0	0
101	13-06-80-2	9.56e-08	1	9.56e-08	1	0	0
102	13-06-81-35-03	8.43e-06	5	3.32e-08	5	0	0
103	13-06-81-35-04	2.13e-07	1	5.32e-08	1	0	0
104	13-06-81-35-05	1.87e-08	1	1.87e-11	1	0	0
105	13-06-81-36	8.59e-08	1	8.59e-08	1	0	0
106	14-01-53	1.87e-08	1	1.25e-12	1	0	0
107	14-13-53	2.02e-08	1	1.36e-12	1	0	0
108	SEQ-000033	1.25e-08	1	0.00	1	0	0
109	SEQ-000183	2.35e-07	2	0.00	2	0	0
110	SEQ-000301	2.51e-07	2	2.51e-10	2	0	0
111	SEQ-000305	2.51e-07	2	2.51e-10	2	0	0

Table 12.2.29 Results from Quantification of H1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
112	SEQ-000309	2.51e-07	4	2.51e-10	4	0	0
113	SEQ-000333	2.90e-08	2	0.00	2	0	0
114	SEQ-000351	4.71e-08	4	4.71e-11	4	0	0
115	SEQ-000355	4.71e-08	4	4.71e-11	4	0	0
116	SEQ-000401	8.73e-08	2	8.73e-11	2	0	0
117	SEQ-000405	8.73e-08	2	8.73e-11	2	0	0
118	SEQ-000409	8.73e-08	4	8.73e-11	4	0	0
119	SEQ-000453	2.91e-06	13	2.91e-09	13	0	0
120	SEQ-000457	2.91e-06	13	2.91e-09	13	0	0
121	SEQ-000461	2.90e-06	24	2.90e-09	24	0	0
122	SEQ-000483	2.61e-07	2	2.61e-07	2	0	0
123	SEQ-000503	4.24e-07	4	4.24e-10	4	0	0
124	SEQ-000507	4.24e-07	4	4.24e-10	4	0	0
125	SEQ-000511	4.24e-07	8	4.24e-10	8	0	0
126	SEQ-000533	4.90e-08	4	0.00	4	0	0
127	SEQ-000553	1.01e-06	12	1.01e-09	12	0	0
128	SEQ-000557	1.01e-06	12	1.01e-09	12	0	0
129	SEQ-000583	9.08e-08	2	0.00	2	0	0
130	SEQ-000601	7.69e-07	7	7.69e-10	7	0	0
131	SEQ-000603	7.22e-06	12	7.22e-09	12	0	0
132	SEQ-000605	7.69e-07	7	7.69e-10	7	0	0
133	SEQ-000607	7.33e-06	16	7.33e-09	16	0	0
134	SEQ-000633	9.82e-07	8	0.00	8	0	0
135	SEQ-000701	9.29e-08	3	9.29e-11	3	0	0
136	SEQ-000703	9.96e-07	8	9.96e-10	8	0	0
137	SEQ-000705	9.29e-08	3	9.29e-11	3	0	0
138	SEQ-000707	9.96e-07	8	9.96e-10	8	0	0
139	SEQ-000711	3.07e-08	2	3.07e-11	2	0	0

Table 12.2.29 Results from Quantification of H1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
140	SEQ-000733	1.17e-07	3	0.00	3	0	0
141	SEQ-000783	1.35e-08	1	0.00	1	0	0
142	SEQ-000933	2.70e-08	2	0.00	2	0	0
143	SEQ-001051	2.72e-07	2	2.72e-10	2	0	0
144	SEQ-001055	2.72e-07	2	2.72e-10	2	0	0
145	SEQ-001059	2.72e-07	4	2.72e-10	4	0	0
146	SEQ-001083	3.14e-08	2	0.00	2	0	0
147	SEQ-001101	5.10e-08	4	5.10e-11	4	0	0
148	SEQ-001105	5.10e-08	4	5.10e-11	4	0	0
149	SEQ-001151	9.45e-08	2	9.45e-11	2	0	0
150	SEQ-001155	9.45e-08	2	9.45e-11	2	0	0
151	SEQ-001159	9.45e-08	4	9.45e-11	4	0	0
152	SEQ-001203	3.16e-06	13	3.16e-09	13	0	0
153	SEQ-001207	3.16e-06	13	3.16e-09	13	0	0
154	SEQ-001211	3.14e-06	24	3.14e-09	24	0	0
155	SEQ-001233	2.83e-07	2	0.00	2	0	0
156	SEQ-001253	4.79e-07	6	4.79e-10	6	0	0
157	SEQ-001257	4.79e-07	6	4.79e-10	6	0	0
158	SEQ-001261	4.59e-07	8	4.59e-10	8	0	0
159	SEQ-001283	5.31e-08	4	0.00	4	0	0
160	SEQ-001303	1.09e-06	12	1.09e-09	12	0	0
161	SEQ-001307	1.09e-06	12	1.09e-09	12	0	0
162	SEQ-001311	9.95e-07	14	9.95e-10	14	0	0
163	SEQ-001333	9.83e-08	2	0.00	2	0	0
164	SEQ-001351	8.33e-07	7	8.33e-10	7	0	0
165	SEQ-001353	7.82e-06	12	7.82e-09	12	0	0
166	SEQ-001355	8.33e-07	7	8.33e-10	7	0	0
167	SEQ-001357	7.94e-06	16	7.94e-09	16	0	0

Table 12.2.29 Results from Quantification of H1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
168	SEQ-001383	1.07e-06	9	0.00	9	0	0
169	SEQ-001451	1.01e-07	3	1.01e-10	3	0	0
170	SEQ-001453	1.09e-06	9	1.09e-09	9	0	0
171	SEQ-001455	1.01e-07	3	1.01e-10	3	0	0
172	SEQ-001457	1.09e-06	9	1.09e-09	9	0	0
173	SEQ-001461	3.32e-08	2	3.32e-11	2	0	0
174	SEQ-001483	1.37e-07	4	0.00	4	0	0
175	SEQ-001503	1.36e-07	4	1.36e-10	4	0	0
176	SEQ-001507	1.36e-07	4	1.36e-10	4	0	0
177	SEQ-001633	2.73e-07	1	0.00	1	0	0
178	SEQ-002103	4.16e-08	4	4.16e-11	4	0	0
179	SEQ-002107	4.16e-08	4	4.16e-11	4	0	0
180	SEQ-002303	1.10e-07	6	1.10e-10	6	0	0
181	SEQ-002307	1.10e-07	6	1.10e-10	6	0	0
182	SEQ-002853	4.50e-08	4	4.50e-11	4	0	0
183	SEQ-002857	4.50e-08	4	4.50e-11	4	0	0
184	SEQ-003053	1.20e-07	6	1.20e-10	6	0	0
185	SEQ-003057	1.20e-07	6	1.20e-10	6	0	0
186	SEQ-003411	1.12e-06	15	1.12e-09	15	0	0
187	SEQ-003413	1.04e-05	32	1.04e-08	32	0	0
188	SEQ-008893	2.48e-08	2	2.48e-11	2	0	0
189	SEQ-008897	2.48e-08	2	2.48e-11	2	0	0
190	SEQ-009045	2.23e-07	2	2.23e-10	2	0	0
191	SEQ-009049	2.23e-07	2	2.23e-10	2	0	0
192	SEQ-009053	2.23e-07	4	2.23e-10	4	0	0
193	SEQ-009075	2.58e-08	2	0.00	2	0	0
194	SEQ-009095	4.19e-08	4	4.19e-11	4	0	0
195	SEQ-009099	4.19e-08	4	4.19e-11	4	0	0

Table 12.2.29 Results from Quantification of H1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
196	SEQ-009145	7.77e-08	2	7.77e-11	2	0	0
197	SEQ-009149	7.77e-08	2	7.77e-11	2	0	0
198	SEQ-009153	7.77e-08	4	7.77e-11	4	0	0
199	SEQ-009193	6.59e-08	3	6.59e-11	3	0	0
200	SEQ-009195	6.76e-07	6	6.76e-10	6	0	0
201	SEQ-009197	6.59e-08	3	6.59e-11	3	0	0
202	SEQ-009199	6.76e-07	6	6.76e-10	6	0	0
203	SEQ-009295	8.27e-08	3	8.27e-11	3	0	0
204	SEQ-009299	8.27e-08	3	8.27e-11	3	0	0
205	SEQ-009643	2.69e-08	2	2.69e-11	2	0	0
206	SEQ-009647	2.69e-08	2	2.69e-11	2	0	0
207	SEQ-009795	2.42e-07	2	2.42e-10	2	0	0
208	SEQ-009799	2.42e-07	2	2.42e-10	2	0	0
209	SEQ-009803	2.42e-07	4	2.42e-10	4	0	0
210	SEQ-009825	2.80e-08	2	0.00	2	0	0
211	SEQ-009845	4.54e-08	4	4.54e-11	4	0	0
212	SEQ-009849	4.54e-08	4	4.54e-11	4	0	0
213	SEQ-009895	8.41e-08	2	8.41e-11	2	0	0
214	SEQ-009899	8.41e-08	2	8.41e-11	2	0	0
215	SEQ-009903	8.41e-08	4	8.41e-11	4	0	0
216	SEQ-009943	7.14e-08	3	7.14e-11	3	0	0
217	SEQ-009945	7.32e-07	6	7.32e-10	6	0	0
218	SEQ-009947	7.14e-08	3	7.14e-11	3	0	0
219	SEQ-009949	7.32e-07	6	7.32e-10	6	0	0
220	SEQ-009975	8.98e-08	3	0.00	3	0	0
221	SEQ-010045	8.96e-08	3	8.96e-11	3	0	0
222	SEQ-010049	8.96e-08	3	8.96e-11	3	0	0
223	SEQ-010195	2.05e-08	2	2.05e-11	2	0	0

Table 12.2.29 Results from Quantification of H1 Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
224	SEQ-010199	2.05e-08	2	2.05e-11	2	0	0
225	SEQ-010225	2.70e-08	1	0.00	1	0	0
226	SEQ-010329	8.09e-08	2	8.09e-11	2	0	0
227	SEQ-010331	9.96e-07	15	9.96e-10	15	0	0
228	SEQ-700004	2.90e-08	2	2.90e-11	2	0	0
229	SEQ-700007	2.61e-07	2	2.61e-10	2	0	0
230	SEQ-700009	4.90e-08	4	4.90e-11	4	0	0
231	SEQ-700011	9.08e-08	2	9.08e-11	2	0	0
232	SEQ-700012	7.71e-08	3	7.71e-11	3	0	0
233	SEQ-700013	8.00e-07	7	8.00e-10	7	0	0
234	SEQ-700015	9.67e-08	3	9.67e-11	3	0	0
235	SEQ-700020	3.14e-08	2	3.14e-11	2	0	0
236	SEQ-700023	2.83e-07	2	2.83e-10	2	0	0
237	SEQ-700025	5.31e-08	4	5.31e-11	4	0	0
238	SEQ-700027	9.83e-08	2	9.83e-11	2	0	0
239	SEQ-700028	8.35e-08	3	8.35e-11	3	0	0
240	SEQ-700029	8.67e-07	7	8.67e-10	7	0	0
241	SEQ-700031	1.05e-07	3	1.05e-10	3	0	0
242	SEQ-700035	2.40e-08	2	2.40e-11	2	0	0
243	SEQ-700121	2.58e-08	2	2.58e-11	2	0	0
244	SEQ-700137	2.80e-08	2	2.80e-11	2	0	0
245	SEQ-700143	7.43e-08	3	7.43e-11	3	0	0
Total		5.47e-04	1489	5.42e-06	1489	1.505E-06	8

Table 12.2.30 Results from Quantification of TRPT Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	03-01-16-02-39	2.05e-06	19	2.05e-09	19	0	0
2	03-01-16-02-67	1.88e-05	36	1.26e-09	36	0	0
3	03-01-16-07-39	2.22e-06	19	2.22e-09	19	0	0
4	03-01-16-07-67	2.03e-05	36	1.36e-09	36	0	0
5	03-01-16-13-67	1.10e-07	8	7.34e-12	8	0	0
6	03-01-16-18-67	1.19e-07	8	7.96e-12	8	0	0
7	03-01-16-24-05	2.21e-06	4	9.27e-09	4	0	0
8	03-01-16-50-2	9.63e-08	1	5.10e-09	1	0	0
9	03-01-16-51-36	1.28e-06	1	6.80e-08	1	6.80e-08	1
10	03-01-21-02-67	4.57e-08	4	3.06e-12	4	0	0
11	03-01-21-07-67	4.95e-08	4	3.31e-12	4	0	0
12	03-01-38-02-67	1.30e-07	8	8.68e-12	8	0	0
13	03-01-38-07-67	1.40e-07	8	9.41e-12	8	0	0
14	03-03-02-39	1.21e-07	3	1.21e-10	3	0	0
15	03-03-02-67	2.23e-06	20	1.49e-10	20	0	0
16	03-03-02-69-05	5.76e-08	2	0.00	2	0	0
17	03-03-05-03-05	2.50e-06	23	1.09e-08	23	0	0
18	03-03-05-21-05	2.62e-07	7	1.18e-09	7	0	0
19	03-03-07-39	2.06e-07	10	2.06e-10	10	0	0
20	03-03-07-67	2.41e-06	20	1.62e-10	20	0	0
21	03-03-07-69-05	6.24e-08	2	0.00	2	0	0
22	03-03-10-03-05	2.70e-06	23	1.18e-08	23	0	0
23	03-03-10-21-05	2.84e-07	7	1.28e-09	7	0	0
24	03-03-11-01-27	1.03e-08	1	9.25e-10	1	0	0
25	03-03-51-35-03	3.07e-07	9	0.00	9	0	0
26	03-07-02-67	2.08e-07	14	6.46e-12	14	0	0
27	03-07-07-67	2.09e-07	14	7.00e-12	14	0	0

Table 12.2.30 Results from Quantification of TRPT Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
28	03-07-51-29-03	4.88e-08	2	6.10e-09	2	0	0
29	03-09-01-23	1.12e-08	1	1.12e-11	1	0	0
30	03-09-04-23	1.21e-08	1	1.21e-11	1	0	0
31	05-01-16-02-39	1.67e-07	4	1.67e-10	4	0	0
32	05-01-16-02-67	1.83e-06	19	1.22e-10	19	0	0
33	05-01-16-07-39	1.81e-07	4	1.81e-10	4	0	0
34	05-01-16-07-67	1.98e-06	19	1.32e-10	19	0	0
35	05-01-16-39-05	2.16e-07	4	9.06e-10	4	0	0
36	05-01-16-80-1-05	1.62e-07	2	6.79e-10	2	0	0
37	05-01-16-81-36	1.27e-07	1	6.73e-09	1	0	0
38	SEQ-000003	1.63e-06	4	1.46e-10	4	0	0
39	SEQ-000007	6.91e-08	3	6.22e-12	3	0	0
40	SEQ-000015	7.48e-08	3	6.73e-12	3	0	0
41	SEQ-000028	5.91e-08	3	5.32e-12	3	0	0
42	SEQ-000032	5.91e-08	3	5.32e-12	3	0	0
43	SEQ-000078	1.51e-06	4	1.36e-10	4	0	0
44	SEQ-000082	1.51e-06	4	1.36e-10	4	0	0
45	SEQ-000103	6.40e-08	3	5.76e-12	3	0	0
46	SEQ-000107	6.40e-08	3	5.76e-12	3	0	0
47	SEQ-000164	1.93e-08	1	0.00	1	0	0
48	SEQ-001602	1.87e-08	1	0.00	1	0	0
49	SEQ-002334	3.04e-07	4	3.04e-10	4	0	0
50	SEQ-002336	2.61e-06	19	2.35e-10	19	0	0
51	SEQ-6A0003	4.30e-08	4	1.81e-10	4	0	0
52	SEQ-6A0126	5.00e-08	4	2.10e-10	4	0	0
53	SEQ-6A0207	4.50e-07	4	1.89e-09	4	0	0
54	SEQ-6A0214	8.44e-08	8	3.54e-10	8	0	0

Table 12.2.30 Results from Quantification of TRPT Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
55	SEQ-6A0221	1.56e-07	4	6.57e-10	4	0	0
56	SEQ-6A0226	2.48e-08	1	2.23e-09	1	0	0
57	SEQ-6A0230	8.03e-07	7	3.26e-09	7	0	0
58	SEQ-6A0237	1.01e-07	3	4.22e-10	3	0	0
59	SEQ-6A0244	4.66e-08	4	1.96e-10	4	0	0
60	SEQ-6A0367	5.42e-08	4	2.27e-10	4	0	0
61	SEQ-6A0448	4.87e-07	4	2.05e-09	4	0	0
62	SEQ-6A0455	9.14e-08	8	3.84e-10	8	0	0
63	SEQ-6A0462	1.69e-07	4	7.11e-10	4	0	0
64	SEQ-6A0467	2.68e-08	1	2.41e-09	1	0	0
65	SEQ-6A0471	8.70e-07	7	3.53e-09	7	0	0
66	SEQ-6A0478	1.09e-07	3	4.58e-10	3	0	0
67	SEQ-6A0483	1.58e-06	1	1.42e-07	1	1.22e-07	1
68	SEQ-6A0487	1.70e-06	2	0.00	2	0	0
69	SEQ-6A0494	2.35e-07	1	9.88e-10	1	0	0
70	SEQ-6A1072	1.35e-07	1	1.35e-10	1	0	0
71	SEQ-6A1085	1.60e-08	1	1.60e-11	1	0	0
72	SEQ-6A11395	2.72e-07	4	6.79e-08	4	0	0
73	SEQ-6A1157	3.83e-07	8	3.45e-11	8	0	0
74	SEQ-6A1165	3.83e-07	8	3.45e-11	8	0	0
75	SEQ-6A1230	2.51e-07	2	2.40e-10	2	0	0
76	SEQ-6A1241	2.52e-07	2	0.00	2	0	0
77	SEQ-6A1243	2.85e-08	1	2.85e-11	1	0	0
78	SEQ-6A1466	1.26e-04	8	1.34e-08	8	0	0
79	SEQ-6A1467	3.18e-06	1	2.38e-08	1	2.38e-08	1
80	SEQ-6A1468	2.92e-07	2	2.80e-10	2	0	0
81	SEQ-6A1469	3.36e-08	1	3.36e-08	1	3.36e-08	1

Table 12.2.30 Results from Quantification of TRPT Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
82	SEQ-6A1472	3.35e-08	1	0.00	1	0	0
83	SEQ-6A4125	9.47e-07	10	7.10e-09	10	0	0
84	SEQ-6A5662	2.63e-07	9	0.00	9	0	0
85	SEQ-6A9858	1.67e-06	14	1.25e-08	14	0	0
86	SEQ-6A9859	2.70e-08	2	6.76e-09	2	0	0
87	SEQ-6B03115	4.81e-08	1	4.81e-11	1	0	0
88	SEQ-6B03117	5.58e-07	3	5.02e-11	3	0	0
89	SEQ-6B03119	1.44e-07	3	9.61e-11	3	0	0
90	SEQ-6B03121	1.73e-06	10	1.06e-10	10	0	0
91	SEQ-6B03201	2.16e-07	6	0.00	6	0	0
92	SEQ-6B03275	7.17e-08	2	6.46e-12	2	0	0
93	SEQ-6B03279	2.15e-07	6	1.29e-11	6	0	0
94	SEQ-6B06545	5.21e-08	1	5.21e-11	1	0	0
95	SEQ-6B06547	6.04e-07	3	5.44e-11	3	0	0
96	SEQ-6B06549	1.56e-07	3	1.04e-10	3	0	0
97	SEQ-6B06551	1.88e-06	10	1.14e-10	10	0	0
98	SEQ-6B06631	2.34e-07	6	0.00	6	0	0
99	SEQ-6B06705	7.77e-08	2	6.99e-12	2	0	0
100	SEQ-6B06709	2.33e-07	6	1.40e-11	6	0	0
101	SEQ-6B09469	8.48e-08	3	7.64e-12	3	0	0
102	SEQ-6B10860	1.71e-08	1	4.28e-09	1	0	0
103	SEQ-6B11345	2.91e-08	1	7.28e-09	1	0	0
104	SEQ-6C00230	4.28e-08	3	1.80e-10	3	0	0
105	SEQ-6C00471	7.73e-08	6	3.25e-10	6	0	0
106	SEQ-6C00482	1.73e-08	1	1.73e-11	1	0	0
107	SEQ-6C00483	1.56e-07	1	1.40e-08	1	1.21e-08	1
108	SEQ-6C00487	1.67e-07	2	7.01e-10	2	0	0

Sequence Quantification

Table 12.2.30 Results from Quantification of TRPT Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
109	SEQ-6C00494	1.40e-08	1	5.86e-11	1	0	0
110	SEQ-6C01072	1.33e-08	1	1.33e-11	1	0	0
111	SEQ-6C01388	2.37e-08	1	2.37e-11	1	0	0
112	SEQ-6C01399	2.49e-08	2	0.00	2	0	0
113	SEQ-6C01624	1.24e-05	5	3.96e-08	5	2.45e-08	1
114	SEQ-6C01625	3.14e-07	1	7.86e-08	1	7.86e-08	1
115	SEQ-6C01626	2.77e-08	1	2.77e-11	1	0	0
116	SEQ-6C03319	6.13e-08	2	1.53e-08	2	0	0
117	SEQ-6C06873	1.49e-07	5	3.74e-08	5	2.61e-08	2
118	SEQ-6C12255	1.16e-08	1	0.00	1	0	0
119	SEQ-6C15809	1.98e-08	1	0.00	1	0	0
120	SEQ-6C15813	1.27e-08	1	0.00	1	0	0
121	SEQ-6C16050	2.14e-08	1	0.00	1	0	0
122	SEQ-6C16054	1.38e-08	1	0.00	1	0	0
123	SEQ-7A00026	5.00e-08	4	5.00e-11	4	0	0
124	SEQ-7A00034	5.00e-08	4	5.00e-11	4	0	0
125	SEQ-7A00053	4.50e-07	4	4.05e-11	4	0	0
126	SEQ-7A00061	4.50e-07	4	4.05e-11	4	0	0
127	SEQ-7A00064	5.20e-08	4	0.00	4	0	0
128	SEQ-7A00078	8.44e-08	8	7.59e-12	8	0	0
129	SEQ-7A00086	8.44e-08	8	7.59e-12	8	0	0
130	SEQ-7A00103	1.56e-07	4	1.41e-11	4	0	0
131	SEQ-7A00111	1.56e-07	4	1.41e-11	4	0	0
132	SEQ-7A00126	6.64e-08	3	6.64e-11	3	0	0
133	SEQ-7A00128	6.54e-07	6	5.89e-11	6	0	0
134	SEQ-7A00136	2.19e-08	1	0.00	1	0	0
135	SEQ-7A00153	8.33e-08	3	7.50e-12	3	0	0

Table 12.2.30 Results from Quantification of TRPT Accident Sequences (Continued)

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
136	SEQ-7A00176	7.19e-08	3	7.19e-11	3	0	0
137	SEQ-7A00178	7.09e-07	6	6.38e-11	6	0	0
138	SEQ-7A00186	2.37e-08	1	0.00	1	0	0
139	SEQ-7A00203	9.02e-08	3	8.12e-12	3	0	0
140	SEQ-7A00228	2.96e-07	4	0.00	4	0	0
141	SEQ-7A00236	2.96e-07	4	0.00	4	0	0
142	SEQ-7A00253	4.13e-08	4	3.72e-12	4	0	0
143	SEQ-7A02384	2.93e-06	19	2.93e-09	19	0	0
144	SEQ-7A02386	2.68e-05	38	2.41e-09	38	0	0
145	SEQ-7B00002	8.34e-08	3	0.00	3	0	0
146	SEQ-7B00028	9.04e-08	3	0.00	3	0	0
147	SEQ-7B00054	1.95e-07	1	0.00	1	0	0
148	SEQ-7B00067	2.72e-08	1	0.00	1	0	0
149	SEQ-7C07663	5.00e-08	1	4.50e-12	1	0	0
150	SEQ-7C10439	6.45e-08	2	5.80e-12	2	0	0
Totals		2.67e-04	826	6.64e-07	826	3.890E-07	10

Sequence Quantification

Table 12.3.1 Summary Results from Quantification of T5D Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
36	03-32-11-01-27	7.67e-07	1	6.91e-08	1	5.95e-08	1
46	03-32-51-35-03	6.02e-05	1	1.51e-05	1	4.52e-07	1
47	03-32-51-35-04	1.54e-06	1	1.54e-06	1	1.16e-08	1
49	03-32-51-35-06	1.63e-08	1	1.63e-08	1	1.63e-08	1
51	03-32-51-36	6.24e-07	1	6.24e-07	1	3.31e-08	1
87	03-48-11-01-27	1.31e-06	1	1.18e-07	1	1.01e-07	1
97	03-48-51-35-03	1.03e-04	1	2.56e-05	1	7.69e-07	1
99	03-48-51-35-06	2.78e-08	1	2.78e-08	1	2.78e-08	1
101	03-48-51-36	1.06e-06	1	1.06e-06	1	5.63e-08	1
171	18-32-81-35-03	5.96e-06	1	1.49e-06	1	1.49e-06	1
172	18-32-81-35-04	1.53e-07	1	1.53e-07	1	3.82e-08	1
228	18-48-11-01-27	1.29e-07	1	1.16e-08	1	1.00e-08	1
239	18-48-81-35-03	1.01e-05	1	2.54e-06	1	2.54e-06	1
240	18-48-81-35-04	2.60e-07	1	2.60e-07	1	6.50e-08	1
351	9AU-000347	7.05e-07	1	6.35e-08	1	5.47e-08	1
426	9BU-001381	1.20e-06	1	1.08e-07	1	9.31e-08	1
533	D3U-000607	5.07e-07	1	1.27e-07	1	1.27e-07	1
Totals		1.876e-04	17	4.891e-05	17	5.938e-06	17

Table 12.3.2 Summary Results from Quantification of TSA Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
53	03-03-67	2.18e-04	1	1.46e-08	1	1.46e-08	1
57	03-03-68-05	6.24e-06	2	4.06e-07	2	2.62e-08	2
60	03-03-68-35-04	5.97e-07	2	1.85e-08	2	1.85e-08	1
77	03-04-21-35-03	8.38e-05	34	3.02e-05	34	8.81e-08	4
78	03-04-21-35-04	1.41e-07	1	1.41e-07	1	1.41e-07	1
133	03-08-67	2.36e-04	1	1.58e-08	1	1.58e-08	1
140	03-08-68-35-04	4.01e-08	2	2.00e-08	2	2.00e-08	1
199	03-50-2	2.83e-07	1	2.83e-07	1	7.08e-08	1
201	03-51-35-03	1.03e-04	15	2.59e-05	15	1.37e-07	4
202	03-51-35-04	8.79e-07	1	8.79e-07	1	2.20e-07	1
204	03-51-36	3.55e-07	1	3.55e-07	1	8.88e-08	1
Totals		6.494e-04	61	5.824e-05	61	8.407e-07	18

Sequence Quantification

Table 12.3.3 Summary Results from Quantification of TDB Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	3-01-31-11-01-27	4.76e-06	11	4.19e-07	11	3.37e-07	1
5	3-01-31-22-01-27	5.16e-06	12	4.54e-07	12	3.65e-07	1
15	3-01-32-04-01-27	1.96e-06	9	1.66e-07	9	1.39e-07	1
22	3-01-32-09-01-27	2.12e-06	9	1.91e-07	9	1.51e-07	1
24	3-01-32-11-01-27	1.89e-07	1	1.70e-08	1	1.47e-08	1
33	3-01-32-51-35-03	3.56e-06	1	8.91e-07	1	8.91e-07	1
34	3-01-32-51-35-04	9.13e-08	1	9.13e-08	1	2.28e-08	1
35	3-01-32-51-35-06	1.10e-08	1	1.10e-08	1	1.10e-08	1
37	3-01-47-11-01-27	8.13e-06	13	7.32e-07	13	5.73e-07	1
43	3-01-47-22-01-27	8.80e-06	13	7.93e-07	13	6.21e-07	1
49	3-01-47-27-01-27	1.56e-07	1	1.40e-08	1	1.21e-08	1
59	3-01-48-09-01-27	3.61e-06	9	3.25e-07	9	2.57e-07	1
62	3-01-48-11-01-27	3.22e-07	1	2.90e-08	1	2.50e-08	1
71	3-01-48-51-35-03	6.07e-06	1	1.52e-06	1	1.52e-06	1
72	3-01-48-51-35-04	1.56e-07	1	1.56e-07	1	3.89e-08	1
74	3-01-48-51-35-06	1.87e-08	1	1.87e-08	1	1.87e-08	1
75	3-01-48-51-36	6.28e-08	1	6.28e-08	1	1.57e-08	1
80	3-14	1.21e-08	1	1.21e-08	1	1.21e-08	1
86	5-04-04-21-05	1.28e-06	8	2.55e-07	8	5.77e-08	1
87	5-04-04-21-35-05	1.36e-07	1	3.40e-08	1	1.36e-07	1
93	5-04-09-21-05	1.38e-06	8	2.77e-07	8	6.25e-08	1
94	5-04-09-21-35-03	1.48e-07	1	3.69e-08	1	1.48e-07	1
105	5-04-81-35-03	8.47e-07	1	2.12e-07	1	2.12e-07	1
118	SEQ-000378	7.48e-08	1	1.87e-08	1	7.48e-08	1
119	SEQ-000802	8.10e-08	1	2.02e-08	1	8.10e-08	1
126	SEQ-004035	1.27e-07	1	3.18e-08	1	1.27e-07	1
127	SEQ-004459	1.38e-07	1	3.45e-08	1	1.38e-07	1
128	SEQ-004598	5.00e-08	1	1.25e-08	1	5.00e-08	1
Totals		4.945e-05	111	6.836e-06	111	6.107E-06	28

Table 12.3.4 Summary Results from Quantification of TIA Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
11	05-05-03-05	1.90e-06	5	3.80e-07	5	1.39e-08	1
12	05-05-03-35-03	2.17e-07	4	5.43e-08	4	3.29e-08	1
25	05-10-03-05	2.06e-06	5	4.12e-07	5	1.51e-08	1
26	05-10-03-35-03	2.35e-07	4	5.88e-08	4	3.56e-08	1
95	18-32-11-01-27	5.84e-07	1	5.26e-08	1	4.53e-08	1
109	18-32-80-1-35-03	6.99e-08	1	1.75e-08	1	1.75e-08	1
110	18-32-81-35-03	4.31e-06	1	1.08e-06	1	1.08e-06	1
111	18-32-81-35-04	1.11e-07	1	1.11e-07	1	2.76e-08	1
112	18-32-81-36	4.47e-08	1	4.47e-08	1	1.12e-08	1
154	18-48-11-01-27	9.94e-07	1	8.95e-08	1	7.71e-08	1
170	18-48-80-1-35-03	1.19e-07	1	2.98e-08	1	2.98e-08	1
171	18-48-80-2	6.06e-08	1	6.06e-08	1	1.52e-08	1
172	18-48-81-35-03	7.34e-06	1	1.84e-06	1	1.84e-06	1
173	18-48-81-35-04	1.88e-07	1	1.88e-07	1	4.71e-08	1
175	18-48-81-36	7.60e-08	1	7.60e-08	1	1.90e-08	1
183	20-05-03-35-03	1.81e-07	4	4.53e-08	4	3.62e-08	3
192	20-10-03-35-03	1.96e-07	4	4.91e-08	4	3.92e-08	3
197	21-81-35-04	5.09e-08	1	5.09e-08	1	1.27e-08	1
Totals		1.874e-05	38	4.640e-06	38	3.387E-06	22

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Table 12.3.5 Summary Results from Quantification of TAB Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
5	3-03-03-68-05	4.43e-07	1	8.85e-08	1	2.17e-08	1
6	3-03-03-68-35-03	5.12e-08	1	1.02e-08	1	5.12e-08	1
9	3-03-04-21-05	3.68e-06	9	7.33e-07	9	1.66e-07	1
10	3-03-04-21-35-03	3.91e-07	1	3.91e-07	1	3.91e-07	1
16	3-03-08-68-05	4.80e-07	1	9.59e-08	1	2.35e-08	1
17	3-03-08-68-35-03	5.54e-08	1	1.11e-08	1	5.54e-08	1
20	3-03-09-21-05	4.01e-06	11	7.98e-07	11	1.79e-07	1
21	3-03-09-21-35-03	4.23e-07	1	8.46e-08	1	4.23e-07	1
24	3-03-51-35-03	1.41e-06	1	1.41e-06	1	3.52e-07	1
29	5-04-04-21-05	3.26e-07	1	6.52e-08	1	1.60e-08	1
33	5-04-09-21-05	3.53e-07	1	7.06e-08	1	1.73e-08	1
38	5-04-81-35-03	2.34e-07	1	2.34e-07	1	5.86e-08	1
Totals		1.186e-05	30	3.992e-06	30	1.753E-06	12

Table 12.3.6 Summary Results from Quantification of J2 Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
165	2-01-11-01-27	2.77e-06	1	2.49e-07	1	2.15e-07	1
205	2-01-51-35-04	1.34e-06	1	1.34e-06	1	1.00e-08	1
286	2-06-11-01-27	2.74e-07	1	2.46e-08	1	2.12e-08	1
310	2-06-51-35-03	1.56e-05	7	3.89e-06	7	1.03e-08	1
311	2-06-51-35-04	1.32e-07	1	1.32e-07	1	3.31e-08	1
313	2-06-51-36	5.34e-08	1	5.34e-08	1	1.34e-08	1
Totals		2.017e-05	12	5.689e-06	12	3.025e-07	6

Table 12.3.7 Summary Results from Quantification of E1B Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
105	05-05-01-27	1.62e-07	1	1.46e-08	1	1.26e-08	1
132	05-10-01-27	1.76e-07	1	1.58e-08	1	1.36e-08	1
Totals		3.380E-07	2	3.040E-08	2	2.612E-07	2

Table 12.3.8 Summary Results from Quantification of E2B Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
52	05-02-67	6.06e-04	1	4.06e-08	1	4.06e-08	1
55	05-02-68-05	1.25e-03	47	1.55e-06	47	1.11e-07	4
57	05-02-68-35-03	2.21e-06	4	5.52e-07	4	7.87e-08	2
58	05-02-68-35-04	5.14e-08	1	5.14e-08	1	5.14e-08	1
66	05-02-70-05	2.44e-05	13	4.47e-07	13	2.83e-08	2
69	05-02-70-35-04	1.79e-08	1	1.79e-08	1	1.79e-08	1
126	05-07-67	6.56e-04	1	4.40e-08	1	4.40e-08	1
129	05-07-68-05	1.35e-03	48	1.70e-06	48	1.20e-07	4
131	05-07-68-35-03	2.39e-06	4	5.98e-07	4	8.52e-08	2
132	05-07-68-35-04	5.57e-08	1	5.57e-08	1	5.57e-08	1
140	05-07-70-05	2.64e-05	13	4.84e-07	13	3.07e-08	2
143	05-07-70-35-04	1.93e-08	1	1.93e-08	1	1.93e-08	1
151	05-11-21-05	5.64e-05	21	1.05e-06	21	6.54e-08	2
154	05-11-21-35-04	4.13e-08	1	4.13e-08	1	4.13e-08	1
225	05-50-2	7.86e-07	1	7.86e-07	1	4.17e-08	1
228	05-51-35-04	1.41e-06	1	1.41e-06	1	1.06e-08	1
230	05-51-35-06	1.49e-08	1	1.49e-08	1	1.49e-08	1
233	05-51-36	5.70e-07	1	5.70e-07	1	3.02e-08	1
Totals		3.977e-03	213	1.143e-05	213	8.870 -06	29

Table 12.3.9 Summary Results from Quantification of E1D Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
3	03-05-81-35-03	1.09e-07	7	2.72e-08	7	1.04e-08	1
8	03-38-81-35-03	1.85e-07	7	4.64e-08	7	2.96e-08	2
40	12-81-35-03	1.27e-05	6	1.60e-06	6	1.26e-08	1
41	12-81-35-04	1.61e-07	1	1.61e-07	1	4.03e-08	1
43	12-81-36	6.51e-08	1	6.51e-08	1	1.63e-08	1
Totals		1.322e-05	22	1.900e-06	22	1.090E-07	6

Table 12.3.10 Summary Results from Quantification of E2D Accident Sequences

		Before Recovery		After Final Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
26	07-81-35-03	2.16e-05	7	5.40e-06	7	1.43e-08	1
27	07-81-35-04	1.84e-07	1	1.84e-07	1	4.59e-08	1
29	07-81-36	7.42e-08	1	7.42e-08	1	1.86e-08	1
Totals		2.186e-05	9	5.658e-06	9	7.879E-08	3

Table 12.3.11 Summary Results from Quantification of T5B Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
79	18-48-11-01-27	1.33e-07	1	1.19e-08	1	1.19e-08	1
Totals		1.33e-07	1	1.19e-08	1	1.19E-08	1

Table 12.3.12 Summary Results from Quantification of T5C Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
79	18-48-11-01-27	1.33e-07	1	1.19e-08	1	1.03e-08	1
Totals		1.33e-07	1	1.19e-08	1	1.03e-08	1

Table 12.3.13 Summary Results from Quantification of A5 Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
2	02-06-01-27	6.83e-07	1	6.15e-08	1	7.37e-07	1
3	06-06-01-27	6.75e-08	1	6.08e-09	1	7.29e-08	1
Totals		7.505e-07	2	1.223e-07	2	8.101E-07	2

Table 12.3.14 Summary Results from Quantification of S2H Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
2	10-1-05-01-27	1.66e-07	1	1.49e-08	1	1.49e-08	1
Totals		1.660e-07	1	1.489e-08		1.489e-08	1

Sequence Quantification

Table 12.3.15 Summary Results from Quantification of A5HY Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
2	3-07-01-27	3.46e-07	1	3.11e-08	1	3.49e-07	1
Totals		3.460e-07	1	3.112e-08	1	3.49E-07	1

Table 12.3.16 Summary Results from Quantification of S1H-5 Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
2	3-09-01-27	3.44e-07	1	3.10e-08	1	3.44e-07	1
Totals		3.440e-07	1	3.099e-08	1	3.443E-08	1

Table 12.3.17 Summary Results from Quantification of S2-5 Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
4	11-1-02-23	1.32e-08	1	1.32e-08	1	1.32e-08	1
Totals		1.323e-08	1	1.323e-08	1	1.323E-08	1

Table 12.3.18 Summary Results from Quantification of S1-5 Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
2	02-06-01-27	7.34e-07	1	6.61e-08	1	7.34e-07	1
8	06-06-01-27	7.26e-08	1	6.54e-09	1	7.26e-07	1
TOTAL		8.07e-07	2	7.26e-08	2	8.069e-07	2

Table 12.3.19 Summary Results from Quantification of E2T Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
73	04-11-01-27	7.54e-06	1	6.78e-07	1	5.85e-07	1
106	04-50-2	4.60e-07	1	4.60e-07	1	2.44e-08	1
112	04-51-36	3.34e-07	1	3.34e-07	1	1.77e-08	1
TOTAL		8.334e-06	3	1.472e-06	3	6.267E-07	3

Table 12.3.20 Summary Results from Quantification of E2V Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
38	04-11-01-27	7.12e-07	1	6.41e-08	1	5.52e-08	1
58	04-80-2	4.34e-08	1	4.34e-08	1	1.09e-08	1
62	04-81-35-04	7.79e-08	1	7.79e-08	1	1.95e-08	1
TOTAL		8.333e-07	3	1.854e-07	3	8.555E-08	3

Table 12.3.21 Summary Results from Quantification of TLM Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
2	03-01-04-01-27	2.19e-07	1	1.97e-08	1	1.70e-08	1
20	03-01-38-51-36	2.43e-07	1	2.43e-07	1	1.29e-08	1
55	SEQ-600405	1.75e-07	1	1.58e-08	1	1.36e-08	1
59	SEQ-600663	1.38e-05	1	3.44e-06	1	1.03e-07	1
70	SEQ-601569	2.99e-07	1	2.69e-08	1	2.32e-08	1
75	SEQ-601827	2.34e-05	1	5.86e-06	1	1.76e-07	1
84	SEQ-610479	1.36e-06	1	3.40e-07	1	3.40e-07	1
89	SEQ-610751	2.32e-06	1	5.80e-07	1	5.80e-07	1
90	SEQ-610752	5.94e-08	1	5.94e-08	1	1.49e-08	1
TOTAL		4.187e-05	9	1.058e-05	9	1.280e-06	9

Table 12.3.22 Summary Results from Quantification of E1T Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
77	05-05-01-27	1.17e-06	3	1.05e-07	3	8.59e-08	1
109	05-10-01-27	1.27e-06	3	1.14e-07	3	9.31e-08	1
118	05-11-01-27	1.70e-06	17	1.53e-07	17	1.15e-07	7
232	07-11-01-27	6.44e-06	4	5.80e-07	4	4.96e-07	3
268	07-50-2	3.92e-07	3	3.92e-07	3	1.94e-08	1
274	07-51-36	2.66e-07	1	2.66e-07	1	1.41e-08	1
Totals		1.124e-05	31	1.610e-06	31	8.259e-07	14

Table 12.3.23 Summary Results from Quantification of E1V Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass with Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
1	03-05-81-35-03	6.79e-07	5	1.70e-07	5	1.70e-07	5
7	03-38-81-35-03	1.20e-06	9	3.01e-07	9	2.89e-07	5
47	08-11-01-27	6.07e-07	3	5.46e-08	3	4.40e-08	1
68	08-81-35-04	6.21e-08	1	6.21e-08	1	1.55e-08	1
89	10-11-01-27	2.87e-07	1	2.58e-08	1	2.23e-08	1
99	10-80-1-05	3.07e-05	37	1.98e-06	37	1.24e-07	2
105	10-81-35-03	5.50e-06	5	2.17e-08	5	1.08e-08	1
106	10-81-35-04	1.39e-07	1	1.39e-07	1	3.47e-08	1
108	10-81-36	5.61e-08	1	5.61e-08	1	1.40e-08	1
Totals		8.530e-06	26	8.303e-07	26	6.000e-07	16

Table 12.3.24 Summary Results from Quantification of T1 Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
24	3-05-08-11-01-27	4.10e-06	1		1	1.53e-08	1
39	3-05-08-51-29-03	7.72e-05	1		1	2.37e-08	1
42	3-05-08-51-29-06	2.58e-07	2		2	1.78e-08	1
72	3-05-15-11-01-27	6.97e-06	1		1	2.60e-08	1
90	3-05-15-51-29-03	1.31e-04	1		1	4.04e-08	1
93	3-05-15-51-29-06	4.40e-07	2		2	3.03e-08	1
198	3-09-01-24-23	3.36e-06	11		11	3.98e-08	2
208	3-09-04-24-23	3.64e-06	11		11	4.31e-08	2
209	3-09-04-25-23	1.25e-06	9		9	1.01e-08	1
229	3-09-52-23	4.41e-05	26		26	1.79e-06	12
237	3-14	8.82e-05	114		114	3.21e-06	28
258	5-06-08-81-29-03	3.11e-06	1		1	3.19e-08	1
277	5-06-15-81-29-03	5.30e-06	1		1	5.44e-01	1
291	5-09-81-29-03	1.43e-06	1		1	1.47e-08	1
294	5-10-83-10	3.25e-05	27		27	1.73e-06	10
295	5-15	8.66e-06	49		49	3.89e-07	12
305	7-7-3	4.47e-05	28		28	1.05e-07	2
312	7-9	1.19e-05	49		49	9.55e-08	3
TOTALS		4.678E-04	335		335	7.663E-06	81

Table 12.3.25 Summary Results from Quantification of H1 Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
13	03-01-05-01-27	2.99e-07	2	2.70e-08	2	1.93e-08	1
30	03-01-11-01-27	1.59e-05	1	1.43e-06	1	1.23e-06	1
40	03-01-22-04-27	2.92e-07	2	2.63e-08	2	2.26e-08	2
60	03-01-50-2	9.67e-07	1	9.67e-07	1	5.12e-08	1
62	03-01-51-35-04	2.15e-06	1	5.38e-07	1	1.61e-08	1
65	03-01-51-36	8.69e-07	1	8.69e-07	1	4.61e-08	1
91	03-06-11-01-27	1.57e-06	1	1.41e-07	1	1.22e-07	1
Total		2.20E-05	9	3.998E-06	9	1.505E-06	8

Table 12.3.26 Summary Results from Quantification of TRPT Accident Sequences

		Before Recovery		After First Recovery Pass Before Cut Set Update		After Final Recovery Pass With Cut Set Update	
No.	Name	Frequency	No. Cut Sets	Frequency	No. Cut Sets	Frequency	No. Cut Sets
9	03-01-16-51-36	1.28e-06	1	6.80e-08	1	6.80e-08	1
67	SEQ-6A0483	1.58e-06	1	1.42e-07	1	1.22e-07	1
79	SEQ-6A1467	3.18e-06	1	2.38e-08	1	2.38e-08	1
81	SEQ-6A1469	3.36e-08	1	3.36e-08	1	3.36e-08	1
107	SEQ-6C00483	1.56e-07	1	1.40e-08	1	1.21e-08	1
113	SEQ-6C01624	1.24e-05	5	3.96e-08	5	2.45e-08	1
114	SEQ-6C01625	3.14e-07	1	7.86e-08	1	7.86e-08	1
117	SEQ-6C06873	1.49e-07	5	3.74e-08	5	2.61e-08	2
Totals		1.936e-05	20	5.049e-07	20	3.890E-07	9

Table 12.3.27 Summary Results for All IEs Before Time Window Analysis

Initiating Event	Totals Before Recovery			Totals After First Recovery Pass: Before Cut Set Update			Totals After Final Recovery Pass: With Cut Set Update		
	Number of Sequences	Number of Cut Sets	Frequency	Number of Sequences	Number of Cut Sets	Frequency	Number of Sequences	Number of Cut Sets	Frequency
T5D	540	3,838	3.487E-03	540	3,838	5.389E-05	17	17	5.938E-06
T5A	231	2,823	1.744E-03	231	2,823	7.646E-05	11	18	8.407E-07
TDB	129	254	9.055E-05	129	254	7.688E-06	28	28	6.107E-06
TIA	237	1,343	4.905E-04	237	1,343	7.780E-06	18	22	3.387E-06
TAB	40	60	1.296E-05	40	60	4.281E-06	12	12	1.753E-06
J2	313	3,022	1.364E-03	313	3,022	5.580E-05	6	6	3.025E-07
E1B	424	5,125	5.847E-04	424	5,125	6.541E-06	2	2	2.612E-08
E2B	258	2,408	8.090E-03	258	2,408	3.531E-05	18	29	8.870E-07
E1D	85	284	4.496E-05	85	284	2.040E-06	5	6	1.090E-07
E2D	67	450	6.645E-05	67	373	6.106E-06	3	3	7.879E-08
T5B	103	392	6.262E-05	103	392	8.525E-07	1	1	1.028E-08
T5C	103	392	6.262E-05	103	392	8.525E-07	1	1	1.028E-08
A5	12	12	1.738E-06	12	12	1.430E-07	2	2	8.101E-07
S2H-5	8	8	5.778E-07	8	8	1.634E-08	1	1	1.489E-08
S3H-5	0	0	0	0	0	0	0	0	0
A5HY	2	2	3.841E-07	2	2	3.115E-08	1	1	3.492E-07
S1H-5	2	2	3.825E-07	2	2	3.102E-08	1	1	3.443E-07
S2-5	15	16	1.357E-06	15	16	2.312E-08	1	1	1.323E-08
S3-5	1	1	1.270E-08	1	1	1.143E-09	0	0	0

Table 12.3.27 Summary Results for All IEs Before Time Window Analysis (Continued)

Initiating Event	Totals Before Recovery			Totals After First Recovery Pass: Before Cut Set Update			Totals After Final Recovery Pass: With Cut Set Update		
	Number of Sequences	Number of Cut Sets	Frequency	Number of Sequences	Number of Cut Sets	Frequency	Number of Sequences	Number of Cut Sets	Frequency
SI-5	12	12	1.736E-06	12	12	7.350E-08	2	2	8.069E-07
TIOP	4	7	7.403E-08	4	7	5.663E-12	0	0	0
E1C	0	0	0	0	0	0	0	0	0
E2C	0	0	0	0	0	0	0	0	0
E2T	124	1456	1.340E-03	124	1456	6.275E-05	3	3	6.267E-07
E2V	79	436	1.406E-04	79	436	9.010E-06	3	3	8.555E-08
TLM	147	681	1.458E-04	147	681	1.586E-05	9	9	1.280E-06
E1T	343	4483	2.418E-03	329	4483	8.526E-05	6	14	8.259E-07
E1V	109	801	1.941E-04	108	801	7.655E-06	8	16	6.000E-07
TIHP	28	77	2.398E-06	28	77	1.507E-07	0	0	0
TIOF	110	346	3.308E-05	110	346	6.830E-07	0	0	0
TORV	0	0	0	0	0	0	0	0	0
T1	388	4379	3.635E-02	388	4379	Not Available	17	81	7.663E-06
H1	245	1489	5.474E-04	245	1489	5.422E-06	7	8	1.505E-06
TRPT	150	826	2.666E-04	150	826	6.644E-07	8	9	3.890E-07
TOTALS	4,309.00	35,425.00	5.754E-02	4,294.00	35,348.00	4.454E-04	191.00	296.00	3.476E-05

Sequence Quantification

Table 12.4.1 Results from the Time Window Analysis

Sequence Number	Initiating Event	Name	Point Estimate	Number of Cut Sets	Time Window
1	A5	02-06-01-27-W1	2.046e-08	1	1
2	A5	02-06-01-27-W2A	5.787e-08	1	2
3	A5	02-06-01-27-W2B	1.229e-07	1	2
4	A5	02-06-01-27-W3A	2.567e-07	1	3
5	A5	06-06-01-27-W3A	2.884e-08	1	3
6	A5HY	3-07-01-27-W3A	2.025e-07	1	3
7	E1T5H	07-11-01-27-W2	4.059e-08	1	2
8	E2T5H	04-11-01-27-W2	5.097e-08	1	2
9	H1-5H	03-01-11-01-27W1	1.624e-08	1	1
10	H1-5H	03-01-11-01-27W2	1.078e-07	1	2
11	H1-5H	03-01-50-2-W2	1.310e-08	1	2
12	J2-5	2-01-11-01-27-W2	2.094e-08	1	2
13	S1-5	02-06-01-27-W1	2.038e-08	1	1
14	S1-5	02-06-01-27-W2A	5.764e-08	1	2
15	S1-5	02-06-01-27-W2B	1.224e-07	1	2
16	S1-5	06-06-01-27-W3A	2.872e-08	1	3
17	S1H-5	3-09-01-27-W3A	1.997e-07	1	3
18	T1-5	3-14-W1A	6.709e-08	2	1
19	T1-5	3-14-W1B	1.712e-08	1	1
20	T1-5	3-14-W1C	1.153e-08	1	1
21	T1-5	3-14-W1E	1.431e-08	1	1
22	T1-5	3-14-W2A	1.087e-08	1	2
23	T1-5	3-14-W2B	1.428e-07	2	2
24	T1-5	3-14-W2C	1.151e-07	2	2
25	T1-5	3-14-W2D	8.541e-08	2	2
26	T1-5	3-14-W2E	2.609e-07	7	2
27	T1-5	5-15-W2B	1.385e-08	1	2
28	T5A5H	03-51-35-04-W2	1.390e-08	1	2
Totals			2.121e-06	38	

Table 12.5.1 Uncertainty Results for Sequences Surviving Recovery Analysis (Sample Size = 1000 and Seed = 12345)

Seq. No.	IE	No. of Cut Sets	Sequence Name	Mean	5th Percentile	Median	95th Percentile	Minimum	Maximum
1	A5	1	02-06-01-27-W1	2.056E-08	7.057E-10	7.388E-09	7.893E-08	1.259E-10	7.573E-07
2	A5	1	02-06-01-27-W2A	5.830E-08	1.800E-09	2.066E-08	2.103E-07	0.000E+00	2.650E-06
3	A5	1	02-06-01-27-W2B	1.202E-07	4.061E-09	4.666E-08	4.431E-07	0.000E+00	5.115E-06
4	A5	1	02-06-01-27-W3A	2.559E-07	9.631E-09	9.389E-08	9.595E-07	6.566E-10	1.032E-05
5	A5	1	06-06-01-27-W3A	2.880E-08	4.761E-10	8.960E-09	1.272E-07	3.343E-11	9.569E-07
6	A5HY	1	3-07-01-27-W3A	2.025E-07	7.418E-09	7.356E-08	7.323E-07	5.413E-10	9.523E-06
7	E1T5H	1	07-11-01-27-W2	3.597E-08	1.757E-10	5.497E-09	1.543E-07	1.951E-12	1.629E-06
8	E2T5H	1	04-11-01-27-W2	4.765E-08	1.200E-09	2.111E-08	1.669E-07	1.736E-11	1.128E-06
9	H1-5H	1	03-01-11-01-27W1	1.530E-08	3.875E-10	6.441E-09	5.429E-08	5.717E-12	2.682E-07
10	H1-5H	1	03-01-11-01-27W2	1.070E-07	2.316E-09	4.385E-08	4.054E-07	0.000E+00	4.965E-06
11	H1-5H	1	03-01-50-2-W2	1.068E-08	1.926E-11	1.108E-09	4.126E-08	0.000E+00	8.152E-07
12	J2-5	1	2-01-11-01-27-W2	1.996E-08	4.621E-10	8.539E-09	6.959E-08	0.000E+00	6.240E-07
13	S1-5	1	02-06-01-27-W1	2.127E-08	7.338E-10	7.062E-09	8.091E-08	6.378E-11	1.486E-06
14	S1-5	1	02-06-01-27-W2A	6.095E-08	1.897E-09	1.984E-08	2.083E-07	0.000E+00	4.216E-06
15	S1-5	1	02-06-01-27-W2B	1.309E-07	3.897E-09	4.359E-08	4.964E-07	0.000E+00	1.040E-05
16	S1-5	1	06-06-01-27-W3A	2.961E-08	4.292E-10	8.478E-09	1.214E-07	5.177E-11	8.246E-07
17	S1H-5	1	3-09-01-27-W3A	2.038E-07	6.380E-09	7.204E-08	7.021E-07	3.295E-10	1.015E-05
18	T1-5	2	3-14-W1A	3.723E-08	2.503E-09	1.732E-08	1.362E-07	2.908E-10	8.941E-07
19	T1-5	1	3-14-W1B	1.729E-08	6.120E-11	1.620E-09	5.005E-08	2.319E-12	2.037E-06
20	T1-5	1	3-14-W1C	1.199E-08	9.184E-11	1.918E-09	3.949E-08	6.525E-12	9.448E-07
21	T1-5	1	3-14-W1E	1.246E-08	4.318E-11	1.443E-09	5.113E-08	9.278E-13	5.536E-07
22	T1-5	1	3-14-W2A	6.159E-09	1.986E-11	7.972E-10	2.582E-08	0.000E+00	2.922E-07
23	T1-5	2	3-14-W2B	1.248E-07	1.398E-09	2.323E-08	4.909E-07	0.000E+00	1.333E-05
24	T1-5	2	3-14-W2C	9.750E-08	2.946E-09	3.125E-08	3.680E-07	0.000E+00	5.983E-06
25	T1-5	2	3-14-W2D	9.403E-08	8.364E-10	1.563E-08	3.189E-07	0.000E+00	1.178E-05
26	T1-5	7	3-14-W2E	2.848E-07	3.390E-09	5.685E-08	9.433E-07	0.000E+00	5.334E-05
27	T1-5	1	5-15-W2B	1.085E-08	8.314E-12	5.298E-10	3.483E-08	6.204E-14	1.657E-06
28	T5A5H	1	03-51-35-04-W2	1.521E-08	1.106E-10	2.534E-09	5.377E-08	0.000E+00	0.00000163

Sequence Quantification

Table 12.5.2 Point Estimate vs. Mean Core Damage Frequency

Sequence Number	Initiating Event	Name	Point Estimate	Mean	Number of Cut Sets	Time Window
1	A5	02-06-01-27-W1	2.046E-08	2.056E-08	1	1
2	A5	02-06-01-27-W2A	5.787E-08	5.830E-08	1	2
3	A5	02-06-01-27-W2B	1.229E-07	1.202E-07	1	2
4	A5	02-06-01-27-W3A	2.567E-07	2.559E-07	1	3
5	A5	06-06-01-27-W3A	2.884E-08	2.880E-08	1	3
6	A5HY	3-07-01-27-W3A	2.025E-07	2.025E-07	1	3
7	E1T5H	07-11-01-27-W2	4.059E-08	3.597E-08	1	2
8	E2T5H	04-11-01-27-W2	5.097E-08	4.765E-08	1	2
9	H1-5H	03-01-11-01-27W1	1.624E-08	1.530E-08	1	1
10	H1-5H	03-01-11-01-27W2	1.078E-07	1.070E-07	1	2
11	H1-5H	03-01-50-2-W2	1.310E-08	1.068E-08	1	2
12	J2-5	2-01-11-01-27-W2	2.094E-08	1.996E-08	1	2
13	S1-5	02-06-01-27-W1	2.038E-08	2.127E-08	1	1
14	S1-5	02-06-01-27-W2A	5.764E-08	6.095E-08	1	2
15	S1-5	02-06-01-27-W2B	1.224E-07	1.309E-07	1	2
16	S1-5	06-06-01-27-W3A	2.872E-08	2.961E-08	1	3
17	S1H-5	3-09-01-27-W3A	1.997E-07	2.038E-07	1	3
18	T1-5	3-14-W1A	6.709E-08	3.723E-08	2	1
19	T1-5	3-14-W1B	1.712E-08	1.729E-08	1	1
20	T1-5	3-14-W1C	1.153E-08	1.199E-08	1	1
21	T1-5	3-14-W1E	1.431E-08	1.246E-08	1	1
22	T1-5	3-14-W2A	1.087E-08	6.159E-09	1	2
23	T1-5	3-14-W2B	1.428E-07	1.248E-07	2	2
24	T1-5	3-14-W2C	1.151E-07	9.750E-08	2	2
25	T1-5	3-14-W2D	8.541E-08	9.403E-08	2	2
26	T1-5	3-14-W2E	2.609E-07	2.848E-07	7	2
27	T1-5	5-15-W2B	1.385E-08	1.085E-08	1	2
28	T5A5H	03-51-35-04-W2	1.390E-08	1.521E-08	1	2
			2.121E-06	2.082E-06	38	

References for Section 12

- [Russell, et al., 1992] K. D. Russell, et al.,
"Integrated Reliability and Risk
Analysis System (IRRAS)
Version 4.0", NUREG/CR-
5813, EGG-2664, January 1992.

13 Plant Damage State Analysis Results

13.1 Description of Plant Damage States

A total of 28 core damage sequences containing 38 cut sets survived the Level 1 analysis. These cut sets were grouped into 22 ESs which were then collapsed into twelve PDSs. The sequences contained in each ES and the rationale used to collapse the ES into PDS are discussed in Appendix L.

The alpha-numeric identifiers associated with the twelve PDSs are presented in Table 13-1; the definitions for these identifiers are presented in Table 7-1. The first number in the PDS name identifies the Time Window in which the accident occurs, the second number identifies the PDS number. For example, PDS1-3 is the third PDS in Time Window 1.

Table 13.1
Plant Damage State Descriptions

Plant Damage States	Alpha-numeric Description	Plant Damage States	Alpha-numeric Description
PDS1-1	A-A-AAA-AC-AA-A1	PDS2-2	D-C-BAA-AD-AB-D2
PDS1-2	D-C-BAA-AD-AB-C1	PDS2-3	B-C-BAA-AD-AB-D2
PDS1-3	C-C-BAB-AA-AB-H1	PDS2-4	A-A-AAA-BB-AA-G2
PDS1-4	B-C-BAA-AD-AB-C1	PDS2-5	A-B-AAA-AA-BC-H2
PDS1-5	A-A-AAA-BB-AA-F1	PDS2-6	A-B-ABA-BE-BC-E2
PDS2-1	A-A-AAA-AC-AA-B2	PDS3-1	A-A-AAA-AC-AA-F3

A brief description of each of the twelve PDSs is provided below.

13.1.1 Plant Damage State PDS1-1

The accidents in PDS1-1 are initiated by a LOCA (A or S1) while the plant is in Time Window 1. The break drains the vessel to the top of the jet pumps (i.e., 2/3 core height). The operators attempt to establish water solid operation (i.e., form a water solid loop between the RPV and the suppression pool) with low pressure ECCS. HPCS is unavailable due to maintenance or random hardware failures. In a LOCA the water will drain from the vessel via the break into the drywell. To form a water solid loop enough water must be pumped into the drywell (i.e., via the break) to flood the drywell up to the weir wall to form a connection between the drywell and suppression pool. To establish a connection between the drywell and the wetwell the operators must dump the SPMU into the suppression pool. In this scenario,

however, the operators fail to dump the SPMU in sufficient time to prevent ECCS from failing on inadequate suction head. Once the ECCS pumps fail, they are assumed to be lost for the entire accident. Unable to perform a water solid operation, the operators attempt to flood the containment with the standby service water crosstie. To successfully flood the containment, the lower personnel lock must be closed. In this plant damage state, the operators did not close the lower personnel lock. Thus, the containment is flooded up to the lower personnel lock at which point the water then enters the auxiliary building. It was assumed that the flooding operation would flood the auxiliary building resulting in the loss of all core and containment cooling one hour after the start of the accident. Core damage is estimated to occur approximately one hour after the loss of core cooling (i.e., core damage is estimated to occur two hours after the initiating event).

At the onset of core damage, the vessel integrity is breached (i.e., the break), the vessel is at low pressure, the containment is open. While offsite power is available during

PDS Results

the accident, both the core cooling and the containment cooling functions are lost for the entire accident.

13.1.2 Plant Damage State PDS1-2

The accidents in PDS1-2 are initiated by a loss of offsite power (T1) followed by a failure of the Train B emergency diesel generator to either start or to run for sufficient time to prevent core damage. The initiating event occurs while the plant is in Time Window 1. The Train A emergency diesel generator is unavailable due to maintenance. HPCS is also unavailable due to either maintenance or random hardware failures. These events result in a station blackout (i.e., loss of all onsite and offsite ac power) resulting in a loss of all emergency core cooling. Furthermore, the station batteries deplete within 2 hours from the start of the accident. Without dc power, the SRVs cannot be opened to keep the vessel at low pressure. To complicate matters, the valves that isolate the low pressure piping and components on the SDC system from the high pressure piping associated with the RPV require ac power to change position. Thus, without ac power these valves remain open. Without core cooling the vessel inventory begins to boil and the resulting steam pressurizes the RPV. The pressurization of the RPV fails the low pressure components associated with the SDC system resulting in a break outside the containment. The break drains the vessel to the top of the jet pumps (i.e., 2/3 core height). Without a means to supply coolant to the core, the accident proceeds to core damage. It is estimated that core damage occurs 3.5 hours after the initiation of the accident.

At the time of core damage the vessel integrity has been breached and the primary system is at low pressure. It is assumed that the loss of dc power precludes the recovery of offsite power. Without electric power, the containment cannot be closed and the core and containment cooling systems cannot be restored.

13.1.3 Plant Damage State PDS1-3

This PDS is similar to PDS1-2 except that the station batteries continue to provide dc power for 12 hours. With dc power available, the operators are able to open two SRVs to keep the vessel depressurized. The operators then align the firewater system to provide coolant to the core. Once the station batteries fail 12 hours after the initiating event, the SRVs close, the vessel pressurizes and the firewater system is lost due to high vessel pressure. In this PDS, the operators

manually isolate the low pressure components of the SDC system from the high pressure primary system. (Note: In this PDS, as apposed to PDS1-2, there is considerable amount of time between the loss of offsite power and the pressurization of the vessel which provides the operators sufficient time to manually isolate the SDC system.) Without core cooling the accident proceeds to core damage in approximately 12 hours.

At the time of core damage, the vessel is at system pressure with pressure relief being provided by the SRVs cycling at their setpoints. The reactor vessel head vent is also open. It is assumed that the loss of dc power precludes the recovery of offsite power. Without electric power, the containment cannot be closed and the core and containment cooling systems cannot be restored.

13.1.4 Plant Damage State PDS1-4

This PDS is the same as PDS1-2 except that the station batteries continue to provide dc power for at least 3.5 hours. In this PDS the operators fail to open two SRVs and align the firewater system for core injection. Furthermore, there is insufficient time for the operators to manually isolate the SDC system from the primary system. Without core cooling the vessel inventory begins to boil and the resulting steam pressurizes the RPV. The pressurization of the RPV fails the low pressure components associated with the SDC system resulting in a break outside the containment. The break drains the vessel to the top of the jet pumps (i.e., 2/3 core height). Without a means to supply coolant to the core, the accident proceeds to core damage. It is estimated that core damage occurs 3.5 hours after the initiation of the accident.

At the time of core damage the vessel integrity has been breached, the primary system is at low pressure, and the containment equipment hatch is open. Since dc power is available it is possible to restore offsite power after the onset of core damage. Following the recovery of ac power, low pressure ECCS can be used to provide coolant to the core.

13.1.5 Plant Damage State PDS1-5

The accidents in PDS1-5 are initiated by a valve misalignment that diverts vessel water to the suppression pool via the RHR system (H1) while the plant is Time Window 1. The diversion of water is automatically isolated when the vessel water level reaches Level 3. The operators recognize the diversion and attempt to restore core cooling using the water solid operation (i.e., form a water solid loop between the vessel and the suppression pool), however, the suppression pool is empty. Next, the operators attempt to flood the containment by injecting water into the vessel using SSW

crosstie. Once the vessel is full, the water passes through the SRVs and enters the suppression pool. In this PDS, however, the operator fails to close the lower containment personnel lock. With the lower personnel lock open, the water being used to flood the containment will pass through the lock and flood the auxiliary building. Once the auxiliary building is flooded, it is assumed that all core and containment cooling systems are lost. At this point in the accident the water level in the vessel is at the main steamlines. Without core cooling the temperature of the core coolant will increase until it reaches the saturation temperature at which point it will begin to boil. The steam generated during the boiling process passes through the SRVs and is condensed in the suppression pool. Core damage is estimated to occur 7 hours after the initiating event.

At the onset of core damage, two SRVs are open, the reactor vessel head vent is open, and the primary system is at low pressure. Even though offsite power is available, the containment is open and all core and containment cooling systems are lost for the entire accident.

13.1.6 Plant Damage State PDS2-1

The accidents in PDS2-1 are initiated by a LOCA (A or S1). This PDS is the same as PDS1-1 except that the accident is initiated while the plant is in Time Window 2.

13.1.7 Plant Damage State PDS2-2

The accidents in PDS2-2 are initiated by a loss of offsite power (T1). This PDS is the same as PDS1-2 except that the initiating event occurs while the plant is in Time Window 2.

13.1.8 Plant Damage State PDS2-3

The accidents in PDS2-3 are initiated by a loss of offsite power (T1). This PDS is the same as PDS1-4 except that the initiating event occurs while the plant is in Time Window 2.

13.1.9 Plant Damage State PDS2-4

The accidents in PDS2-4 are initiated by a diversion of vessel water to the suppression pool via the RHR system due to a misalignment of valves. This PDS is the same as PDS1-5 except that the initiating event occurs while the plant is in Time Window 2.

13.1.10 Plant Damage State PDS2-5

The accidents in this PDS are initiated by a loss of all SSW (T5A) which leads to loss of both Train A and Train B ECCS. HPCS is unavailable due to maintenance of random hardware failures. The operators recognize the loss of SDC but are unable to establish water solid operation because all of the ECCS injection systems are unavailable. Without core cooling, the core coolant inventory temperature increases until it reaches saturation at which point the vessel coolant begins to boil and the vessel begins to pressurize. In this PDS, the operators do not open the SRVs to keep the vessel at low pressure and, therefore, the vessel will pressurize to system pressure and will be maintained at system pressure with the SRVs providing pressure relief at their pressure setpoints. The steam generated in the vessel is directed to the suppression pool, via the SRV tailpipes, where it is condensed. Core damage is estimated to occur 12 hours after the initiating event.

At the onset of core damage, the primary system is at system pressure and the vessel head vent is open. All core and containment cooling systems are lost for the entire accident. The containment can be either open or closed. In the case that the containment is closed prior to core damage, the containment vent system is available to relieve the pressure in the containment.

13.1.11 Plant Damage State PDS2-6

The accidents in PDS2-6 are initiated by a valve misalignment that diverts vessel water to the suppression pool via the RHR system (H1) while the plant is Time Window 2. The diversion of water is automatically isolated when the vessel water level reaches Level 3. The operators recognize the diversion and attempt to restore core cooling using the water solid operation (i.e., form a water solid loop between the vessel and the suppression pool). The operators turn on the ECCS pumps and pump water from the suppression pool into the vessel. In this PDS, the MSIVs are open at the start of the accident and the operators fail to close them during the accident. Furthermore, the operators do not turn ECCS off once the vessel is full. Instead, the water fills the vessel and flows out through the steam lines to the turbine. This is allowed to continue until the ECCS suction strainers in the suppression pool are uncovered. At this point ECCS will fail. Furthermore, it is assumed that the resulting flood in the turbine building will fail any remaining core and containment cooling systems. With the water level now at the main steamlines, the coolant temperature will increase until it reaches saturation at which point the water will begin to boil. The steam generated during the boiloff process will be

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transported to the condenser via the main steamlines. Without core cooling the accident will proceed to core damage in 6.75 hours.

At the time of core damage the MSIVs are open which establishes a direct path from the RPV to the turbine building which is outside the containment. Because the MSIVs are open the primary system is at low pressure. Offsite power is available and the containment can be either open or closed. All core and containment cooling systems are lost for the entire accident.

13.1.12 Plant Damage State PDS3-1

The accidents in PDS3-1 are initiated by a LOCA (A or S1). This PDS is similar to PDS1-1 except that the accident is initiated while the plant is in Time Window 3 and HPCS was initially available. In this PDS, the failure by the operators to dump SPMU results in a loss of all ECCS (both high pressure and low pressure).

13.2 Plant Damage State Results

The 12 PDSs along with their alpha-numeric identifiers, frequencies and fractional contributions to the core damage frequency are presented in Table 13-2. The definitions for the alpha-numeric identifiers are provided in Table 7-1. From Table 13-2 the following observations can be made:

- The containment can only be closed in PDS2-5 and PDS2-6. Combined, these two PDSs contribute only 1 % to the mean core damage frequency. In all of the other PDSs the containment is open to auxiliary building. Thus, at least 99 % percent of the mean core damage frequency results from accidents in which the containment is open allowing for the possibility of a significant release.
- Core coolant can be recovered in only PDS1-4 and PDS2-3. Combined, these two PDS only contribute 5 % to the mean core damage frequency. All of the other PDS will progress to full core damage and vessel failure.
- The reactor pressure vessel is breached prior to core damage in eight of the twelve PDSs (PDS1-3, PDS1-2, PDS1-4, PDS2-1, PDS2-2, PDS2-3, PDS2-6, PDS3-1). Combined these accident contribute 86 % to the mean core damage frequency. Breach of the vessel allows

radioactive material released in the vessel during core damage to bypass the suppression pool. The suppression pool is an effective device that is used to trap radioactive material and, therefore, reduce the amount of radioactive material released into the containment atmosphere. In all of these accidents the containment is open or it is bypassed.

Based on these observations, the POS 5 PDSs are dominated by accidents in which the containment is open or bypassed, the vessel is breached, and core coolant cannot be restored to the vessel to arrest the core damage process before vessel failure.

Table 13.2
Plant Damage State Results

Plant Damage States	Alpha-numeric Description	Descriptive Statistics ¹ : Core Damage Frequency (1/yr)				Fractional Contribution ²	
		5%	50%	95%	Mean	FCM-CDF	MFC-CDF
PDS1-1	A-A-AAA-AC-AA-A1	1.31E-09	1.51E-08	1.56E-07	4.05E-08	0.020	0.017
PDS1-2	D-C-BAA-AD-AB-C1	2.15E-10	4.93E-09	1.11E-07	2.48E-08	0.012	0.016
PDS1-3	C-C-BAB-AA-AB-H1	2.82E-09	1.75E-08	1.22E-07	3.59E-08	0.018	0.027
PDS1-4	B-C-BAA-AD-AB-C1	9.33E-11	1.97E-09	3.79E-08	9.34E-09	0.005	0.007
PDS1-5	A-A-AAA-BB-AA-F1	4.78E-10	6.03E-09	6.68E-08	1.59E-08	0.008	0.011
PDS2-1	A-A-AAA-AC-AA-B2	1.13E-08	1.35E-07	1.41E-06	3.67E-07	0.184	0.154
PDS2-2	D-C-BAA-AD-AB-D2	2.12E-08	1.72E-07	1.63E-06	4.47E-07	0.224	0.210
PDS2-3	B-C-BAA-AD-AB-D2	3.05E-09	2.87E-08	3.33E-07	9.29E-08	0.046	0.055
PDS2-4	A-A-AAA-BB-AA-G2	6.04E-09	9.93E-08	8.19E-07	2.14E-07	0.107	0.140
PDS2-5	A-B-AAA-AA-BC-H2	1.06E-10	2.59E-09	6.01E-08	1.47E-08	0.007	0.010
PDS2-6	A-B-ABA-BE-BC-E2	1.69E-11	1.07E-09	5.22E-08	1.17E-08	0.006	0.009
PDS1-3	A-A-AAA-AC-AA-F3	6.50E-08	3.75E-07	2.29E-06	7.26E-07	0.363	0.343
Total		4.13E-07	1.34E-06	5.38E-06	2.00E-06		

Note 1: Statistics based on a sample size of 1000

Note 2: FCM-CDF = Fractional contribution to mean core damage frequency

MFC-CDF = Mean fractional contribution to core damage frequency

14 Results and Conclusions

The results and conclusions from the Low Power and Shutdown (LP&S) Phase 2 Detailed Analysis of Plant Operational State (POS 5) at Grand Gulf during a refueling outage are presented in this section. Section 14.1 presents results for each of the initiating events and for the total plant model. Section 14.2 describes the conclusions resulting from this study.

14.1 Results

This section presents results from the LP&S Phase 2 Detailed Analysis of POS 5 at Grand Gulf during a refueling outage.

14.1.1 Core Damage Frequency Characterization

Any cut set with a frequency greater than or equal to $1.0E-8$ after the Time Window Analysis was saved. The total estimate of the core damage frequency (CDF) presented in this section results from combining the mean CDFs from all 38 sequence cut sets for the 28 sequences that survived the sequence analysis through the Time Window Analysis. For POS 5 during a refueling outage at Grand Gulf, the sum of the mean CDFs from the surviving sequences is $2.1E-6$ per year for internally initiated events (excluding internal fires and floods). Table 14.1 lists uncertainty information (mean, 5th percentile, median, and 95th percentile) and percentage contribution to the total mean CDF for each sequence. Table 14.2 list each initiator, its mean CDF, and its percentage contribution to the total mean CDF. Figure 14-1 provides the same information in graphical form.

14.1.2 Accident Sequence Results

For each accident initiator this section provides: 1) a short description, 2) the mean CDF, 3) a listing of the accident sequence cut sets, and 4) a listing of the importance measures for each of the basic events contained in the sequence cut sets. (NOTE: The -W# attached to some of the top events indicates the Time Window being examined and is used to uniquely identify the top events. In the description of the accident sequences, the specific Time Window will be identified only once. Also note that due to the large number of tables referred to in Section 14.1.2, these tables will appear at the end of Section 14.)

14.1.2.1 A5 Sequences

14.1.2.1.1 Sequence 02-06-01-27-W1

The logic for sequence 02-06-01-27-W1 is as follows: A5 * POS5 * WD-1 * /PRESS-W1 * /ISSDC-W1 * /WHERE * NOFW * /RLOSP * /ISSP-W1 * /SPWLW-W1 * HPCS-W1 * /LPCS-W1 * OPSPM * /OPFLL * /SSWXT * /ISMSV-W1 * ISTCT-W1 * CTGOP-W1 * OPICT. The sequence is initiated by a large LOCA (A5) inside containment (/WHERE) during Time Window 1 (WD-1). The reactor is in POS 5 (POS5) during non-hydro conditions (/PRESS) with DHR provided by SDC (ISSDC). A random LOSP does not occur (/RLOSP). There is water in the Suppression Pool (/ISSP * /SPWLW); however, the operators fail to dump the Suppression Pool makeup (OPSPM). HPCS fails (HPCS) and LPCS works for a period of time. The operators decide to flood the containment given the LOCA (/OPFLL). The MSIVs are closed (/ISMSV) and the SSW system is successfully cross-tied (/SSWXT) to inject water into the vessel. The containment is open low, i.e., the lower personnel air lock is open (ISTRC * CTGOP), and the operators fail to close the lower air lock (OPICT). This results in a flood out the containment which is assumed to result in core damage. (In this sequence the event NOFW is a "flag" to the analyst to ensure that the sequence is solved properly.)

Table 14.3 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.4 lists the importance measures for each basic event. The mean CDF for this sequence is $2.1E-8$. The sequence is composed of one cut set.

14.1.2.1.2 Sequence 02-06-01-27-W2A

The logic for sequence 02-06-01-27-W2A is as follows: A5 * POS5 * WD-2 * /PRESS-W2 * /ISSDC-W2 * /WHERE * NOFW * /RLOSP * /ISSP-W2 * /SPWLW-W2 * HPCS-W2 * /LPCS-W2 * OPSPM * /OPFLL * /SSWXT * /ISMSV-W2 * ISTCT-W2 * CTGOP-W2 * OPICT. This sequence is the same as 02-06-01-27-W1 except the accident occurs in Time Window 2 (WD-2).

Table 14.5 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.6 lists the importance measures for each basic event. The mean CDF for this sequence is $5.8E-8$. The sequence is composed of one cut set.

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Table 14.1 Core Damage Frequency Information by Sequence

IE	Sequence Name	Mean CDF	Percentage of CDF	5th Percential	Median	95th Percentile
A5	02-06-01-27-W1	2.056e-08	0.99	7.057e-10	7.388e-09	7.893e-08
A5	02-06-01-27-W2A	5.830e-08	2.80	1.800e-09	2.066e-08	2.103e-07
A5	02-06-01-27-W2B	1.202e-07	5.77	4.061e-09	4.666e-08	4.431e-07
A5	02-06-01-27-W3A	2.559e-07	12.29	9.631e-09	9.389e-08	9.595e-07
A5	06-06-01-27-W3A	2.880e-08	1.38	4.761e-10	8.960e-09	1.272e-07
A5HY	3-07-01-27-W3A	2.025e-07	9.73	7.418e-09	7.356e-08	7.323e-07
E1T5H	07-11-01-27-W2	3.597e-08	1.73	1.757e-10	5.497e-09	1.543e-07
E2T5H	04-11-01-27-W2	4.765e-08	2.29	1.200e-09	2.111e-08	1.669e-07
H1-5H	03-01-11-01-27W1	1.530e-08	0.73	3.875e-10	6.441e-09	5.429e-08
H1-5H	03-01-11-01-27W2	1.070e-07	5.14	2.316e-09	4.385e-08	4.054e-07
H1-5H	03-01-50-2-W2	1.068e-08	0.51	1.926e-11	1.108e-09	4.126e-08
J2-5	2-01-11-01-27-W2	1.996e-08	0.96	4.621e-10	8.539e-09	6.959e-08
S1-5	02-06-01-27-W1	2.127e-08	1.02	7.338e-10	7.062e-09	8.091e-08
S1-5	02-06-01-27-W2A	6.095e-08	2.93	1.897e-09	1.984e-08	2.083e-07
S1-5	02-06-01-27-W2B	1.309e-07	6.29	3.897e-09	4.359e-08	4.964e-07
S1-5	06-06-01-27-W3A	2.961e-08	1.42	4.292e-10	8.478e-09	1.214e-07
S1H-5	3-09-01-27-W3A	2.038e-07	9.79	6.380e-09	7.204e-08	7.021e-07
T1-5	3-14-W1A	3.723e-08	1.79	2.503e-09	1.732e-08	1.362e-07
T1-5	3-14-W1B	1.729e-08	0.83	6.120e-11	1.620e-09	5.005e-08
T1-5	3-14-W1C	1.199e-08	0.58	9.184e-11	1.918e-09	3.949e-08
T1-5	3-14-W1E	1.246e-08	0.60	4.318e-11	1.443e-09	5.113e-08
T1-5	3-14-W2A	6.159e-09	0.30	1.986e-11	7.972e-10	2.582e-08
T1-5	3-14-W2B	1.248e-07	6.00	1.398e-09	2.323e-08	4.909e-07
T1-5	3-14-W2C	9.750e-08	4.58	2.946e-09	3.125e-08	3.680e-07
T1-5	3-14-W2D	9.403e-08	4.52	8.364e-10	1.563e-08	3.189e-07
T1-5	3-14-W2E	2.848e-07	13.68	3.390e-09	5.685e-08	9.433e-07
T1-5	5-15-W2B	1.085e-08	0.52	8.314e-12	5.298e-10	3.483e-08
T5A5H	03-51-35-04-W2	1.521e-08	0.73	1.106e-10	2.534e-09	5.377e-08
		2.082e-06	100.00			

Table 14.2 Core Damage Frequency and Percentage of Total Frequency by Initiating Event

Initiator	Mean CDF	Percentage
A5	4.838e-07	23.24
A5HY	2.025e-07	9.73
E1T5H	3.597e-08	1.73
E2T5H	4.765e-08	2.29
H1-5H	1.330e-07	6.39
J2-5	1.996e-08	0.96
S1-5	2.427e-07	11.66
S1H-5	2.038e-07	9.79
T1-5	6.971e-07	33.49
T5A5H	1.521e-08	0.73
Total	2.082e-06	100.00

Figure 14-1 Contribution to CDF by Initiating Event

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14.1.2.1.3 Sequence 02-06-01-27-W2B

The logic for sequence 02-06-01-27-W2B is as follows:
A5 * POSS * WD-2 * /PRESS-W2 * /ISSDC-W2 *
/WHERE * NOFW * /RLOSP * /ISSP-W2 *
SPWLV-W2 * HPCS-W2 * /LPCS-W2 * OPSPM *
/OPFLL * /SSWXT * /ISMSV-W2 * ISTCT-W2 *
CTGOP-W2 * OPICT. This sequence is the same as 02-06-01-27-W2A except the Suppression Pool water level is different (/ISSP * SPWLV).

Table 14.7 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.8 lists the importance measures for each basic event. The mean CDF for this sequence is $1.2\text{E-}7$. The sequence is composed of one cut set.

14.1.2.1.4 Sequence 02-06-01-27-W3A

The logic for sequence 02-06-01-27-W3A is as follows:
A5 * POSS * WD-3 * /PRESS-W3 * /ISSDC-W3 *
/WHERE * NOFW * /RLOSP * /ISSP-W3 *
/SPWLV-W3 * HPCS-W3 * /LPCS-W3 * OPSPM *
/OPFLL * /SSWXT * /ISMSV-W3 * ISTCT-W3 *
CTGOP-W3 * OPICT. This sequence is the same as 02-06-01-27-W1 except the accident occurs in Time Window 3 (WD-3).

Table 14.9 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.10 lists the importance measures for each basic event. The mean CDF for this sequence is $2.6\text{E-}7$. The sequence is composed of one cut set.

14.1.2.1.5 Sequence 06-06-01-27-W3A

The logic for sequence 06-06-01-27-W3A is as follows:
A5 * POSS * WD-3 * /PRESS-W3 * /ISSDC-W3 *
/WHERE * NOFW * /RLOSP * /ISSP-W3 *
/SPWLV-W3 * HPCS-W3 * /LPCS-W3 * OPSPM *
/OPFLL * /SSWXT * /ISMSV-W3 * ISTCT-W3 *
CTGOP-W3 * OPICT. This sequence is the same as 02-06-01-27-W1 except the accident occurs in Time Window 3 (WD-3) and decay heat removal is by ADHRS (ISSDC).

Table 14.11 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table

14.12 lists the importance measures for each basic event. The mean CDF for this sequence is $2.9\text{E-}8$. The sequence is composed of one cut set.

14.1.2.2 A5HY Sequence

14.1.2.2.1 Sequence 3-07-01-27-W3A

The logic for sequence 3-07-01-27-W3A is as follows:
A5HY * POSS * WD-3 * PRESS-W3 * /WHERE *
NOFW * /RLOSP * /ISSP-W3 * /SPWLV-W3 *
HPCS-W3 * /LPCS-W3 * OPSPM * /OPFLL *
/SSWXT * /ISMSV-W3 * ISTCT-W3 * CTGOP-W3 *
OPICT. This sequence is the same as 02-06-01-27-W1 except the accident occurs during the Hydro Test (A5HY * PRESS) in Time Window 3. Decay heat removal is by means other than SDC or ADHRS.

Table 14.13 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.14 lists the importance measures for each basic event. The mean CDF for this sequence is $2.0\text{E-}7$. The sequence is composed of one cut set.

14.1.2.3 E1T5H Sequence

14.1.2.3.1 Sequence 07-11-01-27-W2

The logic for sequence 07-11-01-27-W2 is as follows:
E1T5H * POSS * WD-2 * /PRESS-W2 * /ISSDB-W2 *
/RLOSP * /OPSDC * RESCS * NOOVP * /OPECS *
/ISMSV-W2 * /2SRV * /ISSP-W2 * /OPFLD *
/ISMSV-W2 * /2SRV * /SSWXT * ISTCT-W2 *
CTGOP-W2. The sequence is initiated by an isolation of the SDC common suction line in POS 5 during Time Window 2 (E1T5H * POSS * WD-2). The reactor is not in a Hydro Test (/PRESS-W2). Decay heat removal is by the SDC system. A random LOSP does not occur (/RLOSP), and the operators recognize the loss of SDC (/OPSDC). The attempt to recover from the SDC isolation fails (RESCS). The operators recognize the need to go water solid (/OPECS) and begin following procedures by opening 2 SRVs (/2SRV). With no water in the Suppression Pool (ISSP), the operators decide to flood the containment (/OPFLD). The MSIVs are closed (/ISMSV) and the 2 SRVs are used to relieve water to the Suppression Pool. The SSW system is successfully cross-tied (/SSWXT) to inject water into the vessel. The containment is open low, i.e., the lower personnel air lock is open (ISTRC * CTGOP), and the operators fail to close the lower air lock (OPICT). This results in a flood out the containment which is assumed to result in core

damage. (In this sequence the event NOOVP is a "flag" to the analyst to ensure that the sequence is solved properly.)

Table 14.15 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.16 lists the importance measures for each basic event. The mean CDF for this sequence is $3.6\text{E-}8$. The sequence is composed of one cut set.

14.1.2.4 E2T5H Sequence

14.1.2.4.1 Sequence 03-01-11-01-27-W2

This sequence is similar to the E1T5H sequence 07-11-01-27-W2 except the initiating event is loss of the SDC common suction line.

Table 14.17 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.18 lists the importance measures for each basic event. The mean CDF for this sequence is $4.8\text{E-}8$. The sequence is composed of one cut set.

14.1.2.5 H1-5H Sequences

14.1.2.5.1 Sequence 03-01-11-01-27W1

The logic for sequence 03-01-11-01-27W1 is as follows: H1-5H * POS5 * WD-1 * /PRESS-W1 * /ISSDC-W1 * /RLOSP * OPL1S * /RHRIL * /SDCIL * /ISSDC-W1 * /RLOSP * /OPECS * /ISMSV-W1 * /2SRV * ISSP-W1 * /OPFLD * /ISMSV-W1 * /2SRV * /S. WXT * ISTCT-W1 * CTGOP-W1 * OPICT. The sequence is initiated by a diversion to the Suppression Pool via the RHR system (H1-5H) in Time Window 1 (WD-1). The reactor is in POS 5 (POS5) during non-hydro conditions (/PRESS) with DHR provided by SDC (/ISSDC). A random LOSP does not occur (/RLOSP). The operators decide to go water solid (/OPECS), open two SRVs (/2SRV), but have no water in the Suppression Pool (ISSP). The operators decide to flood (/OPFLD), the MSIVs are closed (/ISMSV), and two SRVs are opened in relief to the Suppression Pool. The SSW system is successfully cross-tied (/SSWXT) to inject water into the vessel. The containment is open low, i.e., the lower personnel air lock is open (ISTRC * CTGOP), and the operators fail to close the lower air lock (OPICT). This results in a flood out the containment which is assumed to result in core damage.

Table 14.19 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.20 lists the importance measures for each basic event. The mean CDF for this sequence is $1.5\text{E-}8$. The sequence is composed of one cut set.

14.1.2.5.2 Sequence 03-01-11-01-27W2

The logic for sequence 03-01-11-01-27W2 is as follows: H1-5H * POS5 * WD-2 * /PRESS-W2 * /ISSDC-W2 * /RLOSP * OPL1S * /RHRIL * /SDCIL * /ISSDC-W2 * /RLOSP * /OPECS * /ISMSV-W2 * /2SRV * ISSP-W2 * /OPFLD * /ISMSV-W2 * /2SRV * /SSWXT * ISTCT-W2 * CTGOP-W2 * OPICT. The sequence is the same as 03-01-11-01-27W1 except the accident occurs in Time Window 2 (WD-2).

Table 14.21 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.22 lists the importance measures for each basic event. The mean CDF for this sequence is $1.1\text{E-}7$. The sequence is composed of one cut set.

14.1.2.5.3 Sequence 03-01-50-2-W2

The logic for sequence 03-01-50-2-W2 is as follows: H1-5H * POS5 * WD-2 * /PRESS-W2 * /ISSDC-W2 * /RLOSP * OPL1S * /RHRIL * /SDCIL * /ISSDC-W2 * /RLOSP * /OPECS * /ISMSV-W2 * OPMSV * OPSOF. The sequence is initiated by a diversion to the Suppression Pool via the RHR system (H1-5H) in Time Window 2 (WD-2). The reactor is in POS 5 (POS5) during non-hydro conditions (/PRESS) with DHR provided by SDC (/ISSDC). A random LOSP does not occur (/RLOSP). The operators decide to go water solid (/OPECS). The MSIVs are open (ISMSV), the operators fail to close them (OPMSV), and they fail to stop the flow of water down the main steam lines (OPSOF). This is assumed to result in core damage.

Table 14.23 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.24 lists the importance measures for each basic event. The mean CDF for this sequence is $1.1\text{E-}8$. The sequence is composed of one cut set.

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14.1.2.6 J2-5 Sequences

14.1.2.6.1 Sequence 2-01-11-01-27-W2

The logic for sequence 2-01-11-01-27-W2 is as follows
J2-5 * POSS * WD-2 * /PRESS-W2 * /RHRIL *
/SDCIL * /ISSDC-W2 * /RLOSP * /OPECS *
/ISMSV-W2 * /2SRV * ISSP-W2 * /OPFLD *
/ISMSV-W2 * /2SRV * /SSWXT * ISTCT-W2 *
CTGOP-W2 * OPICT. The sequence is initiated by a
LOCA in the RHR system (J2-5) in Time Window 2
(WD-2). The reactor is in POS 5 (POS5) during non-
hydro conditions (/PRESS) with DHR provided by SDC
(/ISSDC), and the SDC system isolates on loss of water
level (/RHRIL * /SDCIL). A random LOSP does not
occur (/RLOSP). The operators decide to go water solid
(/OPECS), the MSIVs are closed (/ISMSV), and the
operators open two SRVs (/2SRV). With no water in the
Suppression Pool (ISSP) the operators decide to flood the
containment (/OPFLD), and the SSW system is
successfully cross-tied to inject water into the vessel.
The containment is open low, i.e., the lower personnel
air lock is open (ISRCT * CTGOP), and the operators
fail to close the lower air lock (OPICT). This results in
a flood out the containment which is assumed to result in
core damage.

Table 14.25 provides the sequence frequency (the Mincut
Upper Bound) and a listing of the sequence cut sets and
their contribution to the total sequence frequency. Table
14.26 lists the importance measures for each basic event.
The mean CDF for this sequence is 2.0E-8. The
sequence is composed of one cut set.

14.1.2.7 S1-5 Sequences

14.1.2.7.1 Sequence 02-06-01-27-W1

The logic for sequence 02-06-01-27-W1 is as follows:
S1-5 * POSS * WD-1 * /PRESS-W1 * /ISSDC-W1 *
/WHERE * NOFW * /RLOSP * /ISSP-W1 *
/SPWLV-W1 * HPCS-W1 * /LPCS-W1 * OPSPM *
/OPFLL * /OPSRV * /1SRV * /ISMSV-W1 * /SSWXT
* ISTCT-W1 * CTGOP-W1 * OPICT. The sequence is
initiated by an intermediate LOCA (S1-5) inside
containment (/WHERE) during Time Window 1 (WD-1).
The reactor is in POS 5 (POS5) during non-hydro
conditions (/PRESS) with DHR provided by SDC
(/ISSDC). A random LOSP does not occur (/RLOSP).
There is water in the Suppression Pool (/ISSP *
/SPWLV); however, the operators fail to dump the
Suppression Pool makeup (OPSPM). The operators
decide to flood the containment given the LOCA

(/OPFLL). They decide to open at least one SRV
(/OPSRV) for additional flow and one SRV opens
(/1SRV). The MSIVs are closed (/ISMSV) and the
SSW system is successfully cross-tied (/SSWXT) to inject
water into the vessel. The containment is open low, i.e.,
the lower personnel air lock is open (ISTRCT * CTGOP),
and the operators fail to close the lower air lock
(OPICT). This results in a flood out the containment
which is assumed to result in core damage. (In this
sequence the event NOFW is a "flag" to the analyst to
ensure that the sequence is solved properly.)

Table 14.27 provides the sequence frequency (the Mincut
Upper Bound) and a listing of the sequence cut sets and
their contribution to the total sequence frequency. Table
14.28 lists the importance measures for each basic event.
The mean CDF for this sequence is 2.1E-8. The
sequence is composed of one cut set.

14.1.2.7.2 Sequence 02-06-01-27-W2A

The logic for sequence 02-06-01-27-W2A is as follows:
S1-5 * POSS * WD-2 * /PRESS-W2 * /ISSDC-W2 *
/WHERE * NOFW * /RLOSP * /ISSP-W2 *
/SPWLV-W2 * HPCS-W2 * /LPCS-W2 * OPSPM *
/OPFLL * /OPSRV * /1SRV * /ISMSV-W2 * /SSWXT
* ISTCT-W2 * CTGOP-W2 * OPICT. This sequence is
the same as 02-06-01-27-W1 except the accident occurs
in Time Window 2 (WD-2).

Table 14.29 provides the sequence frequency (the Mincut
Upper Bound) and a listing of the sequence cut sets and
their contribution to the total sequence frequency. Table
14.30 lists the importance measures for each basic event.
The mean CDF for this sequence is 6.1E-8. The
sequence is composed of one cut set.

14.1.2.7.3 Sequence 02-06-01-27-W2B

The logic for sequence 02-06-01-27-W2B is as follows:
S1-5 * POSS * WD-2 * /PRESS-W2 * /ISSDC-W2 *
/WHERE * NOFW * /RLOSP * /ISSP * SPWLV *
HPCS-W2 * /LPCS-W2 * OPSPM * /OPFLL * /OPSRV
* /1SRV * /ISMSV-W2 * /SSWXT * ISTCT-W2 *
CTGOP-W2 * OPICT. This sequence is the same as 02-
06-01-27-W2A except the Suppression Pool water level is
different (/ISSP * SPWLV).

Table 14.31 provides the sequence frequency (the Mincut
Upper Bound) and a listing of the sequence cut sets and
their contribution to the total sequence frequency. Table
14.32 lists the importance measures for each basic event.
The mean CDF for this sequence is 1.3E-7. The

sequence is composed of one cut set.

14.1.2.7.4 Sequence 06-06-01-27-W3A

The logic for sequence 06-06-01-27-W3A is as follows: S1-5 * POSS * WD-3 * /PRESS-W3 * ISSDC-W3 * /WHERE * NOFW * /RLOSP * /ISSP-W3 * /SPWLW-W2 * HPCS-W3 * /LPCS-W3 * OPSPM * /OPFLL * /OPSRV * /ISRV * /ISMSV-W3 * /SSWXT * ISTCT-W3 * CTGOP-W3 * OPICT. This sequence is the same as 02-06-01-27-W1 except the accident occurs in Time Window 3 (WD-3) and decay heat removal is by ADHRS (ISSDC).

Table 14.33 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.34 lists the importance measures for each basic event. The mean CDF for this sequence is $3.0\text{E-}8$. The sequence is composed of one cut set.

14.1.2.8 S1H-5 Sequence

14.1.2.8.1 Sequence 3-09-01-27-W3A

The logic for sequence 3-09-01-27-W3A is as follows: S1H-5 * POSS * WD-3 * PRESS-W3 * /WHERE * NOFW * SDISO * STAHD * STSRV * /RLOSP * /ISSP-W3 * /SPWLW-W2 * HPCS-W3 * /LPCS-W3 * OPSPM * /OPFLL * /OPSRV * /ISRV * /ISMSV-W3 * /SSWXT * ISTCT-W3 * CTGOP-W3 * OPICT. This sequence is the same as 02-06-01-27-W1 except the accident occurs in Time Window 3 (WD-3) and decay heat removal is by ADHRS (ISSDC). (In this sequence the events SDISO, STAHD, and STSRV are "flags" to the analyst to ensure that the sequence is solved properly.)

Table 14.35 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.36 lists the importance measures for each basic event. The mean CDF for this sequence is $2.0\text{E-}7$. The sequence is composed of one cut set.

14.1.2.9 T1-5 Sequences

14.1.2.9.1 Sequence 3-14-W1A

The logic for sequence 3-14-W1A is as follows: T1-5 * POSS * WD-1 * /PRESS-W1 * /ISSDC-W1 * NOOSP * RLOSP * DV1-2-W1 * HPCS-W1 * XTIEB * /BAT-1 * RALOSP1 * /BAT-2 * RALOSP2 * /RAFW * /BAT-3

* RALOSP3 * BAT-4. The sequence is initiated by a loss of offsite power (T1-5). The reactor is in Time Window 1 of POS 5 (POSS * WD-1) during non-Hydro conditions (/PRESS) with DHR provided by the RHR System operating in the SDC mode of operation (/ISSDC). Onsite AC power for 1E Divisions 1 and 2 fails (DV1-2), the HPCS pump is unavailable due to maintenance or it fails (HPCSA), and the cross-tie of the HPCS DG to 1E Division 2 fails (XTIEB). At this point only DC power from the batteries is available, and recovery of offsite power does not occur before batteries deplete (/BAT-1 * RALOSP1 * /BAT-2 * RALOSP2 * /BAT-3 * RALOSP3 * BAT-4). During the time the batteries were available, the Fire Water System was used to inject water(/RAFW); however, this system was lost when the batteries depleted and the SRVs closed. (In this sequence the events NOOSP and RLOSP are "flags" to the analyst to ensure that the sequence is solved properly.)

Table 14.37 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.38 lists the importance measures for each basic event. The mean CDF for this sequence is $3.7\text{E-}8$. The sequence has two cut sets.

14.1.2.9.2 Sequence 3-14-W1B

The logic for sequence 3-14-W1B is as follows: T1-5 * POSS * WD-1 * /PRESS-W1 * /ISSDC-W1 * NOOSP * RLOSP * DV1-2-W1 * HPCS-W1 * XTIEB * /BAT-1 * RALOSP1 * /BAT-2 * RALOSP2 * /RAFW * BAT-3. The sequence is basically the same as 3-14-W1A except the batteries deplete at an earlier time.

Table 14.39 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.40 lists the importance measures for each basic event. The mean CDF for this sequence is $1.7\text{E-}8$. The sequence has one cut set.

14.1.2.9.3 Sequence 3-14-W1C

The logic for sequence 3-14-W1C is as follows: T1-5 * POSS * WD-1 * /PRESS-W1 * /ISSDC-W1 * NOOSP * RLOSP * DV1-2-W1 * HPCS-W1 * XTIEB * /BAT-1 * RALOSP1 * /BAT-2 * RALOSP2 * /RAFW. The sequence is basically the same as 3-14-W1B except the operators fail to align the Fire Water System for injection (RAFW).

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Table 14.41 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.42 lists the importance measures for each basic event. The mean CDF for this sequence is $1.2\text{E-}8$. The sequence has one cut set.

14.1.2.9.4 Sequence 3-14-W1E

The logic for sequence 3-14-W1E is as follows: T1-5 * POS5 * WD-1 * /PRESS-W1 * /ISSDC-W1 * NOOSP * RLOSP * DV1-2-W1 * HPCSA-W1 * XTIEB * BAT-1. In this sequence the batteries fail before the operators can align for Fire Water injection (BAT-1).

Table 14.43 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.44 lists the importance measures for each basic event. The mean CDF for this sequence is $1.2\text{E-}8$. The sequence has one cut set.

14.1.2.9.5 Sequence 3-14-W2A

Same as sequence 3-14-W1A except the accident occurs in Time Window 2.

Table 14.45 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.46 lists the importance measures for each basic event. The mean CDF for this sequence is $6.2\text{E-}9$. The sequence has one cut set.

14.1.2.9.6 Sequence 3-14-W2B

Same as sequence 3-14-W1B except the accident occurs in Time Window 2.

Table 14.47 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.48 lists the importance measures for each basic event. The mean CDF for this sequence is $1.2\text{E-}7$. The sequence has two cut sets.

14.1.2.9.7 Sequence 3-14-W2C

Same as sequence 3-14-W1C except the accident occurs in Time Window 2.

Table 14.49 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.50 lists the importance measures for each basic event. The mean CDF for this sequence is $9.82\text{E-}8$. The sequence has two cut sets.

14.1.2.9.8 Sequence 3-14-W2D

The logic for sequence 3-14-W2D is as follows: T1-5 * POS5 * WD-2 * /PRESS-W2 * /ISSDC-W2 * NOOSP * RLOSP * DV1-2-W2 * HPCSA-W2 * XTIEB * /BAT-1 * RALOSP1 * BAT-2. In this sequence the batteries fail shortly after the time the operators could have established Fire Water injection (/BAT-1 * BAT-2). Offsite power was not recovered (RALOSP1); thus, core damage occurs.

Table 14.51 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.52 lists the importance measures for each basic event. The mean CDF for this sequence is $9.4\text{E-}8$. The sequence has two cut sets.

14.1.2.9.9 Sequence 3-14-W2E

Same as sequence 3-14-W1E except the accident occurs in Time Window 2.

Table 14.53 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.54 lists the importance measures for each basic event. The mean CDF for this sequence is $2.82\text{E-}7$. The sequence has seven cut sets. The cut sets differ only by how DG B is lost.

14.1.2.9.10 Sequence 5-15-W2B

This sequence is the same as 3-14-W1B except the accident occurs in Time Window 2 and decay heat removal is by the ADHRS (ISSDC) in stead of SDC.

Table 14.55 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.56 lists the importance measures for each basic event. The mean CDF for this sequence is $1.1\text{E-}8$. The sequence has one cut set.

14.1.2.10 T5A5H Sequences

14.1.2.10.1 Sequence 3-51-35-04-W2

The logic for sequence 3-51-35-04-W2 is as follows: T5A5H * POSS * WD-2 * /PRESS-W2 * /ISSDC-W2 * SWLOS * /RLOSP * /OPSDC * OPECS * OPSTM * /ISMSV-W2 * /RHRIP * /SDCIL * /1SRVS * OPSTH. The sequence is initiated by a loss of the SSW system in POS 5 Time Window 2 during non Hydro conditions (T5A5H * POSS * WD-2 * /PRESS). DHR was by the SDC system (ISSDC). A random LOSP did not occur (/RLOSP). The operators recognized the loss of SDC (/OPSDC) and failed to go water solid or steam the vessel at low pressure (OPECS * OPSTM). The MSIVs were closed (/ISMSV), and the vessel isolated on high pressure (/RHRIP * /SDCIL). One SRV lifts on its safety set point, but the operators fail to steam at high pressure (OPSTH) resulting in core damage. (In this sequence the event SWLOS is a "flag" to the analyst to ensure that the sequence is solved properly.)

Table 14.57 provides the sequence frequency (the Mincut Upper Bound) and a listing of the sequence cut sets and their contribution to the total sequence frequency. Table 14.58 lists the importance measures for each basic event. The mean CDF for this sequence is 1.5E-8. The sequence has one cut set.

14.1.3 Total Plant Model Results

The results from the uncertainty analysis on the total plant model using 1000 samples are as follows:

Mean Value	2.001E-006
5th Percentile Value	4.127E-007
Median Value	1.337E-006
Mincut Value	2.121E-006
95th Percentile Value	5.382E-006
Minimum Sample Value	1.579E-007
Maximum Sample Value	5.955E-005
Standard Deviation	2.884E-006
Skewness	1.041E+001
Kurtosis	1.768E+002

Table 14.59 lists the importance measures for each basic event from the Total Plant Model. The events are sorted by Risk Reduction Difference.

14.2 Conclusions

One of the purposes of the Low Power and Shutdown (LP&S) Study is to determine the risk associated with plant operations during these non-full power conditions. While in the past probabilistic risk assessments (PRAs) for nuclear power plants have characterized the risk associated with accidents initiated while the plant is in full-power operation, events like the Chernobyl accident and the Vogtle loss of offsite power event have demonstrated that non-full power conditions also warrant study. The following sections present conclusions and other insights based on the results of the Low Power and Shutdown Phase 2 Detailed Study of Plant Operating State (POS) 5 for Grand Gulf during a refueling outage. (NOTE: POS 5 can be defined loosely as the Cold Shutdown Operating Condition for Grand Gulf.)

14.2.1 Specific Conclusions

Two classes of initiating events dominate the results from this study. As can be seen below, LOCA/Diversion and LOSP/Blackout constitute approximately 95% of the total core damage frequency.

IE Class	Mean CDF	% Contribution To CDF
LOCA/Diversion	1.3E-06	62
LOSP/Blackout	7.0E-07	33
Other	9.9E-08	5
	2.082E-06	100

For the important initiating events identified in Section 14.1.1, two types of accident sequences are among the dominant sequences. They are:

- Blackout - Loss of all AC power and
- Flooding Containment - Injection of water into vessel, out the SRVs to the Suppression Pool, and finally out open lower containment personnel lock.

From a core damage frequency vs Time Window aspect, Time Window 2 is the most important. Figure 14-2 indicates that Time Window 2 contributes 58 percent of the total core damage frequency.

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Figure 14-2 Percent of CDF vs Time Window

Another way to present the core damage frequency information is to plot the fractional contribution of each initiator group by Time Window. This results in Figure 14-3. From this figure it can be seen that for:

Time Window 1

The core damage frequency is split between the LOCA/Diversion and the LOSP/Blackout groups (42% and 58% respectively).

Time Window 2

The core damage frequency is split among the three groups (41% - LOCA/Diversion, 50% - LOCA/Blackout, and 9% - Other)

Time Window 3

All core damage frequency results from the LOCA/Diversion group.

One final way to present the core damage frequency information is to plot the percent contribution to the total core damage frequency and the percent of time spent in each Time Window vs the three Time Windows on the same graph. From Figure 14-4 it can be seen that even though the plant spends only 21 percent of the time in Time Window 2 this Time Window contributes 58 percent to the total core damage frequency. Figure 14-4 also indicates that Time Window 3 contributes 35 percent of the total core damage frequency, yet 76 percent of the time is spent in the Time Window.

Figure 14-3 Fractional Contribution to CDF by IE Group vs Time Window

Figure 14-4 Percent of CDF and Percent of Time in Time Window vs Time Window

Thus, from Figures 14-2 and 14-4 we see that Time Window 2 is the most important time regime for POS 5 during a refueling outage.

Comparing the results of this study with those obtained in the NUREG/CR-4550 study of Grand Gulf and the Grand Gulf IPE we find that the mean CDF obtained in this study ($2.0\text{E-}6$) is 50 percent of the NUREG/CR-4550 value of $4.0\text{E-}6$ and almost an order of magnitude less than IPE results of $1.7\text{E-}5$.

In addition, the results from this study indicate that, unlike the NUREG/CR-4550 results, sequences other than those initiated by LOSP (e.g., LOCAs) contribute significantly to the core damage frequency.

14.2.2 General Conclusions

The conclusions drawn from this study can be grouped into three categories. They include:

- (1) methodological,
- (2) plant specific, and
- (3) generic.

Methodological

This study was successful in developing a methodology to estimate the risk (i.e., the core damage frequency) associated with the operation of a BWR during low power and shutdown conditions. The methodology developed and the lessons learned from its application provide the NRC with new tools that could be used in subsequent analyses.

The mean CDF for the Total Plant Model presented in this report includes the fraction of time the plant is in POS 5 during a refueling outage. If one wants to present the results as a conditional CDF (i.e., conditional on the plant being in POS 5), then the results should be divided by the value assigned to the event POS5. Thus, for this study the conditional CDF is $(2E-6)/0.031 = 6.5E-5$ per year in POS 5. However, use of the conditional CDF is not recommended since plant conditions (e.g., system unavailabilities and decay heat loads) would change dramatically during a one year time period.

Plant Specific

There are three major aspects of the specific Grand Gulf plant model used in this analysis that significantly impacted the result. These are:

- (1) Grand Gulf's continued requirement for automatic isolation of low pressure components in the Shutdown Cooling System given an increase in pressure and/or a decrease in water level in POS 5.
- (2) Grand Gulf's requirement that at least two safety relief valves be available in POS 5 allows the operators to use portions of their Inadequate Decay Heat Removal Procedure which would otherwise be inaccessible.
- (3) Grand Gulf's additional system for removing decay heat (i.e., the Alternate Decay Heat Removal System) impacts the estimated core damage frequency during two of the three POS 5 time windows.

Generic

The results from this study appear to indicate that the risk (i.e., core damage frequency) associated with operating in POS 5 during a refueling outage is less than that from operating at full power. While this should be true for Grand Gulf, generalizations to other BWRs should be performed with care.

Two factors that should be considered during any generalization include:

- (1) Does the other BWR have a motor driven high pressure pump? The availability of such a pump provides a mechanism for injecting water at high pressure, if necessary, and also provides an alternate means of injecting water at low pressure should the low pressure pumps fail.
- (2) Does the other BWR have procedures in place to deal with the loss of the normal decay heat removal system? If the procedures do exist, does the utility require the availability of any support system/component necessary for the performance of the procedure?

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Table 14.3 A5 Sequence 02-06-01-27-W1

SEQUENCE CUT SETS (QUANTIFICATION) REPORT				
Family	: FINAL-PDS	Sequence	: 02-06-01-27-W1	
Analysis	: RANDOM	Event Tree	: A5	
Case	: ALTERNATE	Init. Event	: A5	
Mincut Upper Bound : 2.046E-008				
Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	2.0E-008	CTGOP-W1, /ISMSV-W1, /ISSDC-W1, /ISSP-W1, ISTCT-W1, /LPCS-W1, NOFW, /OP-OPFLL-023, OP-OPICT-1, OP-OPSPM-1, POS5, /PRESS-W1, RA-HPCS-HW-1-W1, RA-NO-REC, /RLOSP, /SPWLW-W1, WD-1, /WHERE-0

Table 14.4 Basic Event Importance Measures for Sequence 02-06-01-27-W1

SEQUENCE IMPORTANCE MEASURES REPORT					
Family	: FINAL-PDS	Sequence	: 02-06-01-27-W1		
Analysis	: RANDOM	Event Tree	: A5		
Case	: ALTERNATE	Init. Event	: A5		
(Sorted by Uncertainty Importance Measure)					
Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
A5	1	3.620E-005	7.912E-004	2.046E-008	5.652E-004
WD-1	1	3.000E-002	6.821E-007	2.046E-008	6.616E-007
NOFW	1	1.000E+000	2.046E-008	2.046E-008	+0.000E+000
OP-OPSPM-1	1	1.000E+000	2.046E-008	2.046E-008	+0.000E+000
OP-OPICT-1	1	1.000E+000	2.046E-008	2.046E-008	+0.000E+000
ISTCT-W1	1	1.000E+000	2.046E-008	2.046E-008	+0.000E+000
RA-NO-REC	1	1.000E+000	2.046E-008	2.046E-008	+0.000E+000
RA-HPCS-HW-1-W1	1	7.200E-001	4.594E-009	2.046E-008	7.958E-009
POS5	1	3.100E-002	3.811E-009	2.046E-008	6.396E-007
CTGOP-W1	1	9.000E-001	1.312E-009	2.046E-008	2.273E-009
RLOSP	1	4.000E-004	-3.973E-012	-8.188E-012	-2.046E-008
ISSP-W1	1	1.000E-002	-1.193E-010	-2.067E-010	-2.046E-008
ISMSV-W1	1	1.000E-002	-1.193E-010	-2.067E-010	-2.046E-008
LPCS-W1	1	2.000E-002	-2.043E-008	-4.176E-010	-2.046E-008
WHERE-0	1	+0.000E+000	-2.046E-008	+0.000E+000	-2.046E-008
SPWLW-W1	1	+0.000E+000	-2.046E-008	+0.000E+000	-2.046E-008
ISSDC-W1	1	+0.000E+000	-2.046E-008	+0.000E+000	-2.046E-008
PRESS-W1	1	+0.000E+000	-2.046E-008	+0.000E+000	-2.046E-008
OP-OPFLL-023	1	2.300E-002	-2.049E-008	-4.817E-010	-2.046E-008

Table 14.5 A5 Sequence 02-06-01-27-W2A

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 02-06-01-27-W2A
 Analysis : RANDOM Event Tree : A5
 Case : ALTERNATE Init. Event : A5
 Mincut Upper Bound : 5.787E-008

Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	5.7E-008	CTGOP-W2, /ISMSV-W2, /ISSDC-W2, /ISSP-W2, ISTCT-W2, /LPCS-W2, NOFW, /OP-OPFLL-023, OP-OPICT-1, OP-OPSPM-1, POS5, /PRESS-W2, RA-HPCS-HW-1-W2, RA-NO-REC, /RLOSP, /SPWLW-W2, WD-2, /WHERE-0

Table 14.6 Basic Event Importance Measures for Sequence 02-06-01-27-W2A

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 02-06-01-27-W2A
 Analysis : RANDOM Event Tree : A5
 Case : ALTERNATE Init. Event : A5

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
A5	1	3.620E-005	2.237E-003	5.787E-008	1.598E-003
WD-2	1	2.120E-001	2.729E-007	5.787E-008	2.151E-007
NOFW	1	1.000E+000	5.787E-008	5.787E-008	+0.000E+000
OP-OPSPM-1	1	1.000E+000	5.787E-008	5.787E-008	+0.000E+000
OP-OPICT-1	1	1.000E+000	5.787E-008	5.787E-008	+0.000E+000
ISTCT-W2	1	1.000E+000	5.787E-008	5.787E-008	+0.000E+000
RA-NO-REC	1	1.000E+000	5.787E-008	5.787E-008	+0.000E+000
POS5	1	3.100E-002	1.077E-008	5.787E-008	1.809E-006
CTGOP-W2	1	9.000E-001	3.712E-009	5.787E-008	6.430E-009
RA-HPCS-HW-1-W2	1	9.600E-001	1.392E-009	5.787E-008	2.411E-009
RLOSP	1	4.000E-004	-1.123E-011	-2.315E-011	-5.787E-008
ISSP-W2	1	1.000E-002	-3.375E-010	-5.845E-010	-5.787E-008
ISMSV-W2	1	1.000E-002	-3.375E-010	-5.845E-010	-5.787E-008
SPWLW-W2	1	6.800E-001	-1.253E-008	-1.229E-007	-5.787E-008
LPCS-W2	1	2.000E-002	-5.777E-008	-1.181E-009	-5.787E-008
PRESS-W2	1	+0.000E+000	-5.787E-008	+0.000E+000	-5.787E-008
WHERE-0	1	+0.000E+000	-5.787E-008	+0.000E+000	-5.787E-008
OP-OPFLL-023	1	2.300E-002	-5.795E-008	-1.362E-009	-5.787E-008
ISSDC-W2	1	6.200E-002	-8.636E-008	-3.825E-009	-5.787E-008

Results and Conclusions

Table 14.7 A5 Sequence 02-06-01-27-W2B

SEQUENCE CUT SETS (QUANTIFICATION) REPORT

Family : FINAL-PDS Sequence : 02-06-01-27-W2B
 Analysis : RANDOM Event Tree : A5
 Case : ALTERNATE Init. Event : A5
 Mincut Upper Bound : 1.229E-007

Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	1.2E-007	CTGOP-W2, /ISMSV-W2, /ISSDC-W2, /ISSP-W2, ISTCT-W2, /LPCS-W2, NOFW, /OP-OPFLL-023, OP-OPICT-1, OP-OPSPM-1, POS5, /PRESS-W2, RA-HPCS-HW-1-W2, RA-NO-REC, /RLOSP, SPWLV-W2, WD-2, /WHERE-0

Table 14.8 Basic Event Importance Measures for Sequence 02-06-01-27-W2B

SEQUENCE IMPORTANCE MEASURES REPORT

Family : FINAL-PDS Sequence : 02-06-01-27-W2B
 Analysis : RANDOM Event Tree : A5
 Case : ALTERNATE Init. Event : A5

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
A5	1	3.620E-005	4.755E-003	1.229E-007	3.397E-003
WD-2	1	2.120E-001	5.801E-007	1.229E-007	4.571E-007
NOFW	1	1.000E+000	1.229E-007	1.229E-007	+0.000E+000
OP-OPSPM-1	1	1.000E+000	1.229E-007	1.229E-007	+0.000E+000
OP-OPICT-1	1	1.000E+000	1.229E-007	1.229E-007	+0.000E+000
ISTCT-W2	1	1.000E+000	1.229E-007	1.229E-007	+0.000E+000
RA-NO-REC	1	1.000E+000	1.229E-007	1.229E-007	+0.000E+000
POS5	1	3.100E-002	2.290E-008	1.229E-007	3.844E-006
SPWLV-W2	1	6.800E-001	1.253E-008	1.229E-007	5.787E-008
CTGOP-W2	1	9.000E-001	7.889E-009	1.229E-007	1.366E-008
RA-HPCS-HW-1-W2	1	9.600E-001	2.958E-009	1.229E-007	5.124E-009
RLOSP	1	4.000E-004	-2.388E-011	-4.921E-011	-1.229E-007
ISSP-W2	1	1.000E-002	-7.172E-010	-1.242E-009	-1.229E-007
ISMSV-W2	1	1.000E-002	-7.172E-010	-1.242E-009	-1.229E-007
LPCS-W2	1	2.000E-002	-1.227E-007	-2.509E-009	-1.229E-007
PRESS-W2	1	+0.000E+000	-1.229E-007	+0.000E+000	-1.229E-007
WHERE-0	1	+0.000E+000	-1.229E-007	+0.000E+000	-1.229E-007
OP-OPFLL-023	1	2.300E-002	-1.231E-007	-2.895E-009	-1.229E-007
ISSDC-W2	1	6.200E-002	-1.835E-007	-8.129E-009	-1.229E-007

Table 14.9 A5 Sequence 02-06-01-27-W3A

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 02-06-01-27-W3A
 Analysis : RANDOM Event Tree : A5
 Case : ALTERNATE Init. Event : A5
 Mincut Upper Bound : 2.567E-007

Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	2.5E-007	CTGOP-W3, /ISMSV-W3, /ISSDC-W3, /ISSP-W3, ISTCT-W3, NOFW, /OP-OPFLL-01, OP-OPICT-1, OP-OPSPM-1, POS5, /PRESS-W3, RA-NO-REC, /RLOSP, /SPWLW-W3, WD-3, /WHERE-0

Table 14.10 Basic Event Importance Measures Summary for Sequence 02-06-01-27-W3A5

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 02-06-01-27-W3A
 Analysis : RANDOM Event Tree : A5
 Case : ALTERNATE Init. Event : A5

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
A5	1	3.620E-005	9.926E-003	2.567E-007	7.091E-003
WD-3	1	7.580E-001	3.386E-007	2.567E-007	8.196E-008
NOFW	1	1.000E+000	2.567E-007	2.567E-007	+0.000E+000
OP-OPSPM-1	1	1.000E+000	2.567E-007	2.567E-007	+0.000E+000
OP-OPICT-1	1	1.000E+000	2.567E-007	2.567E-007	+0.000E+000
RA-NO-REC	1	1.000E+000	2.567E-007	2.567E-007	+0.000E+000
POS5	1	3.100E-002	4.781E-008	2.567E-007	8.024E-006
ISTCT-W3	1	8.900E-001	1.831E-008	2.567E-007	3.173E-008
CTGOP-W3	1	9.000E-001	1.646E-008	2.567E-007	2.852E-008
RLOSP	1	4.000E-004	-4.985E-011	-1.027E-010	-2.567E-007
ISSP-W3	1	1.000E-002	-1.497E-009	-2.593E-009	-2.567E-007
ISMSV-W3	1	1.000E-002	-1.497E-009	-2.593E-009	-2.567E-007
PRESS-W3	1	1.690E-001	-9.096E-009	-5.221E-008	-2.567E-007
ISSDC-W3	1	1.010E-001	-1.632E-008	-2.884E-008	-2.567E-007
SPWLW-W3	1	4.800E-001	-2.850E-008	-2.369E-007	-2.567E-007
WHERE-0	1	+0.000E+000	-2.567E-007	+0.000E+000	-2.567E-007
OP-OPFLL-01	1	1.000E-002	-3.629E-007	-2.593E-009	-2.567E-007

Results and Conclusions

Table 14.11 A5 Sequence 06-06-01-27-W3A

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 06-06-01-27-W3A
 Analysis : RANDOM Event Tree : A5
 Case : ALTERNATE Init. Event : A5
 Mincut Upper Bound : 2.884E-008

Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	2.8E-008	CTGOP-W3, /ISMSV-W3, ISSDC-W3, /ISSP-W3, ISTCT-W3, NOFW, /OP-OPFLL-01, OP-OPICT-1, OP-OPSPM-1, POS5, /PRESS-W3, RA-NO-REC, /RLOSP, /SPWLW-W3, WD-3, /WHERE-0

Table 14.12 Basic Event Importance Measures for Sequence 06-06-01-27-W3A

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 06-06-01-27-W3A
 Analysis : RANDOM Event Tree : A5
 Case : ALTERNATE Init. Event : A5

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
A5	1	3.620E-005	1.115E-003	2.884E-008	7.967E-004
WD-3	1	7.580E-001	3.805E-008	2.884E-008	9.208E-009
NOFW	1	1.000E+000	2.884E-008	2.884E-008	+0.000E+000
OP-OPSPM-1	1	1.000E+000	2.884E-008	2.884E-008	+0.000E+000
OP-OPICT-1	1	1.000E+000	2.884E-008	2.884E-008	+0.000E+000
RA-NO-REC	1	1.000E+000	2.884E-008	2.884E-008	+0.000E+000
ISSDC-W3	1	1.010E-001	1.632E-008	2.884E-008	2.567E-007
POS5	1	3.100E-002	5.371E-009	2.884E-008	9.015E-007
ISTCT-W3	1	8.900E-001	2.058E-009	2.884E-008	3.564E-009
CTGOP-W3	1	9.000E-001	1.850E-009	2.884E-008	3.204E-009
RLOSP	1	4.000E-004	-5.600E-012	-1.154E-011	-2.884E-008
ISSP-W3	1	1.000E-002	-1.682E-010	-2.913E-010	-2.884E-008
ISMSV-W3	1	1.000E-002	-1.682E-010	-2.913E-010	-2.884E-008
PRESS-W3	1	1.690E-001	-1.022E-009	-5.865E-009	-2.884E-008
SPWLW-W3	1	4.800E-001	-3.202E-009	-2.662E-008	-2.884E-008
WHERE-0	1	+0.000E+000	-2.884E-008	+0.000E+000	-2.884E-008
OP-OPFLL-01	1	1.000E-002	-4.078E-008	-2.913E-010	-2.884E-008

Table 14.13 A5HY Sequence 3-07-01-27-W3A

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 3-07-01-27-W3A
 Analysis : RANDOM Event Tree : A5HY
 Case : ALTERNATE Init. Event : A5HY
 Mincut Upper Bound : 2.025E-007

Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	2.0E-007	CTGOP-W3, /ISMSV-W3-0, /ISSP-W3, ISTCT-W3, NOFW, /OP-OPFLL-01, OP-OPICT-1, OP-OPSPM-1, POS5, PRESS-W3, RA-NO-REC, /RLOSP, /SPWLV-W3, STAHD, WD-3, /WHERE-0

Table 14.14 Basic Event Importance Measures for Sequence 3-07-01-27-W3A

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 3-07-01-27-W3A
 Analysis : RANDOM Event Tree : A5HY
 Case : ALTERNATE Init. Event : A5HY

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
A5HY	1	1.250E-004	2.268E-003	2.025E-007	1.620E-003
WD-3	1	7.580E-001	2.672E-007	2.025E-007	6.467E-008
NOFW	1	1.000E+000	2.025E-007	2.025E-007	+0.000E+000
OP-OPSPM-1	1	1.000E+000	2.025E-007	2.025E-007	+0.000E+000
OP-OPICT-1	1	1.000E+000	2.025E-007	2.025E-007	+0.000E+000
STAHD	1	1.000E+000	2.025E-007	2.025E-007	+0.000E+000
RA-NO-REC	1	1.000E+000	2.025E-007	2.025E-007	+0.000E+000
POS5	1	3.100E-002	3.772E-008	2.025E-007	6.331E-006
PRESS-W3	1	1.690E-001	3.529E-008	2.025E-007	9.960E-007
ISTCT-W3	1	8.900E-001	1.445E-008	2.025E-007	2.503E-008
CTGOP-W3	1	9.000E-001	1.299E-008	2.025E-007	2.250E-008
RLOSP	1	4.000E-004	-3.933E-011	-8.105E-011	-2.025E-007
ISSP-W3	1	1.000E-002	-1.181E-009	-2.046E-009	-2.025E-007
SPWLV-W3	1	4.800E-001	-2.249E-008	-1.869E-007	-2.025E-007
ISMSV-W3-0	1	+0.000E+000	-2.025E-007	+0.000E+000	-2.025E-007
WHERE-0	1	+0.000E+000	-2.025E-007	+0.000E+000	-2.025E-007
OP-OPFLL-01	1	1.000E-002	-2.864E-007	-2.046E-009	-2.025E-007

Results and Conclusions

Table 14.15 E1T5H Sequence 07-11-01-27-W2

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 07-11-01-27-W2
 Analysis : RANDOM Event Tree : E1T5H
 Case : ALTERNATE Init. Event : E1T5H
 Mincut Upper Bound : 4.059E-008

Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	4.0E-008	CTGOP-W2, /ISMSV-W2, ISSDB-W2, ISSP-W2, ISTCT-W2, NOOVP, /OP-OPECS-01, /OP-OPFLD-012, OP-OPICT-1, /OP-OPSDC-00085, OP-RESCS-085, POS5, /PRESS-W2, RA-OPICT-025, /RLOSP, WD-2

Table 14.16 Basic Event Importance Measures for Sequence 07-11-01-27-W2

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 07-11-01-27-W2
 Analysis : RANDOM Event Tree : E1T5H
 Case : ALTERNATE Init. Event : E1T5H

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
RA-OPICT-025	1	2.500E-002	1.588E-006	4.059E-008	1.583E-006
OP-RESCS-085	1	8.500E-002	6.684E-007	4.059E-008	4.369E-007
WD-2	1	2.120E-001	1.914E-007	4.059E-008	1.508E-007
E1T5H	1	3.560E-001	7.614E-008	4.059E-008	7.343E-008
ISTCT-W2	1	1.000E+000	4.059E-008	4.059E-008	+0.000E+000
NOOVP	1	1.000E+000	4.059E-008	4.059E-008	+0.000E+000
OP-OPICT-1	1	1.000E+000	4.059E-008	4.059E-008	+0.000E+000
ISSP-W2	1	1.000E-002	2.343E-008	4.059E-008	4.018E-006
POS5	1	3.100E-002	7.559E-009	4.059E-008	1.268E-006
CTGOP-W2	1	9.000E-001	2.604E-009	4.059E-008	4.510E-009
ISSDB-W2	1	9.380E-001	1.549E-009	4.059E-008	2.683E-009
RLOSP	1	4.000E-004	-7.882E-012	-1.624E-011	-4.059E-008
ISMSV-W2	1	1.000E-002	-2.367E-010	-4.100E-010	-4.059E-008
OP-OPECS-01	1	1.000E-002	-4.011E-008	-4.100E-010	-4.059E-008
OP-OPFLD-012	1	1.200E-002	-4.019E-008	-4.930E-010	-4.059E-008
PRESS-W2	1	+0.000E+000	-4.059E-008	+0.000E+000	-4.059E-008
OP-OPSDC-00085	1	8.500E-004	-8.399E-008	-3.453E-011	-4.059E-008

Table 14.17 E2T5H Sequence 04-11-01-27-W2

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 04-11-01-27-W2
 Analysis : RANDOM Event Tree : E2T5H
 Case : ALTERNATE Init. Event : E2T5H
 Mincut Upper Bound : 5.097E-008

Cut No.	% Total	% Cut Set	Prob/ Freq.	ALTERNATE CUT SETS
1	100.0	100.0	5.1E-008	CTGOP-W2, /ISMSV-W2, ISSDB-W2, ISSP-W2, ISTCT-W2, NOOVP, /OP-OPECS-01, /OP-OPFLD-012, OP-OPICT-1, /OP-OPSDC-00085, POS5, /PRESS-W2, RA-OPICT-025, /RLOSP, WD-2

Table 14.18 Basic Event Importance Measures for Sequence 04-11-01-27-W2

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 04-11-01-27-W2
 Analysis : RANDOM Event Tree : E2T5H
 Case : ALTERNATE Init. Event : E2T5H

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
RA-OPICT-025	1	2.500E-002	1.994E-006	5.097E-008	1.988E-006
E2T5H	1	3.800E-002	8.958E-007	5.097E-008	1.290E-006
WD-2	1	2.120E-001	2.404E-007	5.097E-008	1.894E-007
ISTCT-W2	1	1.000E+000	5.097E-008	5.097E-008	+0.000E+000
NOOVP	1	1.000E+000	5.097E-008	5.097E-008	+0.000E+000
OP-OPICT-1	1	1.000E+000	5.097E-008	5.097E-008	+0.000E+000
ISSP-W2	1	1.000E-002	2.943E-008	5.097E-008	5.046E-006
POS5	1	3.100E-002	9.493E-009	5.097E-008	1.593E-006
CTGOP-W2	1	9.000E-001	3.270E-009	5.097E-008	5.663E-009
ISSDB-W2	1	9.380E-001	1.945E-009	5.097E-008	3.369E-009
RLOSP	1	4.000E-004	-9.898E-012	-2.039E-011	-5.097E-008
ISMSV-W2	1	1.000E-002	-2.972E-010	-5.148E-010	-5.097E-008
OP-OPECS-01	1	1.000E-002	-5.037E-008	-5.148E-010	-5.097E-008
OP-OPFLD-012	1	1.200E-002	-5.047E-008	-6.191E-010	-5.097E-008
PRESS-W2	1	+0.000E+000	-5.097E-008	+0.000E+000	-5.097E-008
OP-OPSDC-00085	1	8.500E-004	-1.054E-007	-4.336E-011	-5.097E-008

Results and Conclusions

Table 14.19 H1-5H Sequence 03-01-11-01-27W1

SEQUENCE CUT SETS (QUANTIFICATION) REPORT				
Family	: FINAL-PDS	Sequence	: 03-01-11-01-27W1	
Analysis	: RANDOM	Event Tree	: H1-5H	
Case	: ALTERNATE	Init. Event	: H1-5H	
	Mincut Upper Bound : 1.624E-008			
Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	1.6E-008	CTGOP-W1, /ISMSV-W1, /ISSDC-W1, ISSP-W1, ISTCT-W1, /OP-OPECS-012, /OP-OPFLD-014, OP-OPICT-1, OP-OPL1S-1, PDS-DUMMY-1, POS5, /PRESS-W1, RA-OPICT-025, /RLOSP, WD-1

Table 14.20 Basic Event Importance Measures for Sequence 03-01-11-01-27W1

SEQUENCE IMPORTANCE MEASURES REPORT					
Family	: FINAL-PDS	Sequence	: 03-01-11-01-27W1		
Analysis	: RANDOM	Event Tree	: H1-5H		
Case	: ALTERNATE	Init. Event	: H1-5H		
(Sorted by Uncertainty Importance Measure)					
Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
RA-OPICT-025	1	2.500E-002	6.356E-007	1.624E-008	6.334E-007
WD-1	1	3.000E-002	5.414E-007	1.624E-008	5.251E-007
H1-5H	1	8.052E-002	1.347E-007	1.624E-008	1.854E-007
OP-OPL1S-1	1	1.000E+000	1.624E-008	1.624E-008	+0.000E+000
PDS-DUMMY-1	1	1.000E+000	1.624E-008	1.624E-008	+0.000E+000
ISTCT-W1	1	1.000E+000	1.624E-008	1.624E-008	+0.000E+000
OP-OPICT-1	1	1.000E+000	1.624E-008	1.624E-008	+0.000E+000
ISSP-W1	1	1.000E-002	9.377E-009	1.624E-008	1.608E-006
POS5	1	3.100E-002	3.025E-009	1.624E-008	5.077E-007
CTGOP-W1	1	9.000E-001	1.042E-009	1.624E-008	1.804E-009
RLOSP	1	4.000E-004	-3.154E-012	-6.499E-012	-1.624E-008
ISMSV-W1	1	1.000E-002	-9.472E-011	-1.640E-010	-1.624E-008
OP-OPECS-012	1	1.200E-002	-1.608E-008	-1.972E-010	-1.624E-008
OP-OPFLD-014	1	1.400E-002	-1.611E-008	-2.306E-010	-1.624E-008
ISSDC-W1	1	+0.000E+000	-1.624E-008	+0.000E+000	-1.624E-008
PRESS-W1	1	+0.000E+000	-1.624E-008	+0.000E+000	-1.624E-008

Table 14.21 H1-5H Sequence 03-01-11-01-27W2

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 03-01-11-01-27W2
 Analysis : RANDOM Event Tree : H1-5H
 Case : ALTERNATE Init. Event : H1-5H
 Mincut Upper Bound : 1.078E-007

Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	1.0E-007	CTGOP-W2, /ISMSV-W2, /ISSDC-W2, ISSP-W2, ISTCT-W2, /OP-OPECS-012, /OP-OPFLD-012, OP-OPICT-1, OP-OPLIS-1, PDS-DUMMY-1, POS5, /PRESS-W2, RA-OPICT-025, /RLOSP, WD-2

Table 14.22 Basic Event Importance Measures for Sequence 03-01-11-01-27W2

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 03-01-11-01-27W2
 Analysis : RANDOM Event Tree : H1-5H
 Case : ALTERNATE Init. Event : H1-5H

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
RA-OPICT-025	1	2.500E-002	4.222E-006	1.078E-007	4.207E-006
H1-5H	1	8.052E-002	8.948E-007	1.078E-007	1.232E-006
WD-2	1	2.120E-001	5.088E-007	1.078E-007	4.010E-007
OP-OPLIS-1	1	1.000E+000	1.078E-007	1.078E-007	+0.000E+000
PDS-DUMMY-1	1	1.000E+000	1.078E-007	1.078E-007	+0.000E+000
ISTCT-W2	1	1.000E+000	1.078E-007	1.078E-007	+0.000E+000
OP-OPICT-1	1	1.000E+000	1.078E-007	1.078E-007	+0.000E+000
ISSP-W2	1	1.000E-002	6.228E-008	1.078E-007	1.068E-005
POS5	1	3.100E-002	2.009E-008	1.078E-007	3.372E-006
CTGOP-W2	1	9.000E-001	6.920E-009	1.078E-007	1.198E-008
RLOSP	1	4.000E-004	-2.094E-011	-4.317E-011	-1.078E-007
ISMSV-W2	1	1.000E-002	-6.291E-010	-1.089E-009	-1.078E-007
OP-OPFLD-012	1	1.200E-002	-1.068E-007	-1.310E-009	-1.078E-007
OP-OPECS-012	1	1.200E-002	-1.068E-007	-1.310E-009	-1.078E-007
PRESS-W2	1	+0.000E+000	-1.078E-007	+0.000E+000	-1.078E-007
ISSDC-W2	1	6.200E-002	-1.609E-007	-7.131E-009	-1.078E-007

Results and Conclusions

Table 14.23 H1-5H Sequence 03-01-50-2-W2

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 03-01-50-2-W2
 Analysis : RANDOM Event Tree : H1-5H
 Case : ALTERNATE Init. Event : H1-5H
 Mincut Upper Bound : 1.310E-008

Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	1.3E-008	ISMSV-W2, /ISSDC-W2, /OP-OPECS-003, OP-OPL1S-1, OP-OPMSV-1, OP-OPSOF-05, POS5, /PRESS-W2, RA-ECCS-CONTROL, RA-NO-REC, /RLOSP, WD-2

Table 14.24 Basic Event Importance Measures for Sequence 03-01-50-2-W2

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 03-01-50-2-W2
 Analysis : RANDOM Event Tree : H1-5H
 Case : ALTERNATE Init. Event : H1-5H

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
OP-OPSOF-05	1	5.000E-002	3.669E-007	1.310E-008	2.490E-007
RA-ECCS-CONTROL	1	5.300E-002	3.462E-007	1.310E-008	2.342E-007
H1-5H	1	8.052E-002	1.087E-007	1.310E-008	1.497E-007
WD-2	1	2.120E-001	6.183E-008	1.310E-008	4.872E-008
OP-OPL1S-1	1	1.000E+000	1.310E-008	1.310E-008	+0.000E+000
OP-OPMSV-1	1	1.000E+000	1.310E-008	1.310E-008	+0.000E+000
RA-NO-REC	1	1.000E+000	1.310E-008	1.310E-008	+0.000E+000
ISMSV-W2	1	1.000E-002	7.568E-009	1.310E-008	1.297E-006
POS5	1	3.100E-002	2.441E-009	1.310E-008	4.097E-007
RLOSP	1	4.000E-004	-2.545E-012	-5.245E-012	-1.310E-008
OP-OPECS-003	1	3.000E-003	-1.286E-008	-3.944E-011	-1.310E-008
PRESS-W2	1	+0.000E+000	-1.310E-008	+0.000E+000	-1.310E-008
ISSDC-W2	1	6.200E-002	-1.956E-008	-8.664E-010	-1.310E-008

Table 14.25 J2-5 Sequence 2-01-11-01-27-W2

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 2-01-11-01-27-W2
 Analysis : RANDOM Event Tree : J2-5
 Case : ALTERNATE Init. Event : J2-5
 Mincut Upper Bound : 2.094E-008

Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	2.0E-008	CTGOP-W2, /ISMSV-W2, /ISSDC-W2, ISSP-W2, ISTCT-W2, /OP-OPECS-01, /OP-OPFLD-012, OP-OPICT-1, POS5, /PRESS-W2, RA-OPICT-025, /RLOSP, WD-2

Table 14.26 Basic Event Importance Measures for Sequence 2-01-11-01-27-W2

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 2-01-11-01-27-W2
 Analysis : RANDOM Event Tree : J2-5
 Case : ALTERNATE Init. Event : J2-5

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
J2-5	1	1.560E-002	8.966E-007	2.094E-008	1.321E-006
RA-OPICT-025	1	2.500E-002	8.196E-007	2.094E-008	8.168E-007
WD-2	1	2.120E-001	9.879E-008	2.094E-008	7.784E-008
ISTCT-W2	1	1.000E+000	2.094E-008	2.094E-008	+0.000E+000
OP-OPICT-1	1	1.000E+000	2.094E-008	2.094E-008	+0.000E+000
ISSP-W2	1	1.000E-002	1.209E-008	2.094E-008	2.073E-006
POS5	1	3.100E-002	3.900E-009	2.094E-008	6.546E-007
CTGOP-W2	1	9.000E-001	1.343E-009	2.094E-008	2.327E-009
RLOSP	1	4.000E-004	-4.066E-012	-8.381E-012	-2.094E-008
ISMSV-W2	1	1.000E-002	-1.221E-010	-2.115E-010	-2.094E-008
OP-OPECS-01	1	1.000E-002	-2.069E-008	-2.115E-010	-2.094E-008
OP-OPFLD-012	1	1.200E-002	-2.074E-008	-2.543E-010	-2.094E-008
PRESS-W2	1	+0.000E+000	-2.094E-008	+0.000E+000	-2.094E-008
ISSDC-W2	1	6.200E-002	-3.125E-008	-1.384E-009	-2.094E-008

Results and Conclusions

Table 14.27 S1-5 Sequence 02-06-01-27-W1

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 02-06-01-27-W1
 Analysis : RANDOM Event Tree : S1-5
 Case : ALTERNATE Init. Event : S1-5
 Mincut Upper Bound : 2.038E-008

Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	2.0E-008	CTGOP-W1, /ISMSV-W1, /ISSDC-W1, /ISSP-W1, ISTCT-W1, /LPCS-W1, NOFW, /OP-OPFLL-023, OP-OPICT-1, OP-OPSPM-1, /OP-OPSRV-004, POS5, /PRESS-W1, RA-HPCS-HW-1-W1, RA-NO-REC, /RLOSP, /SPWLW-W1, WD-1, /WHERE-0

Table 14.28 Basic Event Importance Measures for Sequence 02-06-01-27-W1

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 02-06-01-27-W1
 Analysis : RANDOM Event Tree : S1-5
 Case : ALTERNATE Init. Event : S1-5

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
S1-5	1	3.620E-005	7.881E-004	2.038E-008	5.630E-004
WD-1	1	3.000E-002	6.793E-007	2.038E-008	6.590E-007
NOFW	1	1.000E+000	2.038E-008	2.038E-008	+0.000E+000
ISTCT-W1	1	1.000E+000	2.038E-008	2.038E-008	+0.000E+000
OP-OPSPM-1	1	1.000E+000	2.038E-008	2.038E-008	+0.000E+000
OP-OPICT-1	1	1.000E+000	2.038E-008	2.038E-008	+0.000E+000
RA-NO-REC	1	1.000E+000	2.038E-008	2.038E-008	+0.000E+000
RA-HPCS-HW-1-W1	1	7.200E-001	4.576E-009	2.038E-008	7.926E-009
POS5	1	3.100E-002	3.796E-009	2.038E-008	6.371E-007
CTGOP-W1	1	9.000E-001	1.307E-009	2.038E-008	2.264E-009
RLOSP	1	4.000E-004	-3.957E-012	-8.156E-012	-2.038E-008
ISSP-W1	1	1.000E-002	-1.188E-010	-2.058E-010	-2.038E-008
ISMSV-W1	1	1.000E-002	-1.188E-010	-2.058E-010	-2.038E-008
OP-OPSRV-004	1	4.000E-003	-2.002E-008	-8.185E-011	-2.038E-008
LPCS-W1	1	2.000E-002	-2.034E-008	-4.159E-010	-2.038E-008
WHERE-0	1	+0.000E+000	-2.038E-008	+0.000E+000	-2.038E-008
SPWLW-W1	1	+0.000E+000	-2.038E-008	+0.000E+000	-2.038E-008
ISSDC-W1	1	+0.000E+000	-2.038E-008	+0.000E+000	-2.038E-008
PRESS-W1	1	+0.000E+000	-2.038E-008	+0.000E+000	-2.038E-008
OP-OPFLL-023	1	2.300E-002	-2.041E-008	-4.798E-010	-2.038E-008

Table 14.29 S1-5 Sequence 02-06-01-27-W2A

SEQUENCE CUT SETS (QUANTIFICATION) REPORT

Family : FINAL-PDS Sequence : 02-06-01-27-W2A
 Analysis : RANDOM Event Tree : S1-5
 Case : ALTERNATE Init. Event : S1-5
 Mincut Upper Bound : 5.764E-008

Cut No.	% Total	% Cut Set	Prob/ Freq.	ALTERNATE CUT SETS
1	100.0	100.0	5.7E-008	CTGOP-W2, /ISMSV-W2, /ISSDC-W2, /ISSP-W2, ISTCT-W2, /LPCS-W2, NOFW, /OP-OPFLL-023, OP-OPICT-1, OP-OPSPM-1, /OP-OPSRV-004, POS5, /PRESS-W2, RA-HPCS-HW-1-W2, RA-NO-REC, /RLOSP, /SPWLV-W2, WD-2, /WHERE-0

Table 14.30 Basic Event Importance Measures for Sequence 02-06-01-27-W2A

SEQUENCE IMPORTANCE MEASURES REPORT

Family : FINAL-PDS Sequence : 02-06-01-27-W2A
 Analysis : RANDOM Event Tree : S1-5
 Case : ALTERNATE Init. Event : S1-5

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
S1-5	1	3.620E-005	2.228E-003	5.764E-008	1.592E-003
WD-2	1	2.120E-001	2.719E-007	5.764E-008	2.142E-007
NOFW	1	1.000E+000	5.764E-008	5.764E-008	+0.000E+000
ISTCT-W2	1	1.000E+000	5.764E-008	5.764E-008	+0.000E+000
OP-OPSPM-1	1	1.000E+000	5.764E-008	5.764E-008	+0.000E+000
OP-OPICT-1	1	1.000E+000	5.764E-008	5.764E-008	+0.000E+000
RA-NO-REC	1	1.000E+000	5.764E-008	5.764E-008	+0.000E+000
POS5	1	3.100E-002	1.073E-008	5.764E-008	1.801E-006
CTGOP-W2	1	9.000E-001	3.697E-009	5.764E-008	6.404E-009
RA-HPCS-HW-1-W2	1	9.600E-001	1.386E-009	5.764E-008	2.401E-009
RLOSP	1	4.000E-004	-1.119E-011	-2.306E-011	-5.764E-008
ISSP-W2	1	1.000E-002	-3.361E-010	-5.822E-010	-5.764E-008
ISMSV-W2	1	1.000E-002	-3.361E-010	-5.822E-010	-5.764E-008
SPWLV-W2	1	6.800E-001	-1.248E-008	-1.224E-007	-5.764E-008
OP-OPSRV-004	1	4.000E-003	-5.662E-008	-2.315E-010	-5.764E-008
LPCS-W2	1	2.000E-002	-5.754E-008	-1.176E-009	-5.764E-008
PRESS-W2	1	+0.000E+000	-5.764E-008	+0.000E+000	-5.764E-008
WHERE-0	1	+0.000E+000	-5.764E-008	+0.000E+000	-5.764E-008
OP-OPFLL-023	1	2.300E-002	-5.772E-008	-1.357E-009	-5.764E-008
ISSDC-W2	1	6.200E-002	-8.601E-008	-3.810E-009	-5.764E-008

Results and Conclusions

Table 14.31 S1-5 Sequence 02-06-01-27-W2B

SEQUENCE CUT SETS (QUANTIFICATION) REPORT				
Family	: FINAL-PDS	Sequence	: 02-06-01-27-W2B	
Analysis	: RANDOM	Event Tree	: S1-5	
Case	: ALTERNATE	Init. Event	: S1-5	
Mincut Upper Bound : 1.224E-007				
Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	1.2E-007	CTGOP-W2, /ISMSV-W2, /ISSDC-W2, /ISSP-W2, ISTCT-W2, /LPCS-W2, NOFW, /OP-OPFLL-023, OP-OPICT-1, OP-OPSPM-1, /OP-OPSRV-004, POS5, /PRESS-W2, RA-HPCS-HW-1-W2, RA-NO-REC, /RLOSP, SPWLW-W2, WD-2, /WHERE-0

Table 14.32 Basic Event Importance Measures Summary for Sequence 02-06-01-27-W2B

SEQUENCE IMPORTANCE MEASURES REPORT					
Family	: FINAL-PDS	Sequence	: 02-06-01-27-W2B		
Analysis	: RANDOM	Event Tree	: S1-5		
Case	: ALTERNATE	Init. Event	: S1-5		
(Sorted by Uncertainty Importance Measure)					
Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
S1-5	1	3.620E-005	4.736E-003	1.224E-007	3.383E-003
WD-2	1	2.120E-001	5.777E-007	1.224E-007	4.553E-007
NOFW	1	1.000E+000	1.224E-007	1.224E-007	+0.000E+000
ISTCT-W2	1	1.000E+000	1.224E-007	1.224E-007	+0.000E+000
OP-OPSPM-1	1	1.000E+000	1.224E-007	1.224E-007	+0.000E+000
OP-OPICT-1	1	1.000E+000	1.224E-007	1.224E-007	+0.000E+000
RA-NO-REC	1	1.000E+000	1.224E-007	1.224E-007	+0.000E+000
POS5	1	3.100E-002	2.281E-008	1.224E-007	3.828E-006
SPWLW-W2	1	6.800E-001	1.248E-008	1.224E-007	5.764E-008
CTGOP-W2	1	9.000E-001	7.857E-009	1.224E-007	1.361E-008
RA-HPCS-HW-1-W2	1	9.600E-001	2.946E-009	1.224E-007	5.103E-009
RLOSP	1	4.000E-004	-2.378E-011	-4.901E-011	-1.224E-007
ISSP-W2	1	1.000E-002	-7.143E-010	-1.237E-009	-1.224E-007
ISMSV-W2	1	1.000E-002	-7.143E-010	-1.237E-009	-1.224E-007
OP-OPSRV-004	1	4.000E-003	-1.203E-007	-4.919E-010	-1.224E-007
LPCS-W2	1	2.000E-002	-1.222E-007	-2.499E-009	-1.224E-007
PRESS-W2	1	+0.000E+000	-1.224E-007	+0.000E+000	-1.224E-007
WHERE-0	1	+0.000E+000	-1.224E-007	+0.000E+000	-1.224E-007
OP-OPFLL-023	1	2.300E-002	-1.226E-007	-2.883E-009	-1.224E-007
ISSDC-W2	1	6.200E-002	-1.827E-007	-8.096E-009	-1.224E-007

Table 14.33 S1-5 Sequence 06-06-01-27-W3A

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 06-06-01-27-W3A
 Analysis : RANDOM Event Tree : S1-5
 Case : ALTERNATE Init. Event : S1-5
 Mincut Upper Bound : 2.872E-008

Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	2.8E-008	CTGOP-W3, /ISMSV-W3, ISSDC-W3, /ISSP-W3, ISTCT-W3, NOFW, /OP-OPFLL-01, OP-OPICT-1, OP-OPSPM-1, /OP-OPSRV-004, POS5, /PRESS-W3, RA-NO-REC, /RLOSP, /SPWLW-W3, WD-3, /WHERE-0

Table 14.34 Basic Event Importance Summary for Sequence 06-06-01-27-W3A

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 06-06-01-27-W3A
 Analysis : RANDOM Event Tree : S1-5
 Case : ALTERNATE Init. Event : S1-5

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
S1-5	1	3.620E-005	1.110E-003	2.872E-008	7.935E-004
WD-3	1	7.580E-001	3.789E-008	2.872E-008	9.171E-009
NOFW	1	1.000E+000	2.872E-008	2.872E-008	+0.000E+000
OP-OPSPM-1	1	1.000E+000	2.872E-008	2.872E-008	+0.000E+000
OP-OPICT-1	1	1.000E+000	2.872E-008	2.872E-008	+0.000E+000
RA-NO-REC	1	1.000E+000	2.872E-008	2.872E-008	+0.000E+000
ISSDC-W3	1	1.010E-001	1.625E-008	2.872E-008	2.557E-007
POS5	1	3.100E-002	5.350E-009	2.872E-008	8.979E-007
ISTCT-W3	1	8.900E-001	2.049E-009	2.872E-008	3.550E-009
CTGOP-W3	1	9.000E-001	1.842E-009	2.872E-008	3.191E-009
RLOSP	1	4.000E-004	-5.578E-012	-1.149E-011	-2.872E-008
ISSP-W3	1	1.000E-002	-1.675E-010	-2.901E-010	-2.872E-008
ISMSV-W3	1	1.000E-002	-1.675E-010	-2.901E-010	-2.872E-008
PRESS-W3	1	1.690E-001	-1.017E-009	-5.842E-009	-2.872E-008
SPWLW-W3	1	4.800E-001	-3.189E-009	-2.651E-008	-2.872E-008
OP-OPSRV-004	1	4.000E-003	-2.821E-008	-1.153E-010	-2.872E-008
WHERE-0	1	+0.000E+000	-2.872E-008	+0.000E+000	-2.872E-008
OP-OPFLL-01	1	1.000E-002	-4.061E-008	-2.901E-010	-2.872E-008

Results and Conclusions

Table 14.35 S1H-5 Sequence 3-09-01-27-W3A

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 3-09-01-27-W3A
 Analysis : RANDOM Event Tree : S1H-5
 Case : ALTERNATE Init. Event : S1H-5
 Mincut Upper Bound : 1.997E-007

Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	2.0E-007	CTGOP-W3, /ISMSV-W3, /ISSP-W3, ISTCT-W3, NOFW, /OP-OPFLL-01, OP-OPICT-1, OP-OPSPM-1, /OP-OPSRV-004, POS5, PRESS-W3, RA-NO-REC, /RLOSP, SDISO, /SPWLV-W3, STAHD, STSRV, WD-3, /WHERE-0

Table 14.36 Basic Event Importance Summary for Sequence 3-09-01-27-W3A

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 3-09-01-27-W3A
 Analysis : RANDOM Event Tree : S1H-5
 Case : ALTERNATE Init. Event : S1H-5

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
S1H-5	1	1.250E-004	2.236E-003	1.997E-007	1.597E-003
WD-3	1	7.580E-001	2.635E-007	1.997E-007	6.376E-008
SDISO	1	1.000E+000	1.997E-007	1.997E-007	+0.000E+000
NOFW	1	1.000E+000	1.997E-007	1.997E-007	+0.000E+000
OP-OPSPM-1	1	1.000E+000	1.997E-007	1.997E-007	+0.000E+000
OP-OPICT-1	1	1.000E+000	1.997E-007	1.997E-007	+0.000E+000
STSRV	1	1.000E+000	1.997E-007	1.997E-007	+0.000E+000
STAHD	1	1.000E+000	1.997E-007	1.997E-007	+0.000E+000
RA-NO-REC	1	1.000E+000	1.997E-007	1.997E-007	+0.000E+000
POS5	1	3.100E-002	3.719E-008	1.997E-007	6.243E-006
PRESS-W3	1	1.690E-001	3.480E-008	1.997E-007	9.821E-007
ISTCT-W3	1	8.900E-001	1.425E-008	1.997E-007	2.468E-008
CTGOP-W3	1	9.000E-001	1.281E-008	1.997E-007	2.219E-008
RLOSP	1	4.000E-004	-3.878E-011	-7.992E-011	-1.997E-007
ISSP-W3	1	1.000E-002	-1.164E-009	-2.017E-009	-1.997E-007
ISMSV-W3	1	1.000E-002	-1.164E-009	-2.017E-009	-1.997E-007
SPWLV-W3	1	4.800E-001	-2.217E-008	-1.843E-007	-1.997E-007
OP-OPSRV-004	1	4.000E-003	-1.962E-007	-8.021E-010	-1.997E-007
WHERE-0	1	+0.000E+000	-1.997E-007	+0.000E+000	-1.997E-007
OP-OPFLL-01	1	1.000E-002	-2.824E-007	-2.017E-009	-1.997E-007

Table 14.37 T1-5 Sequence 3-14-W1A

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 3-14-W1A
 Analysis : RANDOM Event Tree : T1-5
 Case : ALTERNATE Init. Event : T1-5
 Mincut Upper Bound : 6.709E-008

Cut No.	% Total	% Cut Set	Prob/ Freq.	ALTERNATE CUT SETS
1	63.3	63.3	4.2E-008	ACP-DGN-FR-DG12D, DC-20P5-G-DC12, DG11-UNAVAIL-W1, HCS-SYS-MAINT-W1, /ISSDC-W1, NOOSP, NR-LOSP, POS5, /PRESS-W1, RA-LOSP-12-G-3P5, RA-LOSP-2H, RA-LOSP-3P5-G-2, WD-1
2	100.0	36.6	2.4E-008	ACP-DGN-FS-DG12, DC-20P5-G-DC12, DG11-UNAVAIL-W1, HCS-SYS-MAINT-W1, /ISSDC-W1, NOOSP, NR-LOSP, POS5, /PRESS-W1, RA-DGS-3P5H, RA-LOSP-12-G-3P5, RA-LOSP-2H, RA-LOSP-3P5-G-2, WD-1

Table 14.38 Basic Event Importance Summary for Sequence 3-14-W1A

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 3-14-W1A
 Analysis : RANDOM Event Tree : T1-5
 Case : ALTERNATE Init. Event : T1-5

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
WD-1	2	3.000E-002	2.236E-006	6.709E-008	2.169E-006
ACP-DGN-FR-DG12D	1	4.017E-002	1.480E-006	4.249E-008	1.015E-006
ACP-DGN-FS-DG12	1	3.000E-002	5.475E-007	2.459E-008	7.953E-007
NR-LOSP	2	1.000E+000	6.709E-008	6.709E-008	+0.000E+000
NOOSP	2	1.000E+000	6.709E-008	6.709E-008	+0.000E+000
T1-5	2	1.300E-001	3.659E-008	6.709E-008	4.490E-007
RA-LOSP-2H	2	1.030E-001	2.025E-008	6.709E-008	5.843E-007
RA-LOSP-12-G-3P5	2	3.380E-001	1.931E-008	6.709E-008	1.314E-007
HCS-SYS-MAINT-W1	2	6.700E-001	1.908E-008	6.709E-008	3.304E-008
DC-20P5-G-DC12	2	6.756E-001	1.860E-008	6.709E-008	3.221E-008
POS5	2	3.100E-002	1.249E-008	6.709E-008	2.097E-006
RA-LOSP-3P5-G-2	2	6.310E-001	5.630E-009	6.709E-008	3.923E-008
DG11-UNAVAIL-W1	2	8.800E-001	5.282E-009	6.709E-008	9.149E-009
RA-DGS-3P5H	1	7.750E-001	4.122E-009	2.459E-008	7.141E-009
ISSDC-W1	2	+0.000E+000	-6.709E-008	+0.000E+000	-6.709E-008
PRESS-W1	2	+0.000E+000	-6.709E-008	+0.000E+000	-6.709E-008

Results and Conclusions

Table 14.39 T1-5 Sequence 3-14-W1B

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 3-14-W1B
 Analysis : RANDOM Event Tree : T1-5
 Case : ALTERNATE Init. Event : T1-5
 Mincut Upper Bound : 1.712E-008

Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	1.7E-008	ACP-DGN-FR-DG12D, DC-12-G-DC3P5, DG11-UNAVAIL-W1, HCS-SYS-MAINT-W1, /ISSDC-W1, NOOSP, NR-LOSP, POS5, /PRESS-W1, RA-LOSP-2H, RA-LOSP-3P5-G-2, WD-1

Table 14.40 Basic Event Importance Summary for Sequence 3-14-W1B

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 3-14-W1B
 Analysis : RANDOM Event Tree : T1-5
 Case : ALTERNATE Init. Event : T1-5

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
ACP-DGN-FR-DG12D	1	4.017E-002	5.966E-007	1.712E-008	4.091E-007
WD-1	1	3.000E-002	5.707E-007	1.712E-008	5.536E-007
DC-12-G-DC3P5	1	9.200E-002	2.605E-007	1.712E-008	1.689E-007
NR-LOSP	1	1.000E+000	1.712E-008	1.712E-008	+0.000E+000
NOOSP	1	1.000E+000	1.712E-008	1.712E-008	+0.000E+000
T1-5	1	1.300E-001	9.337E-009	1.712E-008	1.145E-007
RA-LOSP-2H	1	1.030E-001	5.168E-009	1.712E-008	1.491E-007
HCS-SYS-MAINT-W1	1	6.700E-001	4.868E-009	1.712E-008	8.433E-009
POS5	1	3.100E-002	3.188E-009	1.712E-008	5.351E-007
RA-LOSP-3P5-G-2	1	6.310E-001	1.436E-009	1.712E-008	1.001E-008
DG11-UNAVAIL-W1	1	8.800E-001	1.348E-009	1.712E-008	2.334E-009
ISSDC-W1	1	+0.000E+000	-1.712E-008	+0.000E+000	-1.712E-008
PRESS-W1	1	+0.000E+000	-1.712E-008	+0.000E+000	-1.712E-008

Table 14.41 T1-5 Sequence 3-14-W1C

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 3-14-W1C
 Analysis : RANDOM Event Tree : T1-5
 Case : ALTERNATE Init. Event : T1-5
 Mincut Upper Bound : 1.153E-008

Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	1.1E-008	ACP-DGN-FR-DG12D, DG11-UNAVAIL-W1, HCS-SYS-MAINT-W1, /ISSDC-W1, NOOSP, NR-LOSP, POS5, /PRESS-W1, RA-FWLVL-3, RA-LOSP-2H, RA-LOSP-3P5-G-2, WD-1

Table 14.42 Basic Event Importance Summary for Sequence 3-14-W1C

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 3-14-W1C
 Analysis : RANDOM Event Tree : T1-5
 Case : ALTERNATE Init. Event : T1-5

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
ACP-DGN-FR-DG12D	1	4.017E-002	4.020E-007	1.153E-008	2.757E-007
WD-1	1	3.000E-002	3.846E-007	1.153E-008	3.730E-007
RA-FWLVL-3	1	6.200E-002	1.820E-007	1.153E-008	1.745E-007
NR-LOSP	1	1.000E+000	1.153E-008	1.153E-008	+0.000E+000
NOOSP	1	1.000E+000	1.153E-008	1.153E-008	+0.000E+000
T1-5	1	1.300E-001	6.292E-009	1.153E-008	7.722E-008
RA-LOSP-2H	1	1.030E-001	3.483E-009	1.153E-008	1.004E-007
HCS-SYS-MAINT-W1	1	6.700E-001	3.281E-009	1.153E-008	5.683E-009
POS5	1	3.100E-002	2.149E-009	1.153E-008	3.606E-007
RA-LOSP-3P5-G-2	1	6.310E-001	9.682E-010	1.153E-008	6.747E-009
DG11-UNAVAIL-W1	1	8.800E-001	9.084E-010	1.153E-008	1.573E-009
ISSDC-W1	1	+0.000E+000	-1.153E-008	+0.000E+000	-1.153E-008
PRESS-W1	1	+0.000E+000	-1.153E-008	+0.000E+000	-1.153E-008

Results and Conclusions

Table 14.43 T1-5 Sequence 3-14-W1E

SEQUENCE CUT SETS (QUANTIFICATION) REPORT				
Family	: FINAL-PDS	Sequence	: 3-14-W1E	
Analysis	: RANDOM	Event Tree	: T1-5	
Case	: ALTERNATE	Init. Event	: T1-5	
Mincut Upper Bound : 1.431E-008				
Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	1.4E-008	ACP-DGN-FR-DG12D, DC-2H-DEP, DG11-UNAVAIL-W1, HCS-SYS-MAINT-W1, /ISSDC-W1, NOOSP, NR-LOSP, POS5, /PRESS-W1, WD-1

Table 14.44 Basic Event Importance Summary for Sequence 3-14-W1E

SEQUENCE IMPORTANCE MEASURES REPORT					
Family	: FINAL-PDS	Sequence	: 3-14-W1E		
Analysis	: RANDOM	Event Tree	: T1-5		
Case	: ALTERNATE	Init. Event	: T1-5		
(Sorted by Uncertainty Importance Measure)					
Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
DC-2H-DEP	1	5.000E-003	4.008E-006	1.431E-008	2.849E-006
ACP-DGN-FR-DG12D	1	4.017E-002	4.988E-007	1.431E-008	3.421E-007
WD-1	1	3.000E-002	4.772E-007	1.431E-008	4.629E-007
NR-LOSP	1	1.000E+000	1.431E-008	1.431E-008	+0.000E+000
NOOSP	1	1.000E+000	1.431E-008	1.431E-008	+0.000E+000
T1-5	1	1.300E-001	7.808E-009	1.431E-008	9.581E-008
HCS-SYS-MAINT-W1	1	6.700E-001	4.071E-009	1.431E-008	7.051E-009
POS5	1	3.100E-002	2.666E-009	1.431E-008	4.475E-007
DG11-UNAVAIL-W1	1	8.800E-001	1.127E-009	1.431E-008	1.952E-009
ISSDC-W1	1	+0.000E+000	-1.431E-008	+0.000E+000	-1.431E-008
PRESS-W1	1	+0.000E+000	-1.431E-008	+0.000E+000	-1.431E-008

Table 14.45 T1-5 Sequence 3-14-W2A

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 3-14-W2A
 Analysis : RANDOM Event Tree : T1-5
 Case : ALTERNATE Init. Event : T1-5
 Mincut Upper Bound : 1.087E-008

Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	1.0E-008	ACP-DGN-FR-DG12C, DC-18P5-G-DC12, DG11-UNAVAIL-W2, HCS-SYS-MAINT-W2, /ISSDC-W2, NOOSP, NR-LOSP, POS5, /PRESS-W2, RA-ISO89, RA-LOSP-12-G-5P5, RA-LOSP-2H, RA-LOSP-5P5-G-2, WD-2

Table 14.46 Basic Event Importance Summary for Sequence 3-14-W2A

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 3-14-W2A
 Analysis : RANDOM Event Tree : T1-5
 Case : ALTERNATE Init. Event : T1-5

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
ACP-DGN-FR-DG12C	1	3.632E-002	4.189E-007	1.087E-008	2.884E-007
RA-ISO89	1	3.800E-002	2.799E-007	1.087E-008	2.752E-007
WD-2	1	2.120E-001	5.128E-008	1.087E-008	4.041E-008
NR-LOSP	1	1.000E+000	1.087E-008	1.087E-008	+0.000E+000
DG11-UNAVAIL-W2	1	1.000E+000	1.087E-008	1.087E-008	+0.000E+000
NOOSP	1	1.000E+000	1.087E-008	1.087E-008	+0.000E+000
DC-18P5-G-DC12	1	4.907E-001	6.276E-009	1.087E-008	1.128E-008
T1-5	1	1.300E-001	5.929E-009	1.087E-008	7.275E-008
RA-LOSP-2H	1	1.030E-001	3.282E-009	1.087E-008	9.468E-008
RA-LOSP-12-G-5P5	1	4.890E-001	2.537E-009	1.087E-008	1.136E-008
POS5	1	3.100E-002	2.024E-009	1.087E-008	3.398E-007
RA-LOSP-5P5-G-2	1	4.370E-001	1.848E-009	1.087E-008	1.400E-008
HCS-SYS-MAINT-W2	1	9.100E-001	6.207E-010	1.087E-008	1.075E-009
PRESS-W2	1	+0.000E+000	-1.087E-008	+0.000E+000	-1.087E-008
ISSDC-W2	1	6.200E-002	-1.622E-008	-7.186E-010	-1.087E-008

Results and Conclusions

Table 14.47 T1-5 Sequence 3-14-W2B

SEQUENCE CUT SETS (QUANTIFICATION) REPORT				
Family	: FINAL-PDS	Sequence	: 3-14-W2B	
Analysis	: RANDOM	Event Tree	: T1-5	
Case	: ALTERNATE	Init. Event	: T1-5	
Mincut Upper Bound : 1.428E-007				
Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	64.2	64.2	9.1E-008	ACP-DGN-FR-DG12C, DC-12-G-DC5P5, DG11-UNAVAIL-W2, HCS-SYS-MAINT-W2, /ISSDC-W2, NOOSP, NR-LOSP, POS5, /PRESS-W2, RA-LOSP-2H, RA-LOSP-5P5-G-2, WD-2
2	100.0	35.8	5.1E-008	ACP-DGN-FS-DG12, DC-12-G-DC5P5, DG11-UNAVAIL-W2, HCS-SYS-MAINT-W2, /ISSDC-W2, NOOSP, NR-LOSP, POS5, /PRESS-W2, RA-DGS-5P5H, RA-LOSP-2H, RA-LOSP-5P5-G-2, WD-2

Table 14.48 Basic Event Importance Summary for Sequence 3-14-W2B

SEQUENCE IMPORTANCE MEASURES REPORT					
Family	: FINAL-PDS	Sequence	: 3-14-W2B		
Analysis	: RANDOM	Event Tree	: T1-5		
Case	: ALTERNATE	Init. Event	: T1-5		
(Sorted by Uncertainty Importance Measure)					
Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
ACP-DGN-FR-DG12C	1	3.632E-002	3.533E-006	9.169E-008	2.432E-006
DC-12-G-DC5P5	2	7.690E-002	2.599E-006	1.428E-007	1.714E-006
ACP-DGN-FS-DG12	1	3.000E-002	1.137E-006	5.111E-008	1.652E-006
WD-2	2	2.120E-001	6.736E-007	1.428E-007	5.308E-007
DG11-UNAVAIL-W2	2	1.000E+000	1.428E-007	1.428E-007	+0.000E+000
NR-LOSP	2	1.000E+000	1.428E-007	1.428E-007	+0.000E+000
NOOSP	2	1.000E+000	1.428E-007	1.428E-007	+0.000E+000
T1-5	2	1.300E-001	7.788E-008	1.428E-007	9.557E-007
RA-LOSP-2H	2	1.030E-001	4.311E-008	1.428E-007	1.243E-006
POS5	2	3.100E-002	2.659E-008	1.428E-007	4.463E-006
RA-LOSP-5P5-G-2	2	4.370E-001	2.428E-008	1.428E-007	1.839E-007
RA-DGS-5P5H	1	6.750E-001	1.420E-008	5.111E-008	2.461E-008
HCS-SYS-MAINT-W2	2	9.100E-001	8.154E-009	1.428E-007	1.412E-008
PRESS-W2	2	+0.000E+000	-1.428E-007	+0.000E+000	-1.428E-007
ISSDC-W2	2	6.200E-002	-2.131E-007	-9.439E-009	-1.428E-007

Table 14.49 T1-5 Sequence 3-14-W2C

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 3-14-W2C
 Analysis : RANDOM Event Tree : T1-5
 Case : ALTERNATE Init. Event : T1-5
 Mincut Upper Bound : 1.151E-007

Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	64.2	64.2	7.3E-008	ACP-DGN-FR-DG12C, DG11-UNAVAIL-W2, HCS-SYS-MAINT-W2, /ISSDC-W2, NOOSP, NR-LOSP, POS5, /PRESS-W2, RA-FWLVL-3, RA-LOSP-2H, RA-LOSP-5P5-G-2, WD-2
2	100.0	35.8	4.1E-008	ACP-DGN-FS-DG12, DG11-UNAVAIL-W2, HCS-SYS-MAINT-W2, /ISSDC-W2, NOOSP, NR-LOSP, POS5, /PRESS-W2, RA-DGS-5P5H, RA-FWLVL-3, RA-LOSP-2H, RA-LOSP-5P5-G-2, WD-2

Table 14.50 Basic Event Importance Summary for Sequence 3-14-W2C

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 3-14-W2C
 Analysis : RANDOM Event Tree : T1-5
 Case : ALTERNATE Init. Event : T1-5

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
ACP-DGN-FR-DG12C	1	3.632E-002	2.848E-006	7.392E-008	1.961E-006
RA-FWLVL-3	2	6.200E-002	1.816E-006	1.151E-007	1.741E-006
ACP-DGN-FS-DG12	1	3.000E-002	9.174E-007	4.121E-008	1.332E-006
WD-2	2	2.120E-001	5.430E-007	1.151E-007	4.279E-007
DG11-UNAVAIL-W2	2	1.000E+000	1.151E-007	1.151E-007	+0.000E+000
NR-LOSP	2	1.000E+000	1.151E-007	1.151E-007	+0.000E+000
NOOSP	2	1.000E+000	1.151E-007	1.151E-007	+0.000E+000
T1-5	2	1.300E-001	6.279E-008	1.151E-007	7.705E-007
RA-LOSP-2H	2	1.030E-001	3.475E-008	1.151E-007	1.002E-006
POS5	2	3.100E-002	2.144E-008	1.151E-007	3.598E-006
RA-LOSP-5P5-G-2	2	4.370E-001	1.957E-008	1.151E-007	1.483E-007
RA-DGS-5P5H	1	6.750E-001	1.145E-008	4.121E-008	1.984E-008
HCS-SYS-MAINT-W2	2	9.100E-001	6.574E-009	1.151E-007	1.138E-008
PRESS-W2	2	+0.000E+000	-1.151E-007	+0.000E+000	-1.151E-007
ISSDC-W2	2	6.200E-002	-1.718E-007	-7.610E-009	-1.151E-007

Results and Conclusions

Table 14.51 T1-5 Sequence 3-14-W2D

SEQUENCE CUT SETS (QUANTIFICATION) REPORT					
Family : FINAL-PDS		Sequence : 3-14-W2D			
Analysis : RANDOM		Event Tree : T1-5			
Case : ALTERNATE		Init. Event : T1-5			
		Mincut Upper Bound : 8.541E-008			
Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS	
1	64.2	64.2	5.4E-008	ACP-DGN-FR-DG12C, DC-5P5-G-DC2, DG11-UNAVAIL-W2, HCS-SYS-MAINT-W2, /ISSDC-W2, NOOSP, NR-LOSP, POS5, /PRESS-W2, RA-LOSP-2H, WD-2	
2	100.0	35.8	3.0E-008	ACP-DGN-FS-DG12, DC-5P5-G-DC2, DG11-UNAVAIL-W2, HCS-SYS-MAINT-W2, /ISSDC-W2, NOOSP, NR-LOSP, POS5, /PRESS-W2, RA-DGS-5P5H, RA-LOSP-2H, WD-2	

Table 14.52 Basic Event Importance Summary for Sequence 3-14-W2D

SEQUENCE IMPORTANCE MEASURES REPORT					
Family	: FINAL-PDS	Sequence : 3-14-W2D			
Analysis	: RANDOM	Event Tree : T1-5			
Case	: ALTERNATE	Init. Event : T1-5			
(Sorted by Uncertainty Importance Measure)					
Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
DC-5P5-G-DC2	2	2.010E-002	5.948E-006	8.541E-008	4.164E-006
ACP-DGN-FR-DG12C	1	3.632E-002	2.113E-006	5.484E-008	1.455E-006
ACP-DGN-FS-DG12	1	3.000E-002	6.806E-007	3.057E-008	9.885E-007
WD-2	2	2.120E-001	4.029E-007	8.541E-008	3.174E-007
DG11-UNAVAIL-W2	2	1.000E+000	8.541E-008	8.541E-008	+0.000E+000
NR-LOSP	2	1.000E+000	8.541E-008	8.541E-008	+0.000E+000
NOOSP	2	1.000E+000	8.541E-008	8.541E-008	+0.000E+000
T1-5	2	1.300E-001	4.658E-008	8.541E-008	5.716E-007
RA-LOSP-2H	2	1.030E-001	2.578E-008	8.541E-008	7.438E-007
POS5	2	3.100E-002	1.590E-008	8.541E-008	2.669E-006
RA-DGS-5P5H	1	6.750E-001	8.498E-009	3.057E-008	1.472E-008
HCS-SYS-MAINT-W2	2	9.100E-001	4.877E-009	8.541E-008	8.447E-009
PRESS-W2	2	+0.000E+000	-8.541E-008	+0.000E+000	-8.541E-008
ISSDC-W2	2	6.200E-002	-1.274E-007	-5.645E-009	-8.541E-008

Table 14.53 T1-5 Sequence 3-14-W2E

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 3-14-W2E
 Analysis : RANDOM Event Tree : T1-5
 Case : ALTERNATE Init. Event : T1-5
 Mincut Upper Bound : 2.609E-007

Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	50.7	50.7	1.3E-007	ACP-DGN-FR-DG12C, DC-2H-DEP, DG11-UNAVAIL-W2, HCS-SYS-MAINT-W2, /ISSDC-W2, NOOSP, NR-LOSP, POS5, /PRESS-W2, WD-2
2	79.0	28.3	7.3E-008	ACP-DGN-FS-DG12, DC-2H-DEP, DG11-UNAVAIL-W2, HCS-SYS-MAINT-W2, /ISSDC-W2, NOOSP, NR-LOSP, POS5, /PRESS-W2, RA-DGS-5P5H, WD-2
3	83.2	4.1	1.0E-008	DC-2H-DEP, DG11-UNAVAIL-W2, EHV-MOV-CC-MVC1B, HCS-SYS-MAINT-W2, /ISSDC-W2, NOOSP, NR-LOSP, POS5, /PRESS-W2, WD-2
4	87.4	4.1	1.0E-008	DC-2H-DEP, DG11-UNAVAIL-W2, HCS-SYS-MAINT-W2, /ISSDC-W2, NOOSP, NR-LOSP, POS5, /PRESS-W2, SSW-MDP-FS-MDP1B, WD-2
5	91.6	4.1	1.0E-008	DC-2H-DEP, DG11-UNAVAIL-W2, HCS-SYS-MAINT-W2, /ISSDC-W2, NOOSP, NR-LOSP, POS5, /PRESS-W2, SSW-MOV-CC-MV18B, WD-2
6	95.8	4.1	1.0E-008	DC-2H-DEP, DG11-UNAVAIL-W2, HCS-SYS-MAINT-W2, /ISSDC-W2, NOOSP, NR-LOSP, POS5, /PRESS-W2, SSW-MOV-CC-MV1B, WD-2
7	100.0	4.1	1.0E-008	DC-2H-DEP, DG11-UNAVAIL-W2, HCS-SYS-MAINT-W2, /ISSDC-W2, NOOSP, NR-LOSP, POS5, /PRESS-W2, SSW-MOV-CC-MV5B, WD-2

Table 14.54 Basic Event Importance Summary for Sequence 3-14-W2E

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 3-14-W2E
 Analysis : RANDOM Event Tree : T1-5
 Case : ALTERNATE Init. Event : T1-5

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
DC-2H-DEP	7	5.000E-003	7.305E-005	2.609E-007	5.192E-005
ACP-DGN-FR-DG12C	1	3.632E-002	5.103E-006	1.324E-007	3.513E-006
SSW-MOV-CC-MV18B	1	3.000E-003	5.103E-006	1.093E-008	3.635E-006
SSW-MOV-CC-MV5B	1	3.000E-003	5.103E-006	1.093E-008	3.635E-006
SSW-MDP-FS-MDP1B	1	3.000E-003	5.103E-006	1.093E-008	3.635E-006
SSW-MOV-CC-MV1B	1	3.000E-003	5.103E-006	1.093E-008	3.635E-006
EHV-MOV-CC-MVC1B	1	3.000E-003	5.103E-006	1.093E-008	3.635E-006
ACP-DGN-FS-DG12	1	3.000E-002	1.643E-006	7.383E-008	2.387E-006
WD-2	7	2.120E-001	1.231E-006	2.609E-007	9.700E-007
NR-LOSP	7	1.000E+000	2.609E-007	2.609E-007	+0.000E+000
DG11-UNAVAIL-W2	7	1.000E+000	2.609E-007	2.609E-007	+0.000E+000
NOOSP	7	1.000E+000	2.609E-007	2.609E-007	+0.000E+000
T1-5	7	1.300E-001	1.423E-007	2.609E-007	1.746E-006
POS5	7	3.100E-002	4.860E-008	2.609E-007	8.157E-006
RA-DGS-5P5H	1	6.750E-001	2.052E-008	7.383E-008	3.555E-008
HCS-SYS-MAINT-W2	7	9.100E-001	1.490E-008	2.609E-007	2.581E-008
PRESS-W2	7	+0.000E+000	-2.609E-007	+0.000E+000	-2.609E-007
ISSDC-W2	7	6.200E-002	-3.894E-007	-1.725E-008	-2.609E-007

Results and Conclusions

Table 14.55 T1-5 Sequence 5-15-W2B

SEQUENCE CUT SETS (QUANTIFICATION) REPORT				
Family	: FINAL-PDS	Sequence	: 5-15-W2B	
Analysis	: RANDOM	Event Tree	: T1-5	
Case	: ALTERNATE	Init. Event	: T1-5	
Mincut Upper Bound : 1.385E-008				
Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	1.3E-008	ACP-DGN-FR-DG12B, DC-12-G-DC3, DG11-UNAVAIL-W2, HCS-SYS-MAINT-W2, ISSDC-W2, NOOSP, NR-LOSP, POS5, /PRESS-W2, RA-LOSP-2H, RA-LOSP-3-G-2, WD-2

Table 14.56 Basic Event Importance Summary for Sequence 5-15-W2B

SEQUENCE IMPORTANCE MEASURES REPORT					
Family	: FINAL-PDS	Sequence	: 5-15-W2B		
Analysis	: RANDOM	Event Tree	: T1-5		
Case	: ALTERNATE	Init. Event	: T1-5		
(Sorted by Uncertainty Importance Measure)					
Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
ACP-DGN-FR-DG12B	1	4.113E-002	4.715E-007	1.385E-008	3.230E-007
ISSDC-W2	1	6.200E-002	3.128E-007	1.385E-008	2.096E-007
DC-12-G-DC3	1	9.320E-002	2.080E-007	1.385E-008	1.348E-007
WD-2	1	2.120E-001	6.535E-008	1.385E-008	5.150E-008
DG11-UNAVAIL-W2	1	1.000E+000	1.385E-008	1.385E-008	+0.000E+000
NR-LOSP	1	1.000E+000	1.385E-008	1.385E-008	+0.000E+000
NOOSP	1	1.000E+000	1.385E-008	1.385E-008	+0.000E+000
T1-5	1	1.300E-001	7.556E-009	1.385E-008	9.272E-008
RA-LOSP-2H	1	1.030E-001	4.182E-009	1.385E-008	1.206E-007
POS5	1	3.100E-002	2.580E-009	1.385E-008	4.330E-007
RA-LOSP-3-G-2	1	7.280E-001	8.290E-010	1.385E-008	5.176E-009
HCS-SYS-MAINT-W2	1	9.100E-001	7.911E-010	1.385E-008	1.370E-009
PRESS-W2	1	+0.000E+000	-1.385E-008	+0.000E+000	-1.385E-008

Table 14.57 T5A5H Sequence 03-51-35-04-W2

SEQUENCE CUT SETS (QUANTIFICATION) REPORT
 Family : FINAL-PDS Sequence : 03-51-35-04-W2
 Analysis : RANDOM Event Tree : T5A5H
 Case : ALTERNATE Init. Event : T5A5H
 Mincut Upper Bound : 1.390E-008

Cut No.	% Total	% Cut Set	Prob/Freq.	ALTERNATE CUT SETS
1	100.0	100.0	1.3E-008	/ISMSV-W2, /ISSDC-W2, OP-OPECS-011, /OP-OPSDC-00084, OP-OPSTH-009, OP-OPSTM-1, POS5, /PRESS-W2, RA-HPCS-HW-1-W2, /RLOSP, SWLOS, WD-2

Table 14.58 Basic Event Importance Summary for Sequence 03-51-35-04-W2

SEQUENCE IMPORTANCE MEASURES REPORT
 Family : FINAL-PDS Sequence : 03-51-35-04-W2
 Analysis : RANDOM Event Tree : T5A5H
 Case : ALTERNATE Init. Event : T5A5H

(Sorted by Uncertainty Importance Measure)

Event Name	Num. of Occ.	Probability of Failure	Uncertainty Importance Measure	Risk Reduction Difference	Risk Increase Difference
OP-OPSTH-009	1	9.000E-003	2.162E-006	1.390E-008	1.530E-006
OP-OPECS-011	1	1.100E-002	1.236E-006	1.390E-008	1.250E-006
T5A5H	1	2.400E-002	3.868E-007	1.390E-008	5.654E-007
WD-2	1	2.120E-001	6.558E-008	1.390E-008	5.167E-008
SWLOS	1	1.000E+000	1.390E-008	1.390E-008	+0.000E+000
OP-OPSTM-1	1	1.000E+000	1.390E-008	1.390E-008	+0.000E+000
POS5	1	3.100E-002	2.589E-009	1.390E-008	4.345E-007
RA-HPCS-HW-1-W2	1	9.600E-001	3.344E-010	1.390E-008	5.793E-010
RLOSP	1	4.000E-004	-2.699E-012	-5.563E-012	-1.390E-008
ISMSV-W2	1	1.000E-002	-8.108E-011	-1.404E-010	-1.390E-008
PRESS-W2	1	+0.000E+000	-1.390E-008	+0.000E+000	-1.390E-008
ISSDC-W2	1	6.200E-002	-2.074E-008	-9.189E-010	-1.390E-008
OP-OPSDC-00084	1	8.400E-004	-2.877E-008	-1.168E-011	-1.390E-008

Table 14.59 Basic Event Importance Summary for Total Plant Model

IMPORTANCE MEASURES REPORT (Alternate Cut Sets)

Family : FINAL-PDS Sequence : GROUP
 Analysis : RANDOM Event Tree : GROUP
 Case : ALTERNATE Init. Event : GROUP

(Sorted by Risk Reduction Interval)

Event Name	Number of Occurrences	Probability of Failure	Risk Reduction Difference	Risk Increase Difference
POSS	38	3.100e-02	2.121e-06	6.630e-05
OP-OPICT-1	16	1.000e+00	1.355e-06	0.000e+00
WD-2	25	2.120e-01	1.237e-06	4.600e-06
RA-NO-REC	12	1.000e+00	1.132e-06	0.000e+00
NOFW	11	1.000e+00	1.118e-06	0.000e+00
OP-OPSPM-1	11	1.000e+00	1.118e-06	0.000e+00
T1-5	20	1.300e-01	7.391e-07	4.947e-06
NOOSP	20	1.000e+00	7.391e-07	0.000e+00
NR-LOSP	20	1.000e+00	7.391e-07	0.000e+00
WD-3	5	7.580e-01	7.166e-07	2.288e-07
ISTCT-W3	5	8.900e-01	7.166e-07	8.857e-08
CTGOP-W3	5	9.000e-01	7.166e-07	7.962e-08
DG11-UNAVAIL-W2	15	1.000e+00	6.291e-07	0.000e+00
HCS-SYS-MAINT-W2	15	9.100e-01	6.291e-07	6.222e-08
CTGOP-W2	8	9.000e-01	5.814e-07	6.460e-08
ISTCT-W2	8	1.000e+00	5.814e-07	0.000e+00
A5	5	3.620e-05	4.869e-07	1.345e-02
RA-LOSP-2H	12	1.030e-01	4.638e-07	4.039e-06
STAHD	2	1.000e+00	4.023e-07	0.000e+00
RA-HPCS-HW-1-W2	5	9.600e-01	3.749e-07	1.562e-08
ACP-DGN-FR-DG12C	5	3.632e-02	3.638e-07	9.651e-06
PRESS-W3	5	1.690e-01	3.384e-07	1.664e-06
DC-2H-DEP	8	5.000e-03	2.753e-07	5.478e-05
RA-LOSP-5P5-G-2	5	4.370e-01	2.688e-07	3.463e-07
RA-OPICT-025	5	2.500e-02	2.366e-07	9.229e-06
S1-5	4	3.620e-05	2.292e-07	6.332e-03
ACP-DGN-FS-DG12	5	3.000e-02	2.213e-07	7.157e-06
ISSP-W2	8	1.000e-02	2.167e-07	2.146e-05
A5HY	1	1.250e-04	2.026e-07	1.620e-03
S1H-5	1	1.250e-04	1.997e-07	1.598e-03
STSRV	1	1.000e+00	1.997e-07	0.000e+00
SDISO	1	1.000e+00	1.997e-07	0.000e+00
RA-DGS-5P5H	4	6.750e-01	1.967e-07	9.473e-08
WD-1	8	3.000e-02	1.672e-07	5.405e-06
DC-12-G-DC5P5	2	7.690e-02	1.428e-07	1.714e-06
H1-5H	3	8.052e-02	1.372e-07	1.567e-06
OP-OPL1S-1	3	1.000e+00	1.372e-07	0.000e+00
RA-FWLVL-3	3	6.200e-02	1.267e-07	1.916e-06
PDS-DUMMY-1	2	1.000e+00	1.241e-07	0.000e+00

Table 14.59 Basic Event Importance Summary for Total Plant Model (Continued)

Event Name	Number of Occurrences	Probability of Failure	Risk Reduction Difference	Risk Increase Difference
DG11-UNAVAIL-W1	5	8.800e-01	1.101e-07	1.501e-08
HCS-SYS-MAINT-W1	5	6.700e-01	1.101e-07	5.421e-08
RA-LOSP-3P5-G-2	4	6.310e-01	9.576e-08	5.600e-08
NOOVP	2	1.000e+00	9.157e-08	0.000e+00
ISSDB-W2	2	9.380e-01	9.157e-08	6.052e-09
ACP-DGN-FR-DG12D	4	4.017e-02	8.548e-08	2.042e-06
DC-5P5-G-DC2	2	2.010e-02	8.542e-08	4.164e-06
DC-20P5-G-DC12	2	6.756e-01	6.709e-08	3.222e-08
RA-LOSP-12-G-3P5	2	3.380e-01	6.709e-08	1.314e-07
CTGOP-W1	3	9.000e-01	5.709e-08	6.343e-09
ISTCT-W1	3	1.000e+00	5.709e-08	0.000e+00
E2T5H	1	3.800e-02	5.097e-08	1.290e-06
RA-HPCS-HW-1-W1	2	7.200e-01	4.085e-08	1.588e-08
E1T5H	1	3.560e-01	4.059e-08	7.343e-08
OP-RESCS-085	1	8.500e-02	4.059e-08	4.370e-07
ISSDC-W3	3	1.010e-01	2.873e-08	2.557e-07
RA-DGS-3P5H	1	7.750e-01	2.460e-08	7.141e-09
J2-5	1	1.560e-02	2.094e-08	1.322e-06
DC-12-G-DC3P5	1	9.200e-02	1.712e-08	1.690e-07
ISSP-W1	3	1.000e-02	1.583e-08	1.567e-06
SWLOS	1	1.000e+00	1.390e-08	0.000e+00
OP-OPSTM-1	1	1.000e+00	1.390e-08	0.000e+00
T5A5H	1	2.400e-02	1.390e-08	5.654e-07
OP-OPSTH-009	1	9.000e-03	1.390e-08	1.531e-06
OP-OPECS-011	1	1.100e-02	1.390e-08	1.250e-06
DC-12-G-DC3	1	9.320e-02	1.386e-08	1.348e-07
RA-LOSP-3-G-2	1	7.280e-01	1.386e-08	5.177e-09
ACP-DGN-FR-DG12B	1	4.113e-02	1.386e-08	3.230e-07
RA-ECCS-CONTROL	1	5.300e-02	1.311e-08	2.342e-07
OP-OPMSV-1	1	1.000e+00	1.311e-08	0.000e+00
OP-OPSOF-05	1	5.000e-02	1.311e-08	2.491e-07
SSW-MOV-CC-MV5B	1	3.000e-03	1.094e-08	3.635e-06
SSW-MDP-FS-MDP1B	1	3.000e-03	1.094e-08	3.635e-06
SSW-MOV-CC-MV18B	1	3.000e-03	1.094e-08	3.635e-06
SSW-MOV-CC-MV1B	1	3.000e-03	1.094e-08	3.635e-06
EHV-MOV-CC-MVC1B	1	3.000e-03	1.094e-08	3.635e-06
DC-18P5-G-DC12	1	4.907e-01	1.087e-08	1.128e-08
RA-LOSP-12-G-5P5	1	4.890e-01	1.087e-08	1.136e-08
RA-ISO89	1	3.800e-02	1.087e-08	2.752e-07
ISMSV-W2	10	1.000e-02	7.096e-09	7.025e-07
WHERE-0	11	0.000e+00	0.000e+00	-1.118e-06
ISSDC-W1	8	0.000e+00	0.000e+00	-1.672e-07
ISMSV-W3-0	1	0.000e+00	0.000e+00	-2.026e-07
SPWLV-W1	2	0.000e+00	0.000e+00	-4.085e-08
PRESS-W2	25	0.000e+00	0.000e+00	-1.237e-06
PRESS-W1	8	0.000e+00	0.000e+00	-1.672e-07

Results and Conclusions

Table 14.59 Basic Event Importance Summary for Total Plant Model (Continued)

Event Name	Number of Occurrences	Probability of Failure	Risk Reduction Difference	Risk Increase Difference
SPWLV-W2	4	6.800e-01	-3.812e-21	1.271e-21
OP-OPSDC-00084	1	8.400e-04	-1.169e-11	-1.390e-08
OP-OPECS-003	1	3.000e-03	-3.945e-11	-1.311e-08
OP-OPSDC-00085	2	8.500e-04	-7.790e-11	-9.157e-08
OP-OPFLD-014	1	1.400e-02	-2.306e-10	-1.624e-08
RLOSP	18	4.000e-04	-5.531e-10	-1.382e-06
ISMSV-W1	3	1.000e-02	-5.767e-10	-5.709e-08
LPCS-W1	2	2.000e-02	-8.336e-10	-4.085e-08
OP-OPECS-01	3	1.000e-02	-1.136e-09	-1.125e-07
OP-OPECS-012	2	1.200e-02	-1.508e-09	-1.241e-07
OP-OPSRV-004	5	4.000e-03	-1.723e-09	-4.290e-07
OP-OPFLD-012	4	1.200e-02	-2.677e-09	-2.204e-07
ISMSV-W3	4	1.000e-02	-5.192e-09	-5.140e-07
ISSP-W3	5	1.000e-02	-7.238e-09	-7.166e-07
OP-OPFLL-01	5	1.000e-02	-7.238e-09	-7.166e-07
LPCS-W2	4	2.000e-02	-7.367e-09	-3.610e-07
OP-OPFLL-023	6	2.300e-02	-9.460e-09	-4.018e-07
ISSDC-W2	23	6.200e-02	-6.097e-08	-9.224e-07
SPWLV-W3	5	4.800e-01	-6.615e-07	-7.166e-07

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