12 PROBABILISTIC FIRE ANALYSIS

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12 PROBABILISTIC FIRE ANALYSIS

This section documents the internal fire analysis of the ESBWR PRA.

12.1 INTRODUCTION

The probabilistic fire analysis is performed with reasonable assumptions since the specifics of cable routings, ignition sources, or target locations in each zone of the plant are still in the design phase. Because of this limitation, a simplified, conservative, and bounding approach is used in this analysis.

The aim of the analysis is to show that core damage frequency (CDF) and large release frequency (LRF) due to fire are non-significant contributors to ESBWR risks.

The scope of the analysis includes both at-power and shutdown fire-induced accident scenarios.

12.2 METHODOLOGY AND ASSUMPTIONS

The Revision 2 of the ESBWR internal fires probabilistic risk assessment is performed according to the guidance in NUREG/CR-6850 (EPRI 1011989), EPRI/NRC-RES Fire PRA Methodology for Nuclear Power Facilities as applicable (Reference 12-1). NUREG/CR-6850 documents state-of-the-art methods, tools, and data for the conduct of a fire Probabilistic Risk Assessment (PRA) for a commercial nuclear power plant (NPP) application. The methods have been developed under the Fire Risk Requantification Study. This study was conducted as a joint activity between the Electric Power Research Institute (EPRI) and the U.S. Nuclear Regulatory Commission (NRC) Office of Nuclear Regulatory Research (RES) under the terms of an NRC/EPRI Memorandum of Understanding and an accompanying Fire Research Addendum.

For Revision 2 ESBWR Fire PRA (FPRA) model development, the following NUREG/CR-6850 tasks are applicable:

- Task 1: Plant Boundary & Partitioning
- Task 2: Fire PRA Component Selection
- Task 3: Fire PRA Cable Selection
- Task 4: Qualitative Screening
- Task 5: Fire-Induced Risk Model
- Task 6: Fire Ignition Frequencies
- Task 7: Quantitative Screening

Support Task A (Plant Walk Downs) is not performed since ESBWR plant is still in the design certification phase. Support Task B (Fire PRA Database) is performed with an ACCESS database that includes all the tables that are necessary to develop a fire PRA model.

Fire ignition frequencies for power operation at each area are estimated, using the NUREG/CR-6850 methodology and data. Fire frequencies for shutdown conditions are estimated using the information included in Reference 12-2.

For a postulated fire, a list of the impacted components is generated with the mapping defined in the fire PRA database. A list of impacted fibers and cables is also generated with the assumed cable routing. The cable routing is assumed based on the modeled PRA components, their supports, and the cabinet locations from instrumentation and control designs.

Fires are conservatively assumed to propagate unmitigated in each fire area (no suppression is credited) and damage all functions in the fire area with a few exceptions for shutdown fire scenarios.

The internal events PRA accident sequence structures and system fault trees and success criteria are used in the calculation of the fire CDF and LRF.

12.2.1 General Assumptions

The fire risk analysis is performed using conservative assumptions due, in part, to the stage of the design. The key conservative assumptions are summarized below:

(1) The analysis recognizes that a fire ignition in any fire area may grow into a fully-developed fire.

(2) The analysis does not take credit for any fire suppression (i.e., self-extinguishment, installed suppression systems, nor manual fire fighting activities). Therefore, the analysis assumes that all fires disable all potentially affected equipment in the area.

(3) The analysis does not take credit for the distance between fire sources and targets.

(4) The analysis assumes that all fire-induced equipment damage occurs at t=0.

(5) Design requirements have been implemented to prevent spurious actuations induced by a single fire in the reactor building. Fire propagation cases in the Reactor Building are conservatively assumed to result in the inadvertent opening of relief valves (IORV) initiating event.

Other key assumptions are listed in the following paragraphs with respect to the specific tasks.

12.2.2 Task 1 Plant Partitioning Assumptions:

Since the insights from fire PRA analysis are impacting the detailed designs, the following assumptions are made in the fire PRA analysis as a result of that process:

(6) Fire area F3301 is assumed to include room 3301 only while fire area F3140 is assumed to include room 3140 only. Since the two rooms are only connected by a cable chase and are well separated, it is difficult for a fire to propagate from one room to the other. A sensitivity case on this assumption is performed in Section 11 for the full-power fire sensitivity study.

(7) In Table 12.3-1, two new fire areas are assumed: FFPE and FSWYD. The first one assumes the fire pumphouse enclosure for fire protection system. Fire area FSWYD is used to evaluate a postulated fire in the switchyard area that is conservatively assumed to result in a loss of preferred power (LOPP) without potential for recovery.

12.2.3 Task 2 Component Selection Assumptions:

The following assumptions are made in this task:

(8) The main control room (MCR) controls will be connected to the DCIS rooms (unaffected by a main control room fire) via fiber cables and that the loss (including melting) of the fibers or visual display units (VDUs) will not cause inadvertent actuations nor affect the automatic actions associated with safety and non-safety equipment.

(9) The ESBWR plant is designed to prevent spurious actuations that could adversely affect the capability to achieve and maintain safe shutdown.

a. The ESBWR design features as described in DCD Tier 2 Section 7.1.3 help minimize the adverse affect on safe shutdown due to fire-induced spurious actuations. First of all, the ESBWR instrumentation and control system is digital. A spurious signal cannot be induced by the fire damages in a fiber optic cable. The hard wires are minimized to limit the consequences of a postulated fire. From the DCIS rooms to the components, fiber optics will also be used up to the Remote Multiplexing Units (RMUs) in the plant. Hard wires then are used to control the subject components. Typically two load drivers are actuated simultaneously in order to actuate the component. To eliminate spurious actuations, these two load drivers are located in different fire areas. Therefore, by design, a fire in a single fire area cannot cause spurious actuation of safety-related equipment.

b. ESBWR plant has a passive design that the safety systems do not have active components such as the high-pressure injection pumps in the traditional plant designs. For the high/low pressure interfaces, multiple check valves are included which prevent the opening of the path even if a spurious actuation should occur after a fire. DCD Tier 2 section 7.6.1 describes the HP/LP system interlock function.

The following assumptions are used to address the additional consideration of the fire impact on equipment credited in the shutdown PRA model:

(10) Although fire areas F3301 and F3302 are well separated by the corridor F3100, it is conservatively assumed that fire propagation could occur via two pairs of fire doors with a fire barrier failure probability of 2*7.4E-3*7.4E-3 = 1.1E-4. Similarly, although RWCU pump rooms are well separated, it is conservatively assumed that a fire propagation could occur via the fire door at elevation 4650 between fire areas F1152 and F1162, which could fail the controls to both RWCU trains. The fire barrier failure probability for this case is then assumed to be 7.4E-3. Losses of both RCCWS trains, both instrument air trains and both PIP buses due to fire propagation are also assumed to result in loss of RWCU. Fire areas F4250 & F4260, and F4350 & F4360 are separated by walls. Thus a fire barrier failure rate of 1.2E-3 is assumed. Fire areas F5550 & F5560 are separated by a corridor (fire area F5100). It is conservatively assumed that fire propagation could occur via three pairs of fire doors with a fire barrier failure probability of 3*7.4E-3*7.4E-3 = 1.6E-4.

(11) The fire areas in the electrical building are well separated. Fire propagation from one area to another in the electrical building would not cause LOPP until it propagates to a third area, which is not considered per the guidance. Fire propagation between the two cable tunnels could result in a scenario similar to LOPP. Since the fire barriers between the two tunnels are walls and sealed penetrations, a fire barrier failure probability of 1.2E-3 is used. A fire in switchyard is conservatively assumed to result in a loss of preferred offsite power.

(12) A fire in the Service Water/Water Treatment Building (fire area F7300) is assumed to result in loss of service water. A fire propagation case with both F3301 and

F3302 would result in a loss of service water. However, it is determined that the loss of RWCU initiator would be bounding for shutdown scenarios.

(13) A fire is assumed to cause failure of all fire-susceptible components in the subject fire area. Recovery to the failed system(s) after the postulated fire is not credited.

12.2.4 Task 3 Cable Selection Assumptions:

The following assumptions/considerations are applied in this task:

(14) Based on the plant general arrangement drawings with component locations, cable routing is assumed for PRA purposes. A list of cables is generated from system model database that includes all modeled supports for PRA components included in the system models. This list captures the majority of cables, especially for risk-important components.

(15) For some cables, their failure may only fail one input to the component, which does not impact its operability. Therefore, a cable to component mapping cannot accurately model the actual failure mechanism. For these cables, a special mapping from the cables to the fault tree gates that model the divisional actuation logic is generated.

(16) Fibers are assumed to connect RMUs to their corresponding control cabinets in the DCIS rooms. Hard wires are assumed to connect the components to RMUs. To prevent spurious actuations, load drivers are designed to be located in different fire areas.

(17) It is assumed that there will be no controls in the MCR that can induce undesirable spurious operations that affect the PRA. The HFE process ultimately decides the hard-wired controls in the MCR. At this time, the SCRAM and MSIV closure will have hard-wired controls in the MCR. In the full-power fire PRA models, the operator action to manually scram the reactor is credited. A MCR fire is not assumed to impact this operator action since this operator action is skill-based and will be performed as operator’s first response to an accident. The HFE group has been recommended not to include other hard-wired controls because of the potential for spurious operations due to fires.

(18) The postulated cable routing obeys the separation criteria.

   a. For the safety-related Q-DCIS cables, it will typically originate from the Q-DCIS divisional room in the control building and pass through its own divisional duct bank, then connect to its divisional cable chase in the reactor building.

   b. For nonsafety-related N-DCIS cables, it will typically originate from the N-DCIS rooms in the control building and pass through the nonsafety-related divisional tunnel and connect to rooms in the reactor building, turbine building, or electrical building.

   c. If the N-DCIS cable has to pass through the divisional rooms in reactor building, it is assumed that Q-DICS Div 1 and 3 rooms can be used for N-DCIS Div A and Div 2 and 4 used for Div B.

12.2.5 Task 6 Fire Ignition Frequencies Assumptions:

Per NUREG/CR-6850, the analysis model described in this task is based on the following assumptions.

(19) Fire ignition frequencies remain constant over time.

(20) Among the plants, total ignition frequency is the same for the same equipment type, regardless of differences in the quantity and characteristics of the equipment type that may exist among the plants.

The above assumptions are conservative since the ESBWR design will have significantly lower numbers of pumps, valves and other active components.

(21) Within each plant, the likelihood of fire ignition is the same across an equipment type. For example, pumps are assumed to have the same fire ignition frequency regardless of size, usage level, working environment, etc.

The following are other assumptions used in the fire ignition frequency calculations:

(22) The fire ignition frequencies are evaluated with the best available design information. The design inputs are subject to changes as a result of more detailed designs and PRA insights. However, it is reasonable to assume that the major components and their locations have been well designed and will not have significant changes in the final designs.

(23) It is assumed that all ignition source type bins are applicable to the ESBWR plant with the following exceptions:

   a. Bins 02 and 03 are not applicable since they are used for PWR plants.

   b. Bin 22 for RPS MG sets is not applicable to ESBWR plants.

(24) Bin 04 is assumed to be not applicable to the main control room since the ESBWR main control room design is completely digital as opposed to the traditional electro-mechanical designs.

(25) Bin 14 includes the traveling screens. MOV and fan motors are not counted since their power rating is typically smaller than 5 horsepower. Additionally, MOVs are only energized during valve actuation.

(26) The buses, load centers, breakers, inverters, and rectifiers are included in the electrical cabinet (bin 15) counts. Multiple vertical segments for a switchgear section are hard to evaluate at this time since those segments could be associated with the breakers or local displays. Therefore, each bus or breaker is also counted as one cabinet.

(27) Ignition frequency from bin 29 (transformer yard, other) is omitted because the yard fire frequency (fire area FSWYD) is taken from report RES/OERAB/S02-01 (Reference 12-2).

(28) For bins 13, 17, 19, 20, 30, simplified assumptions are made as follows:

   a. Two dryers are assumed (bin 13). However, it is assumed that these dryers will not be located in the fire areas included in the FPRA model.

b. Two hydrogen tanks are assumed (bin 17). These two tanks are located in the yard area.
c. Misc. hydrogen fires (bin 19) and off-gas/H2 recombiners (bin 20) are not estimated.
d. Two boilers are assumed (bin 30) and they are in separate fire areas that have been screened.

(29) Although the ESBWR plant may be located with the existing nuclear power plants, the plant location weighting factors are assumed to be 1 because the ESBWR plant is designed as a single-unit plant with no shared buildings.

(30) Since the ESBWR plant is still in design phase, the count of components are performed with the modeled PRA components. This approach is very conservative since the non-PRA components are typically going to greatly increase the number of total sources and reduce the "per component" ignition frequencies.

(31) Since the plant has not operated and no history on the maintenance activity is available, the weighting factor evaluation is simplified. It is assumed that all compartments have the same transient fire influencing factors. This is conservative since the high risk areas are going to have tighter controls. Potential exceptions are the main control room (fire area F3270) and the turbine building general area (fire area F4100). The main control room typically has high occupancy and the bin 7 (transient) count is increased to 10. The turbine building general area covers a large portion of the turbine building and would expect high maintenance activity and high occupancy all the time. For conservatism, the weighting factor for this area (for bins 36 and 37) is increased by a factor of 10.

(32) The bins for cable fires, cable run and junction boxes are estimated with the cable routing information generated in the cable selection task.

(33) For main control room and DCIS room fire ignition frequency calculations, additional non-PRA transformers, cabinets, and AHUs are counted, which are shown on the general arrangement drawings. This is conservative since the total counts of those components are based on the PRA components only.

(34) During shutdown conditions, a fire barrier may not be intact due to maintenance activities. However, an added fire watch would not only increase the success probability of fire detection and suppression, but also help restore the fire barrier in time to prevent fire propagation. Shutdown fire risks related to the fire barriers are evaluated and managed in accordance with the outage risk management program of 10CFR50.65(a)(4).

Because of the compounding conservative assumptions associated with the fire PRA, it is inappropriate to add the fire CDF or LRF results to the internal events results.

12.3 IDENTIFICATION OF PLANT FIRE AREAS

This section discusses the division of the plant into fire areas for the purpose of the probabilistic internal fires analysis. This division considers separation design criteria and the systems considered significant to the risk profile. The separation design criteria and the resulting fire areas are discussed below.

The plant layout drawings for fire areas and fire boundaries are included in DCD Section 9A (Figures 9A.2-1 through 9A.2-47). Table 9A.5-1 through 9A.5-7 in DCD Section 9A list additional information for these fire areas (Reference 12-4).

A fire in the switchyard could result in a plant trip if it results in loss of preferred power. Such scenario has been included in the fire PRA model with a conservative assumption that any fire in the switchyard would result in a reactor trip. For consistency and conservatism, a fire frequency of 1.8E-2/yr and 5.2E-2/shutdown-year based on RES/OERAB/S01-01 has been used (Reference 12-2). This is double counting since the fire events that could result in a plant trip has been included in the loss of preferred power initiator (the switchyard-related portion of initiator %T-LOPP) in the internal events PRA models. Therefore, the inclusion of these fire scenarios in fire PRA model is conservative.

12.3.1 Separation Criteria

The "Electrical Equipment Separation" design specification provides the basic criteria concerning separation, both physical and electrical, of redundant safety equipment. These specifications are as follows:

- NRC Regulatory Guide 1.75 and IEEE Standard 384 require physical separation and electrical isolation. In addition, the more stringent NRC Policy Statement SECY-89-013 (Paragraph 2.3.c) requires capability for safe shutdown assuming all equipment in any one fire area has been rendered inoperable by fire. In all areas except the Control Room and the primary containment, redundant electrical divisions should be placed in different fire areas separated by fire barriers rated in accordance with the Fire Prevention and Protection Specification.
- Exceptions are anticipated, but must be individually justified. The Control Room is exempted on condition that independent alternate shutdown capability is provided that is physically and electrically independent of the Control Room (i.e., the Remote Shutdown System). The primary containment design should ensure, to as great an extent as possible, that one shutdown division is free of fire damage.

Fire protection is achieved through an adequate balance of:

- Preventing fires from starting
- Detecting fires quickly, suppressing those fires by controlling and extinguishing them quickly, and limiting their damage; and
- Designing plant systems so that a fire that starts and burns for considerable time does not prevent essential plant safety functions.

This fire PRA considers only the mitigation of fires by designs; suppression is not credited in the analysis.

The plant is divided into separate fire areas. The redundant cables and equipment are separated with fire barriers to limit any damage caused by a fire and to provide a means to ensure that there is sufficient capacity to perform safety functions in case of fire.

The ESBWR plant design has three-hour fire rated barriers separating:

- Safety-related systems from potential fires in nonsafety-related areas that could affect their ability to perform their safety function;
- Redundant divisions or trains of safety-related systems so that both are not subject to damage from a single credible fire that could consume everything within the given fire area; fires within inerted containment during plant operation are not considered credible;
- Components within a single safety division that could present a fire hazard to other safety-related components;
- Redundant remote shutdown panels.

The application of these separation criteria ensures an adequate independence of each safety system division, such that a fire in a single fire area can only affect one safety system division. These criteria are used in this analysis to support definitions of the major fire areas.

ESBWR nonsafety-related systems with the potential to adversely affect safety are designed with similar separation considerations.

12.3.2 Plant Fire Areas

The global plant analysis boundary uses all the fire areas defined in DCD Rev. 4 Chapter 9 (Reference 12-4), which covers all the protected area. All fire areas defined in the Fire Hazard Analysis (FHA) are included in the plant boundary. These fire areas are used to map to physical rooms and then to components.

A total of 148 fire areas are defined in FHA tables. Table 12.3-1 summarized all the fire areas with the exceptions described as follows.

Primary containment is not a significant fire area because it is inerted during plant operation. During shutdown the primary containment is not inerted; however, the small quantity of combustible materials and spatial separation prevent damage to the redundant divisional circuits in this area. The Level 2 PRA considers de-inerted operation prior to and following shutdown as described in NEDO-33201, Section 8.1.4.

The FHA fire areas are grouped in the plant locations described as follows.

12.3.2.1 Reactor Building

This building houses all safety-related structures, systems and components (SSCs), except for the main control room, safety-related distributed control and information system equipment rooms and spent fuel storage pool. This includes the reactor, containment, equipment rooms/compartments outside containment, the refueling area with the fuel buffer pool, and auxiliary equipment area.

- The reactor building contains cabinets and electrical equipment associated with each of the safety-related divisions. This electrical equipment includes the batteries and the DC distribution panels for all safety-related equipment. The electrical equipment is distributed on different elevations within the Reactor Building. Each division is located in a separate fire area, which in some cases include areas on more than one elevation. Each divisional fire area is bounded on all sides by three-hour rated fire barriers. Likewise, it is also assumed that the routing of associated cables respects the separation criteria. It is assumed that all fires in a divisional fire area results in the immediate loss of function of that division.
- The Reactor Building also contains nonsafety-related systems that are credited in the PRA models, such as the Reactor Water Cleanup (RWCU) and the Control Rod Drive (CRD) systems. The pumps and heat exchangers of each RWCU train are located in different fire areas. It is assumed that separation criteria are applied using fire barriers such that a single fire affects only a single RWCU train.

The fire areas in reactor building are named as “F1XXX.”

12.3.2.2 Fuel Building

This building houses the spent fuel storage pool, its auxiliary equipment and the lower end of the fuel transfer machine. The fuel and auxiliary pools cooling system (FAPCS) equipment is mainly located in the fuel building.

The fire areas in fuel building are named as “F2XXX.”

12.3.2.3 Control Building

This building houses the main control room and all safety-related controls outside the reactor building.

- The safety-related Q-DCIS cabinet areas contain the control and information cabinets of the four safety divisions in the control building. Each of the four safety divisions is located in a separate fire area. These areas contain the equipment needed for the actuation of safety systems.
- The nonsafety-related N-DCIS cabinet areas are divided into two separate fire areas.
- The ESBWR main control room (MCR) is designed differently from a traditional plant. There is no electrical system protection equipment in the MCR and the MCR fire will not actuate any DCIS controls other than trip the main generator. The MCR fire does not result in the loss of offsite power (or the loss of the diesels).
- The DPS cabinet is located in a separate fire area in the control building. A preliminary fire PRA analysis model with DPS cabinet located inside room 3301 showed that the fire risk in fire area F3301 would be the dominant contributor to

all fire risks. The combination of the high failure probability of common cause failure of software for the safety system and the failure of DPS with multiple nonsafety-related systems impacted by a fire in room 3301 results in unacceptable plant risk. With a separate fire area for the proposed DPS cabinet in the detailed design, the fire risk is significantly reduced.

The fire areas in control building are named as "F3XXX." The DPS fire area is defined as FDPS in this fire analysis.

12.3.2.4 Turbine Building

This building houses equipment associated with the main turbine and generator and their auxiliary systems and equipment including the condensate purification system and the process offgas treatment system. Other nonsafety-related systems modeled in PRA models are located in turbine building:

- Feedwater and condensate system;
- Reactor component cooling water system;
- Turbine component cooling water system;
- Instrument air system; and
- Service water system.

The fire areas in turbine building are named as "F4XXX."

12.3.2.5 Electrical Building

This building houses the plant generation (PG) and plant investment protection (PIP) switchgears. It also includes the nonsafety-related batteries and two nonsafety-related standby diesel generators and their associated auxiliary equipment.

The fire areas in electrical building are named as "F5XXX."

12.3.2.6 Radwaste Building

This building houses equipment associated with the collection and processing of solid and liquid radioactive waste generated by the plant. No PRA components are included in the radwaste building, so the building is conservatively excluded from the analysis.

The fire areas in radwaste building are named as "F6XXX."

12.3.2.7 Yard Area

The yard area includes other fire areas located outside the buildings described above. The fire area names in the yard area range from "F4XXX" to F9XXX."

12.3.3 Fire Propagation

Fire propagation cases are postulated for the majority of the fire areas under the full power condition, which are listed in Table 12.3-2. Some fire areas are not postulated for fire propagation for the following reasons:

(1) The fire-induced core damage frequencies in these fire areas are negligible,

(2) The subject fire area has no adjacent fire areas (e.g., some fire areas located in the yard).

For risk-significant fire areas, typically the exposing area and exposed areas are reversed to construct two fire propagation scenarios. Some fire propagation cases do not have their reversed scenarios because they are not significant risk contributors. Moreover, the inclusion of some cases is simply to demonstrate that these postulated fire propagation scenarios are not risk significant (especially the propagation scenarios that change the initiating event from T-GEN to T-IORV). It is not intended to postulate all potential fire propagation scenarios.

With the conservative assumption that a postulated fire will damage all fire-susceptible equipment in the affected fire areas, the most risk-significant case of the fire propagation paths is chosen when the fire can spread in multiple ways. Three types of fire barriers are used based on NUREG/CR-6850 Table 11-3:

- Type 1 - fire, security, and water tight doors with a failure probability of 7.4E-03
- Type 2 - fire and ventilation dampers with a failure probability of 2.7E-03
- Type 3 - penetration seals and fire walls with a failure probability of 1.2E-03

For shutdown cases, the fire propagation cases are postulated in the identification of shutdown initiating events. More conservative assumptions have been made to postulate a fire that can be propagated to multiple areas, which defeats the redundancy in the systems and results in one of the shutdown initiating events.

Table 12.3-1
ESBWR Plant Partitioning for Probabilistic Fire Analysis

Fire Area	Description	Building
F1104	Elevator A	Reactor
F1105	Elevator C	Reactor
F1110	HCU A	Reactor
F1120	HCU B	Reactor
F1130	HCU C	Reactor
F1140	HCU D	Reactor
F1150	Nonsafety NE quadrant	Reactor
F1152	Nonsafety SE quadrant	Reactor
F1160	Nonsafety NW quadrant	Reactor
F1162	Nonsafety SW quadrant	Reactor
F1170	Drywell and Containment	Reactor
F1190	Stairwells A and E	Reactor
F1191	Stairwell B	Reactor
F1192	Stairwells C and F	Reactor
F1193	Stairwell D	Reactor
F1194	Elevator B	Reactor
F1195	Interior Stairwell A	Reactor
F1196	Interior Stairwell B	Reactor
F1197	Interior Stairwell C	Reactor
F1198	Interior Stairwell D	Reactor
F1203	CRD and Containment Access	Reactor
F1210	Division I Battery	Reactor
F1220	Division II Battery	Reactor
F1230	Division III Battery	Reactor
F1240	Division IV Battery	Reactor

Table 12.3-1
ESBWR Plant Partitioning for Probabilistic Fire Analysis

Fire Area	Description	Building
F1262	B Demineralizers	Reactor
F1311	Division I Electrical	Reactor
F1321	Division II Electrical	Reactor
F1331	Division III Electrical	Reactor
F1341	Division IV Electrical	Reactor
F1450	Hydrogen Gas A	Reactor
F1460	Hydrogen Gas B	Reactor
F1600	Refueling Floor and Common Access	Reactor
F1770	Main Steam Tunnel	Reactor
F2100	New and Spent Fuel Handling	Fuel
F2192	Elevator A	Fuel
F2193	Stairwell A	Fuel
F2490	Stairwell B	Fuel
F2600	HVAC Penthouse A	Fuel
F2601	HVAC Penthouse B	Fuel
F3100	Corridor A	Control
F3101	Corridor B	Control
F3110	Division I Electrical	Control
F3120	Division II Electrical	Control
F3130	Division III Electrical	Control
F3140	Division VI Electrical	Control
F3190	Stairwell A	Control
F3191	Elevator A	Control
F3192	Stairwell B	Control
F3270	Main Control Room Complex	Control
F3301	Non-1E Electrical	Control

Table 12.3-1
ESBWR Plant Partitioning for Probabilistic Fire Analysis

Fire Area	Description	Building
F3302	Non-1E Electrical	Control
F4100	Turbine Equipment	Turbine
F4103	Feedwater Pumps	Turbine
F4108	Charcoal Absorbers	Turbine
F4190	Elevator A	Turbine
F4191	Stairwell A	Turbine
F4192	Elevator B	Turbine
F4193	Stairwell B	Turbine
F4194	Elevator C	Turbine
F4195	Stairwell C	Turbine
F4196	Elevator D	Turbine
F4197	Stairwell D	Turbine
F4201	Lube Oil Storage	Other
F4202	Hydrogen Storage	Other
F4250	Reactor Component Cooling Water A	Turbine
F4251	A Feedpump ASD Transformer	Other
F4252	C Feedpump ASD Transformer	Other
F4260	Reactor Component Cooling Water B	Turbine
F4261	B Feedpump ASD Transformer	Other
F4262	D Feedpump ASD Transformer	Other
F4271	Phase A Main Transformer	Other
F4272	Phase B Main Transformer	Other
F4273	Phase C Main Transformer	Other
F4274	Spare Main Transformer	Other
F4307	Turbine EHC	Turbine
F4308	Turbine Lube Oil	Turbine

Table 12.3-1

ESBWR Plant Partitioning for Probabilistic Fire Analysis

Fire Area	Description	Building
F4350	Instrument Air A	Turbine
F4360	Instrument Air B	Turbine
F4550	Chilled Water A	Turbine
F4560	Chilled Water B	Turbine
F4651	Water Surge Tanks A	Turbine
F4661	Water Surge Tanks B	Turbine
F5100	Corridors	Electrical
F5150	Batteries A	Electrical
F5154	Diesel Generator A	Electrical
F5156	D-G Electrical Equipment A	Electrical
F5157	Reserve Auxiliary Transformer A	Other
F5158	Unit Auxiliary Transformer A	Other
F5159	Fuel Oil Storage A	Other
F5160	Batteries B	Electrical
F5164	Diesel Generator B	Electrical
F5166	D-G Electrical Equipment B	Electrical
F5167	Reserve Auxiliary Transformer B	Other
F5168	Unit Auxiliary Transformer B	Other
F5169	Fuel Oil Storage B	Other
F5180	Technical Support Center Complex	Electrical
F5188	Fire Protection Equipment	Electrical
F5190	Elevator A	Electrical
F5191	Stairwell A	Electrical
F5192	Elevator B	Electrical
F5193	Stairwell B	Electrical
F5194	Stairwell C	Electrical

Table 12.3-1

ESBWR Plant Partitioning for Probabilistic Fire Analysis

Fire Area	Description	Building
F5250	Lower Cable Spreading A	Electrical
F5255	Day Tank A	Electrical
F5260	Lower Cable Spreading B	Electrical
F5265	Day Tank B	Electrical
F5301	Battery C	Electrical
F5302	Electrical Equipment C	Electrical
F5303	Electronic Equipment	Electrical
F5350	Lower Electrical Equipment A	Electrical
F5360	Lower Electrical Equipment B	Electrical
F5450	Upper Cable Spreading A	Electrical
F5460	Upper Cable Spreading B	Electrical
F5550	Upper Electrical Equipment A	Electrical
F5560	Upper Electrical Equipment B	Electrical
F5650	HVAC Equipment A	Electrical
F5660	HVAC Equipment B	Electrical
F6101	Radwaste Handling Equipment	Radwaste
F6170	Electrical Equipment	Radwaste
F6190	Elevator	Radwaste
F6191	Stairwell A	Radwaste
F6192	Stairwell B	Radwaste
F6193	Stairwell C	Radwaste
F6194	Stairwell D	Radwaste
F6270	Radwaste Control Room Complex	Radwaste
F6290	Stairwell E	Radwaste
F6301	HVAC Equipment	Radwaste
F7100	Pump House	Other

Table 12.3-1

ESBWR Plant Partitioning for Probabilistic Fire Analysis

Fire Area	Description	Building
F7150	Nonseismic Diesel Fire Pump	Other
F7180	Guard House	Other
F7200	Hot Machine Shop & Storage	Other
F7300	Service Water / Water Treatment Building	Other
F7400	Cold Machine Shop	Other
F7500	Warehouse	Other
F7600	Training Center	Other
F7700	Service Building	Other
F7800	Auxiliary Boiler Building	Other
F7900	Administration Building	Other
F8110	Breathing Air Storage Division I	Other
F8120	Breathing Air Storage Division II	Other
F8130	Breathing Air Storage Division III	Other
F8250	Electric Firepump A	Other
F8260	Diesel Fire Pump B	Other
F9101	Uncontrolled Access (Tunnel)	Other
F9150	Cable Tunnel A	Other
F9160	Cable Tunnel B	Other
F9201	Controlled Access (Tunnel)	Other
FDPS	DPS Room (assumed)	Control
FFPE	Fire pump enclosure (primary)	Other
FSWYD	Switchyard (assumed)	Other

Table 12.3-2
Adjacent Fire Areas Evaluated for Fire Propagation under Full Power Conditions

#	Exposing Area	Exposed Area	Most Limiting Boundary
1	F1210	F1150	Dampers
2	F1210	F1311	Dampers
3	F1210	F1230	Doors
4	F1210	F1240	Doors
5	F1220	F1203	Wall or penetration seal
6	F1220	F1230	Doors
7	F1220	F1240	Doors
8	F1220	F1162	Dampers
9	F1220	F1321	Dampers
10	F1230	F1210	Doors
11	F1230	F1220	Doors
12	F1230	F1152	Dampers
13	F1230	F1262	Wall or penetration seal
14	F1230	F1331	Dampers
15	F1240	F1210	Doors
16	F1240	F1220	Doors

Table 12.3-2
Adjacent Fire Areas Evaluated for Fire Propagation under Full Power Conditions

#	Exposing Area	Exposed Area	Most Limiting Boundary
17	F1240	F1160	Dampers
18	F1240	F1341	Dampers
19	F1311	F1331	Doors
20	F1311	F1341	Doors
21	F1311	F1150	Dampers
22	F1311	F1210	Dampers
23	F1321	F1162	Dampers
24	F1321	F1341	Doors
25	F1321	F1203	Doors
26	F1321	F1220	Dampers
27	F1331	F1152	Dampers
28	F1331	F1311	Doors
29	F1331	F1203	Doors
30	F1331	F1230	Dampers
31	F1341	F1160	Dampers
32	F1341	F1311	Doors
33	F1341	F1321	Doors

Table 12.3-2

Adjacent Fire Areas Evaluated for Fire Propagation under Full Power Conditions

#	Exposing Area	Exposed Area	Most Limiting Boundary
34	F1341	F1240	Dampers
35	F3110	F3100	Doors
36	F3110	F3130	Wall or penetration seal
37	F3110	F3270	Dampers
38	F3120	F3101	Doors
39	F3120	F3140	Wall or penetration seal
40	F3120	F3270	Wall or penetration seal
41	F3130	F3101	Doors
42	F3130	F3110	Wall or penetration seal
43	F3130	F3270	Dampers
44	F3140	F3100	Doors
45	F3140	F3120	Wall or penetration seal
46	F3140	F3270	Wall or penetration seal
47	F3301	F3100	Doors
48	F3301	F3101	Dampers
49	F3301	F3270	Wall or penetration seal
50	F3301	F3110	Wall or penetration seal

Table 12.3-2
Adjacent Fire Areas Evaluated for Fire Propagation under Full Power Conditions

#	Exposing Area	Exposed Area	Most Limiting Boundary
51	F3301	F3130	Wall or penetration seal
52	F3302	F3270	Wall or penetration seal
53	F3302	F3110	Wall or penetration seal
54	F3302	F3130	Wall or penetration seal
55	F3302	F3100	Doors
56	F3302	F9150	Wall or penetration seal
57	F4100	F4103	Doors
58	F4100	F1770	Wall or penetration seal
59	F4100	F4250	Doors
60	F4100	F4260	Doors
61	F4100	F4350	Doors
62	F4100	F4360	Doors
63	F4100	F4550	Doors
64	F4100	F4560	Doors
65	F4100	F4651	Doors
66	F4100	F4661	Doors
67	F4103	F4100	Doors

Table 12.3-2

Adjacent Fire Areas Evaluated for Fire Propagation under Full Power Conditions

#	Exposing Area	Exposed Area	Most Limiting Boundary
68	F5550	F5100	Doors
69	F5550	F5650	Dampers
70	F5550	F5350	Wall or penetration seal
71	F5560	F5100	Doors
72	F5560	F5660	Dampers
73	F5560	F5360	Wall or penetration seal
74	F3301	FDPS	Doors
75	FDPS	F3301	Doors
76	F9150	F9160	Wall or penetration seal
77	F9160	F9150	Wall or penetration seal

12.4 COMPONENT SELECTION

A list of components in the system models are investigated for the following major categories:

1. Equipment whose fire-induced failures will contribute to or otherwise cause an initiating event in FPRA (include spurious actuations);
2. Equipment supports the success of mitigating system functions; and
3. Equipment supports the success of operator actions to achieve and maintain safe shutdown (include spurious actuations).

The list of equipment located in each fire area and the cable routing information are included in NEDE/NEDO-33386 Rev. 0 Section 4 (Reference 12-5). The mapping from fire areas to rooms, then to components and basic events is based on the current detailed design drawings, which could be subject to changes. However, the separation criteria are implemented and no significant changes are expected in future modifications to the detailed designs.

The remote shutdown panels will be located in separate fire areas in the reactor building per DCD section 9A.4.3. Since the fire PRA model does not take credit for the remote shutdown panels for conservatism, the location of the remote shutdown panels is not critical to the current PRA model. Such conservatism can be removed when the detailed design provides the necessary information.

12.4.1 Component Selection for Full-Power Condition

The component selection task follows the guidance in NUREG/CR-6850. Some internal events PRA sequences are eliminated based on the guidance in NUREG/CR-6850 Table 2-1. Other considerations are listed as follows:

- ATWS sequences are included in ESBWR FPRA due to the relatively low internal events (IE) CDF values and relatively higher contribution from ATWS sequences based on the current revision.
- Spurious actuations of SRVs and DPVs are prevented by the ESBWR design. However, T-IORV sequences are still considered for the fire propagation cases.
- Human actions are modeled to minimum in the internal events PRA model. For a typical sequence, no additional consideration is necessary except MCR fire, which could have additional delay. However, the ESBWR plants are designed to allow operators to perform their tasks at any terminal where all controls would be available to them.

The cable routing is assumed with the currently designed plant general arrangement drawings with divisional separation. The instrumentation and control is assumed based on the preliminary designs on panels and RMUs.

The operator actions are minimized in the ESBWR PRA model. Therefore, the fire impact should not be significant due to the loss of instrumentation. A main control room fire is modeled by assuming failure of all manual actions.

The ESBWR instrumentation and control systems are designed to prevent spurious actuations. Potential spurious actuation is only evaluated for fire propagation cases. The following are additional considerations on spurious actuation:

- The potential new sequences due to spurious actuation will be focused on the ISLOCA sequences since the fire could damage multiple cables to the MOVs in series, which would make ISLOCA sequences more significant in the FPRA models. However, in the ESBWR design on the high/low pressure interfaces, multiple check valves are included which prevent the opening of the path due to a spurious actuation after a fire.
- Another potential candidate is the spurious closing of the MSIVs due to the fire in a postulated area. However, the T-GEN sequences have already considered the closure of MSIVs. Therefore, the fire should not introduce additional mitigating system failures.

Since the human actions are minimally modeled, the impact of fire to additional mitigating equipment, instrumentation and diagnostic equipment important to human response is deemed to be insignificant.

With the current internal events PRA model, the “potentially high consequence” related equipment is in the turbine building, where typically trains are not as well separated as in the safety-related systems. The safety-related systems have N-2 redundancies, which make these systems not significant contributors to CDF except for common cause failures. A fire that can propagate to other fire areas would result in more failures; however, the fire initiator frequencies would be so low that these postulated sequences would not be significant contributors either.

The FPRA component list is based on the database used for system modeling with the augmented information on mapping to PRA basic events, rooms, and cables summarized in NEDE/NEDO-33386 Rev 0 Table 4-1 (Reference 12-5). By grouping the components and their associated basic events with fire areas, it is easy to identify the fire-induced failures.

12.4.2 Component Selection for Shutdown Condition

The shutdown PRA model is constructed based on the Level 1 internal events PRA model. No new components are added in the system models. Therefore, the component selection follows the same process as described in the previous section except the evaluation of the applicability of shutdown initiating events to the shutdown fire PRA model.

Additional assumptions (10 – 13) are made for component selection under shutdown conditions.

12.5 CABLE SELECTION

Per NUREG/CR-6850, Tasks 3 (cable selection) and Task 9 (detailed circuit failure analysis) are recommended to be performed at the same time. Due to the limitation of the design, no detailed circuits are available for evaluation. However, the ESBWR digital instrument and control system designs will prevent spurious actuations.

The list of equipment located in each fire area and the cable routing information are included in NEDE/NEDO-33386 Rev. 0 Section 4 (Reference 12-5). The cable routing is assumed for PRA fire model under the guideline for separation criteria. Slight cable routing variations will not significantly impact the PRA results.

This task is performed based on the component support information in the PRA system model database and the general arrangement drawings. Simplified conservative assumptions are made for the potential impact of the failure of these cables to the relevant components. The cables are postulated based on the supports in system models. Mainly four types of cables are postulated:

Support Type	Cables Postulated	Cable Failure Induces Component Failure
Component Cooling		
Control Air		
Control Power	X	X
Control Signal	X	Depends
Motive Air		
Motive Nitrogen		
Motive Power	X	X
Powered Control Signal	X	Depends
Room Cooling		

Assumptions 14-18 are made for this task. NEDE/NEDO-33386 Tables 4-2 and 4-3 (Reference 12-5) summarize the cable routing and the rooms/fire areas on the cable routing paths.

12.6 QUALITATIVE SCREENING

12.6.1 Qualitative Screening for Full-Power Conditions

For full power conditions, Table 12.6-1 lists the applicable initiating events in the internal events PRA model and Table 12.6-2 lists all the fire areas with qualitative screening results. The qualitative screening process is performed with the following criteria:

1. The area does not contain PRA equipment (or their associated circuits) identified in Fire PRA Tasks 2 and 3, and
2. The area is such that fires in the area will not lead to:
   a. an automatic trip, or
   b. a manual trip as specified in fire procedures or plans, emergency operating procedures, or other plant policies, procedures and practices, or
   c. a mandated controlled shutdown as prescribed by plant technical specifications because of invoking a limiting condition of operation (LCO).

As a result of the qualitative screening, 66 fire areas are not screened and require quantitative analysis.

12.6.1.1 Evaluation of Potential Fire-Induced Spurious Valve Actuations Causing LOCA or Incorrect Valve Lineup

In the internal events PRA model, the following additional events contribute to the LOCA frequencies in addition to pipe breaks for LOCA inside containment:

	Event	Contribution To
a.	Spurious actuation of one DPV	Medium Steam LOCA
b.	Spurious actuation two or more SRVs/DPVs	Large LOCA
c.	Spurious actuation of one GDCS Squib	Medium Liquid LOCA

A single fire in any fire area will not result in spurious actuation of the subject valves to result in a LOCA. The ESBWR design features as described in DCD Tier 2 Section 7.1.3 help minimize the adverse affect on safe shutdown due to fire-induced spurious actuations. The ESBWR instrumentation and control system is digital. A spurious signal cannot be induced by the fire damages in a fiber optic cable. The hard wires are minimized to limit the consequences of a postulated fire. Typically, the main control room (MCR) communicates with the safety-related and nonsafety-related DCIS rooms with fiber optics. From the DCIS rooms to the components, fiber optics will also be used up to the Remote Multiplexing Units (RMUs) in the plant. Hard wires then are used to control the subject components. Typically, two or three load drivers are actuated simultaneously in order to actuate the component. To eliminate spurious actuations, these multiple load drivers are located in different fire areas. Therefore, a fire in a single fire area cannot cause spurious actuation.

The existence of fire detection and suppression systems, fire barriers, and adequate monitoring and supervision means that it can be assumed that fire propagation to neighboring zones separated by those barriers is a relatively negligible contribution to risk. Nevertheless, the potential propagation of a fire started in one of the divisions of the building and propagating to another area is considered in the Fire PRA.

The squib valves used in ADS, GDCS, and SLCS are located inside the primary containment, and their firing mechanisms are not vulnerable to direct contact with a fire during at-power operations. Furthermore, the sensing and actuation circuitry is primarily digital with fiber-optic connections, and they are immune to the hot-shorting phenomena. A relatively minor amount of copper wiring exists from the Remote Multiplexing Units in the Reactor Building to the firing circuits inside the primary containment such that concurrent hot-shorts due to a fire are considered to be negligible. Moreover, the primary containment is inerted during at-power operations so there is no possibility for a fire-induced spurious actuation inside the containment during at-power operations.

12.6.1.2 Evaluation of Potential Fire-Induced Spurious Valve Actuations Causing ISLOCA

For intersystem LOCA (ISLOCA), there are two systems with penetration lines that did not screen.

- Main Steam Line Drains Upstream of the MSIVs
- Feedwater System (Line A)

The main steam line drains upstream of the MSIVs have multiple, normally closed valves including two containment isolation valves (one normally closed and the other normally open). The safety-related DCIS system is designed in a way that no single fire can spuriously actuate the containment isolation valves. Moreover, if spurious actuation had occurred on both valves, the drain is still isolated. The other normally closed valve downstream on the drain line is normally closed and it is unlikely to have a fire that can propagate across multiple fire areas to cause spurious actuations on both the containment isolation valves and the downstream valve.

For the high/low pressure interfaces on the feedwater system line A, multiple check valves are included, which prevent the opening of the path even if a spurious actuation should occur after a fire. DCD Tier 2 section 7.6.1 describes the HP/LP system interlock function. Moreover, the detailed design has added the monitoring and alarm functions on the line between the check valve and the normally closed isolation valves to check for potential leakage to detect valve failure upstream. Therefore, the spurious actuation due to a postulated fire has negligible impact on the ISLOCA evaluations.

12.6.1.3 Evaluation of Potential Fire-Induced Spurious SRV Actuations

The reactor building is divided into four divisions for the safety-related system. For each division, multiple fire areas on different elevations are assigned to house multiple load drivers that are required to actuate the safety relief valves. Typically two load drivers are actuated simultaneously in order to actuate the component. This arrangement eliminates spurious actuations due to a postulated fire in a single fire area. Therefore, a fire in a single fire area cannot cause spurious actuation. DCD Section 7.3.1.1.2 states as follows:

> *Each of the trains (per division) of ADS start signals are sent to the load drivers/discrete outputs for the ADS SRVs and DPVs operated by that division. The load drivers/discrete outputs are wired in series for each valve such that each is required for operation. This scheme makes the logic single failure proof against inadvertent actuation.*

Per DCD Section 7.3.1.1.2, each of the SRVs is equipped with four solenoid-operated pilot valves. Three solenoids receive Q-DCIS signal, the fourth is part of the DPS. The solenoid-operated pilot valves are powered by 250 VDC buses. The divisional safety-related power sources are located in the divisional batteries rooms. The power and control cables are physically separated from other divisions.

12.6.1.4 Evaluation of Potential Smoke Damage

The propagation of smoke to areas beyond the postulated fire could result in smoke damage to advanced digital instrumentation and control system components and prevent actuation of multiple components.

The fire propagation scenarios have already considered the smoke propagation but are limited to the adjacent fire areas. Some fire areas are connected in a way that only smoke damage can be postulated via the failed fire dampers. The ESBWR plant is designed to address the potential smoke damages in accordance of NFPA 92A per DCD Section 9.4 (Reference 12-4).

Based on the simplified HVAC system diagrams (Figures 9.4-1 through 9.4-13) included in DCD Section 9.4, the potential smoke propagation paths are identified as follows:

- **Control Room**: The control room ventilation system is separate from other rooms in the control building. Therefore there is no potential smoke propagation path between the control room and other rooms.
- **Control Building**: There are two trains of control building ventilation. With the failure of the smoke removal mode, smoke can potentially propagate among N-DCIS room A (fire area F3301), Div I and IV Q-DCIS rooms (fire areas F3110 and F3140), or among N-DCIS room B (fire area F3302), Div II and Div III Q-DCIS rooms (fire areas F3120 and F3130).
- **Fuel Building**: With the failure of exhaust fans, smoke could potentially propagate among all fuel building elevations. However, the FAPCS components are the only modeled PRA components in the fuel building. All components are assumed to be located in one fire area F2100. Therefore, the potential smoke propagation paths have no impact on fire analysis.
- **Turbine Building**: With the failure of exhaust fans, smoke could potentially propagate among all turbine building elevations. However, the turbine building covers very large open areas and should not result in high concentration of

particles that can result in component failure. The RCCW system components are housed in separate fire areas and are designed with separation criteria that no single fire can fail both trains. RCCW rooms have their own fan coil units that are cooled by the nuclear-island chilled water system. Therefore, the RCCW rooms can be isolated from the rest of the turbine building to ensure its operability after a postulated fire in the turbine building general area (i.e., not the RCCW rooms).

- **Reactor Building**: Two HVAC systems (CLAVS for clean areas and CONAVS for contaminated areas) are designed for the reactor building. With the failure of the smoke removal mode, certain reactor building levels can have smoke propagation. The drywell/containment ventilation system is not connected to the reactor building HVAC systems.
- **Electrical Building**: With the failure of the smoke removal mode, the electric and electronic rooms can have smoke propagation. The two trains are separated since there are two HVAC sub-systems for redundancy. Diesel generator rooms have their own ventilation systems. There are no smoke propagation paths between the two diesel generator rooms and between the diesel generator rooms and the electrical building rooms.

The following design and operational features are used to mitigate the potential risk associated with smoke propagation:

Per DCD Section 9.5.1.11, Fire protection/smoke control provisions for ventilation for the various building areas are designed as follows:

- Smoke control in accordance with NFPA 92A guidelines is provided for unsprinklered areas where the FHA identifies a potential for heavy smoke or heat conditions. Additionally, safe egress and safe smoke refuge areas during a fire incident are provided in accordance with NFPA 92A guidelines for building occupants and the fire brigade. NFPA 101 guidelines are utilized for the design and labeling of safe egress routes.
- Smoke removal meets NFPA 804 with exception to NFPA 804 Sections 8.4.3 (3) and 8.4.3.2. Automatic sprinkler protection is provided for the high density cable tunnels, fuel oil tank rooms, diesel-generator rooms and a significant portion of the turbine building to limit heat and smoke generation. The COL Applicant will establish provisions for manual smoke control by manual actions of the fire brigade for all plant areas in accordance with NFPA 804 guidelines.
- Smoke removal from areas containing equipment required for safe shutdown is provided by the Heating, Ventilating, and Air-Conditioning (HVAC) systems operating in smoke removal mode. Upon indication of a fire from any fire detector, the local fire panel will activate a visual and audible fire alarm and annunciate the location of the fire. All fire alarms will be transmitted to the Main Fire Alarm Panel (MFAP) and to remote annunciation panels via a dedicated fire protection (FP) multiplexing data link. The MFAP will interface directly with the MCR panels to display common fire alarm, supervisory, and trouble conditions. Receipt of initiating signals from fire detectors or activation of an automatic

sprinkler will actuate the automatic suppression system in the room. A manual fire suppression system will be used where automatic suppression systems are not provided. Smoke will be removed from rooms containing equipment required for safe shutdown by the normal HVAC system in smoke removal mode.

- All ventilation duct openings in fire barriers will be protected by fire dampers as required by NFPA 90A.
- The safety-related Q-DCIS circuit boards will be coated for protection. Per NUREG/CR-6850 Appendix T, smoke damage, only one mode of component failure was found to be of potential risk significance, which is circuit bridging. By coating the Q-DCIS circuit boards, the potential smoke damage is significantly reduced.

Based on the above discussions, the following are the evaluation on the potential smoke propagation paths if the smoke removal mode fails and fire dampers fail to isolate the subject area:

- **N-DCIS room A (fire area F3301), Div I and IV Q-DCIS rooms (fire areas F3110 and F3140):** The risk increase due to the additional failures for the postulated smoke damage is not significant since the ESBWR plant has N-2 redundancy in the safety system design. With the additional failure probability of the smoke removal mode and the failure of fire dampers to isolate, the risk contribution due to smoke propagation is negligible. Q-DCIS components are coated, so smoke-related failure modes are not applicable.
- **N-DCIS room B (fire area F3302), Div II and Div III Q-DCIS rooms (fire areas F3120 and F3130):** Same as above. The risk increase due to smoke propagation is negligible.
- **Different levels in the reactor building**: The potential risk associated with smoke propagation is significantly mitigated by the fact that the safety-related Q-DCIS circuit boards are coated. Moreover, the risk increase due to smoke damage, if assumed, combined with the failure of the smoke removal mode and the fire damper isolation is not significant.
- **Electric and electronic rooms in the electric building for each train of the electrical distribution system:** The risk increase due to the additional failures for the postulated smoke damage is not significant since only one train of the electric system is impacted. With the additional failure probability of the smoke removal mode and the failure of fire dampers to isolate, the risk contribution due to smoke propagation is negligible.

In summary, the risk associated with postulated smoke propagation is negligible.

12.6.2 Qualitative Screening for Shutdown Conditions

The guidance in NUREG/CR-6850 is not applicable to qualitative screening for shutdown conditions. Therefore, the screening for shutdown fire model is performed with a criterion that the postulated fire has to result in one of the initiating events as defined in the shutdown model.

The critical safety functions essential to the shutdown model are Decay Heat Removal (DHR) and Inventory Control. Containment is open for much of the analysis, and containment integrity is not relevant to any modeled functions. Reactivity Control and Spent Fuel Pool Cooling are assumed to have no significant impact on the shutdown model. Power availability is modeled for its impact on decay heat removal. Loss of power is evaluated as an initiating event, and power dependencies for systems are included in the model.

A shutdown initiating event is defined as any event that provokes a disturbance in the desired state of the plant and that requires some kind of action to prevent damage to the core. The postulated shutdown initiating events related to internal events, fire and flooding will challenge:

- Decay Heat Removal (includes Loss of RWCU/SDC, Loss of Preferred Power. And Loss of all Service Water), or
- Reactor Coolant System Inventory Control (includes several postulated LOCAs during shutdown).

Fire scenarios during Mode 6-Flooded are not explicitly quantified in the accident sequence analysis. Fires cause loss of RWCU/SDC scenarios, but during Mode 6-Flooded the time to reach RCS boiling is very long. As such, the risk contribution from Mode 6-Flooded fire scenarios is not significant.

Fire-induced IORV is not a shutdown fire initiating event. Line breaks, or a stuck-open relief valve, that occur above RPV level L3 are not initiating events because RWCU/SDC and a natural circulation flow path are available .

The fire scenario in the drywell/containment area is screened in the shutdown fire models. A fire in the drywell/containment area is highly unlikely to result in the loss of RWCU/SDC. The RWCU inboard containment isolation valves are located in the lower drywell, which should be well separated spatially. There are minimal combustible fuel loads inside the lower drywell. Since there are multiple openings between the lower drywell and upper drywell, no hot gas layer is assumed to form in the lower drywell. The hot gas entering the upper drywell is not going to induce additional damage due to the much larger volume in the upper drywell and the open containment without drywell head for most of shutdown.

A fire in the turbine building fire area F4100 (general areas) could potentially damage the cables providing control and power supply to instrument air compressors. While the loss of instrument air would result in the closing of the RWCU containment isolation valves, this fire scenario is modeled as a shutdown initiating event. Per design requirements, the instrument air system shall be configured, and system equipment compartmentalized, such that for the fire event only the portions of the system equipment in the space (or area) experiencing the fire will be rendered inoperable.

The following is a list of the unscreened fire areas for shutdown fire PRA model:

- F3301 and F3302 (the two nonsafety-related DCIS rooms),
- F1152 and F1162 (the two RWCU/SDC pump rooms),
- F4100 (turbine building general area),
- F4250 and F4260 (the two RCCW rooms),
- F4350 and F4360 (the two instrument air rooms),
- F5550 and F5560 (the two 6.9kV PIP switchgear rooms),
- FSWYD (the switchyard),
- F9150 and F9160 (the two cable tunnels), and
- F7300 (service water building).

Table 12.6-1

Evaluation of Potential Applicability of Initiating Events in Internal Events PRA Model to Fire PRA under Full Power Conditions

(Modified NEDO-33201 Table 3.2-1)

Initiating Event	Designator	Event Tree	App. to FPRA	Basis
Transients				
General Transient	%T-GEN	T-GEN	X	
Transient with PCS Unavailable	%T-PCS	T-GEN	X	
Loss of Feedwater	%T-FDW	T-FDW	X	
IORV	%T-IORV	T-IORV	X	Design should prevent this sequence, but included for fire propagation cases.
Loss of Preferred Power (LOPP)	%T-LOPP	T-LOPP	X	A fire in the switchyard or certain areas in EB could result in an LOPP.
LOCAs Inside Containment				
Large Steam LOCA	%LL-S	LL-S		Fire cannot induce a pipe break
Large Steam LOCA in FW Line A	%LL-S-FDWA	LL-S-FDWA		Fire cannot induce a pipe break
Large Steam LOCA in FW Line B	%LL-S-FDWB	LL-S-FDWB		Fire cannot induce a pipe break
Medium Liquid LOCA (no RWCU break)	%ML-L	ML-L		Fire cannot induce a pipe break
Medium/Small Steam LOCA	%SL-S	SL-S		Fire cannot induce a pipe break
Small Liquid LOCA	%SL-L	SL-L		Fire cannot induce a pipe break
Vessel Rupture	%RVR	RVR		Fire cannot induce a vessel rupture
LOCAs Outside Containment				
Main Steam Line	%BOC-MS	BOC-MS		Fire cannot induce a pipe

Table 12.6-1

Evaluation of Potential Applicability of Initiating Events in Internal Events PRA Model to Fire PRA under Full Power Conditions

(Modified NEDO-33201 Table 3.2-1)

Initiating Event	Designator	Event Tree	App. to FPRA	Basis
				break
Feedwater Line A	%BOC-FDWA	BOC-FDWA		Fire cannot induce a pipe break
Feedwater Line B	%BOC-FDWB	BOC-FDWB		Fire cannot induce a pipe break
RWCU Line	%BOC-RWCU	BOC-RWCU		Fire cannot induce a pipe break
IC Line	%BOC-IC	BOC-IC		Fire cannot induce a pipe break
ISLOCA	%ISLOCA	BOC-RWCU		Fire could potentially impact multiple MOVs in series and result in an ISLOCA. However, the ESBWR design prevents the fire-induced ISLOCA sequences.
Special Initiators				
Complete Loss of PSWS	%T-SW	T-SW	X	
Complete Loss of Air Systems	%T-IA	T-GEN	X	

Table 12.6-2
Qualitative Screening Results for Full-Power Conditions

Fire Area	Description	Induce Rx Trip	Affect PRA Components	Qualitatively Screened
F1104	Elevator A			X
F1105	Elevator C			X
F1110	HCU A	X	X	
F1120	HCU B	X	X	
F1130	HCU C	X	X	
F1140	HCU D	X	X	
F1150	Nonsafety NE quadrant	X	X	
F1152	Nonsafety SE quadrant	X	X	
F1160	Nonsafety NW quadrant	X	X	
F1162	Nonsafety SW quadrant	X	X	
F1170	Drywell and Containment	X	X	X (see note)
F1190	Stairwells A and E			X
F1191	Stairwell B			X
F1192	Stairwells C and F			X
F1193	Stairwell D			X
F1194	Elevator B			X
F1195	Interior Stairwell A			X
F1196	Interior Stairwell B			X
F1197	Interior Stairwell C			X
F1198	Interior Stairwell D			X
F1203	CRD and Containment Access	X	X	

Table 12.6-2

Qualitative Screening Results for Full-Power Conditions

Fire Area	Description	Induce Rx Trip	Affect PRA Components	Qualitatively Screened
F1210	Division I Battery		X	
F1220	Division II Battery		X	
F1230	Division III Battery		X	
F1240	Division IV Battery		X	
F1262	B Demineralizers		X	
F1311	Division I Electrical		X	
F1321	Division II Electrical		X	
F1331	Division III Electrical		X	
F1341	Division IV Electrical		X	
F1450	Hydrogen Gas A			X
F1460	Hydrogen Gas B			X
F1600	Refueling Floor and Common Access	X	X	
F1770	Main Steam Tunnel	X	X	
F2100	New and Spent Fuel Handling		X	
F2192	Elevator A			X
F2193	Stairwell A			X
F2490	Stairwell B			X
F2600	HVAC Penthouse A			X
F2601	HVAC Penthouse B			X
F3100	Corridor A			X
F3101	Corridor B			X

Table 12.6-2

Qualitative Screening Results for Full-Power Conditions

Fire Area	Description	Induce Rx Trip	Affect PRA Components	Qualitatively Screened
F3110	Division I Electrical		X	
F3120	Division II Electrical		X	
F3130	Division III Electrical		X	
F3140	Division VI Electrical		X	
F3190	Stairwell A			X
F3191	Elevator A			X
F3192	Stairwell B			X
F3270	Main Control Room Complex	X	X	
F3301	Non-1E Electrical	X	X	
F3302	Non-1E Electrical	X	X	
F4100	Turbine Equipment	X	X	
F4103	Feedwater Pumps	X	X	
F4108	Charcoal Absorbers			X
F4190	Elevator A			X
F4191	Stairwell A			X
F4192	Elevator B			X
F4193	Stairwell B			X
F4194	Elevator C			X
F4195	Stairwell C			X
F4196	Elevator D			X
F4197	Stairwell D			X
F4201	Lube Oil Storage			X

Table 12.6-2

Qualitative Screening Results for Full-Power Conditions

Fire Area	Description	Induce Rx Trip	Affect PRA Components	Qualitatively Screened
F4202	Hydrogen Storage			X
F4250	Reactor Component Cooling Water A		X	
F4251	A Feedpump ASD Transformer			X
F4252	C Feedpump ASD Transformer			X
F4260	Reactor Component Cooling Water B		X	
F4261	B Feedpump ASD Transformer			X
F4262	D Feedpump ASD Transformer			X
F4271	Phase A Main Transformer	X		
F4272	Phase B Main Transformer	X		
F4273	Phase C Main Transformer	X		
F4274	Spare Main Transformer			X
F4307	Turbine EHC	X	X	
F4308	Turbine Lube Oil	X	X	
F4350	Instrument Air A		X	
F4360	Instrument Air B		X	
F4550	Chilled Water A		X	
F4560	Chilled Water B		X	
F4651	Water Surge Tanks A			X
F4661	Water Surge Tanks B			X
F5100	Corridors		X	
F5150	Batteries A		X	

Table 12.6-2

Qualitative Screening Results for Full-Power Conditions

Fire Area	Description	Induce Rx Trip	Affect PRA Components	Qualitatively Screened
F5154	Diesel Generator A		X	
F5156	D-G Electrical Equipment A		X	
F5157	Reserve Auxiliary Transformer A		X	
F5158	Unit Auxiliary Transformer A	X	X	
F5159	Fuel Oil Storage A			X
F5160	Batteries B		X	
F5164	Diesel Generator B		X	
F5166	D-G Electrical Equipment B		X	
F5167	Reserve Auxiliary Transformer B		X	
F5168	Unit Auxiliary Transformer B	X	X	
F5169	Fuel Oil Storage B			X
F5180	Technical Support Center Complex			X
F5188	Fire Protection Equipment			X
F5190	Elevator A			X
F5191	Stairwell A			X
F5192	Elevator B			X
F5193	Stairwell B			X
F5194	Stairwell C			X
F5250	Lower Cable Spreading A			X
F5255	Day Tank A			X
F5260	Lower Cable Spreading B			X

Table 12.6-2

Qualitative Screening Results for Full-Power Conditions

Fire Area	Description	Induce Rx Trip	Affect PRA Components	Qualitatively Screened
F5265	Day Tank B			X
F5301	Battery C		X	
F5302	Electrical Equipment C		X	
F5303	Electronic Equipment		X	
F5350	Lower Electrical Equipment A		X	
F5360	Lower Electrical Equipment B		X	
F5450	Upper Cable Spreading A			X
F5460	Upper Cable Spreading B			X
F5550	Upper Electrical Equipment A		X	
F5560	Upper Electrical Equipment B		X	
F5650	HVAC Equipment A			X
F5660	HVAC Equipment B			X
F6101	Radwaste Handling Equipment			X
F6170	Electrical Equipment			X
F6190	Elevator			X
F6191	Stairwell A			X
F6192	Stairwell B			X
F6193	Stairwell C			X
F6194	Stairwell D			X
F6270	Radwaste Control Room Complex			X
F6290	Stairwell E			X

Table 12.6-2

Qualitative Screening Results for Full-Power Conditions

Fire Area	Description	Induce Rx Trip	Affect PRA Components	Qualitatively Screened
F6301	HVAC Equipment			X
F7100	Pump House	X	X	
F7150	Nonseismic Diesel Fire Pump			X
F7180	Guard House			X
F7200	Hot Machine Shop & Storage			X
F7300	Service Water / Water Treatment Building	X	X	
F7400	Cold Machine Shop			X
F7500	Warehouse			X
F7600	Training Center			X
F7700	Service Building			X
F7800	Auxiliary Boiler Building			X
F7900	Administration Building			X
F8110	Breathing Air Storage Division I			X
F8120	Breathing Air Storage Division II			X
F8130	Breathing Air Storage Division III			X
F8250	Electric Firepump A			X
F8260	Diesel Fire Pump B			X
F9101	Uncontrolled Access (Tunnel)			X
F9150	Cable Tunnel A		X	
F9160	Cable Tunnel B		X	
F9201	Controlled Access (Tunnel)			X

Table 12.6-2

Qualitative Screening Results for Full-Power Conditions

Fire Area	Description	Induce Rx Trip	Affect PRA Components	Qualitatively Screened
FDPS	DPS Room (assumed)		X	
FFPE	Fire pump enclosure (primary)		X	
FSWYD	Switchyard (assumed)	X		

Note: Fire area F1170 is qualitatively screened since the primary containment for ESBWR is inerted during at-power operations. A sensitivity case for this fire area during other modes is performed in Section 11 for full-power fire sensitivity study.

Table 12.6-3

Evaluation of Potential Applicability of Initiating Events in Internal Events PRA Model to Fire PRA under Shutdown Conditions

Shutdown Initiators	Description	Applicable Fire Scenarios
%M5-G31	LOSS OF RWCU/SDC MODE 5	F4100 and Fire propagation cases (F3301 & F3302, F1152 & F1162, F4250 & F4260, F4350 & F4360, F5550 & F5560)
%M5-LOCA-FW	LOCA - FEEDWATER - MODE 5	N/A since a fire would not induce LOCA
%M5-LOCA-G	LOCA - GDCS - MODE 5	N/A since a fire would not induce LOCA
%M5-LOCA-I	LOCA - INSTRUMENT LINE BELOW TAF MODE 5	N/A since a fire would not induce LOCA
%M5-LOCA-OT	LOCA - OTHER THAN FW OR GDCS - MODE 5	N/A since a fire would not induce LOCA
%M5-LOCA-RW	LOCA - RWCU BELOW TAF	N/A since a fire would not induce LOCA
%M5-LOPP	LOSS OF PREF POWER - MODE 5	FSWYD, and Fire propagation case F9150 & F9160
%M5_LPSWS	LOSS OF SERVICE WATER MODE 5	F7300
%M5O_G31	LOSS OF RWCU/SDC - MODE 5 OPEN	F4100 and Fire propagation cases (F3301 & F3302, F1152 & F1162, F4250 & F4260, F4350 & F4360, F5550 & F5560)
%M5O_LOCA-FW	LOCA IN FEEDWATER LINE - MODE 5 OPEN	N/A since a fire would not induce LOCA
%M5O_LOCA-G	GDCS LOCA - MODE 5 OPEN	N/A since a fire would not induce LOCA
%M5O_LOCA-OT	LOCA OTHER THAN FW OR GDCS - MODE 5 OPEN	N/A since a fire would not induce LOCA

Table 12.6-3

Evaluation of Potential Applicability of Initiating Events in Internal Events PRA Model to Fire PRA under Shutdown Conditions

Shutdown Initiators	Description	Applicable Fire Scenarios
%M5O_LOPP	LOSS OF PREF POWER - MODE 5 OPEN	FSWYD, and Fire propagation case F9150 & F9160
%M5O_LPSWS	LOSS OF SERVICE WATER - MODE 5 OPEN	F7300
%M6F_LOCA_I	INSTRUMENT LINE LOCA IN MODE 6 FLOODED	N/A since a fire would not induce LOCA
%M6F_LOCA_R	RWCU LOCA IN MODE 6 FLOODED	N/A since a fire would not induce LOCA
%M6U_G31	LOSS OF RWCU - MODE 6 UNFLOODED	F4100 and Fire propagation cases (F3301 & F3302, F1152 & F1162, F4250 & F4260, F4350 & F4360, F5550 & F5560)
%M6U_LOCA-FW	LOCA IN FEEDWATER LINE - MODE 6 UNFLOODED	N/A since a fire would not induce LOCA
%M6U_LOCA-G	GDCS LOCA - MODE 6 UNFLOODED	N/A since a fire would not induce LOCA
%M6U_LOCA-I	INSTRUMENT LINE LOCA - MODE 6 UNFLOODED	N/A since a fire would not induce LOCA
%M6U_LOCA-OT	LOCA OTHER THAN FW OR GDCS - MODE 6 UNFLOODED	N/A since a fire would not induce LOCA
%M6U_LOCA-RW	RWCU LOCA - MODE 6 UNFLOODED	N/A since a fire would not induce LOCA
%M6U_LOPP	LOSS OF PREF POWER - MODE 6 UNFLOODED	FSWYD, and Fire propagation case F9150 & F9160
%M6U_LPSWS	LOSS OF SERVICE WATER - MODE 6 UNFLOODED	F7300

12.7 CALCULATION OF THE FIRE IGNITION FREQUENCY

Section 12.7.1 documents the fire ignition frequency calculations for at-power operation. Section 12.7.2 documents the fire ignition frequency calculations for shutdown conditions.

12.7.1 Calculation of the Full Power Fire Ignition Frequency

This section documents the calculations of the fire ignition frequency during at-power operations for each of the unscreened fire areas of this analysis. The NUREG/CR-6850 methodology is used to calculate the full power fire ignition frequencies.

This task is organized around the following eight steps:

- Step 1: Mapping plant ignition sources to generic sources,
- Step 2: Plant fire event data collection and review,
- Step 3: Plant specific updates of generic ignition frequencies,
- Step 4: Mapping plant-specific locations to generic locations,
- Step 5: Location weighting factors,
- Step 6: Fixed fire ignition source counts,
- Step 7: Ignition source weighting factors, and
- Step 8: Ignition source and compartment fire frequency evaluation.

Steps 2 and 3 are not applicable since the ESBWR plant is in design phase. The location weighting factors are simplified as described in assumptions.

Tables 12.7-1 and 12.7-2 list all the fire ignition source bins and the plant locations. The template shown in Table 12.7-3 is used to list fire ignition sources. All 37 bins listed in NUREG/CR-6850 are included with their applicability evaluated according to the plant location. Per NUREG/CR-6850 guidance, the sources in plant location are counted as follows:

- For bins 01, 08, 09, 10, 14, 17, 21, 23a, 23b, 26, 27, 28, 29, 32, 33, 34, and 35, the equipment counts are obtained from the system model database using queries for specific fire areas and component types.
- For bins 02, 03, 04, 20, and 22, no data is collected since they are not applicable to ESBWR plant design. For the main control room, a postulated fire would not result in spurious actuations. The control cabinets are located in the Q-DCIS and N-DCIS rooms. Therefore, the ESBWR MCR is significantly different from a traditional plant design. A sensitivity study case is evaluated in Section 11 for MCR that includes bin 4 for main control boards.
- For bins 06, 07, 24, 25, 36, and 37, the transient fires caused by welding and cutting or generic transient fires are typically estimated with the count of fire areas. While the more risk significant areas will have more restrictive access for maintenance activities, this approach is considered conservative. For the MCR

(F3270) fire scenario, the elevated maintenance/occupancy rating for bin 07 is used. For the turbine building general area (F4100) fire scenario, the elevated maintenance/occupancy ratings for bin 36 and 37 are used.

- For bins 05, 11, and 31, the maintenance-influencing factors are assumed to be the same. Therefore, only the numbers of cable runs in those areas are counted for the weighting factor calculations. The total sources are summed up for the three plant locations (CAR, TB and XX).
- For bin 12 and 18, the cable runs are counted for those areas. The total sources are counted for all plant locations. Junction boxes are assumed to be proportional to cable loading.
- For bin 15, the cabinet numbers are estimated based on a spreadsheet from the responsible design engineer. More cabinets are expected to be included in the final plant design. Therefore, the screening results are conservative.
- For bin 16, the switchgears that have voltage higher than or equal to 480VAC are counted.

The calculation of weighting factors for certain fire ignition sources requires an estimate of the total number of plant fire areas. A total number of 148 plant fire areas are divided into the three categories as follows:

- CAR (Control/Auxiliary/Reactor Building): 52 fire areas
- TB (Turbine Building): 21 fire areas
- XX (plant-wide location): 75 fire areas

The calculation of fire ignition frequencies for the unscreened fire areas is included in Appendix 12A of this section. A summary of all calculated fire area ignition frequencies is included in Table 12.7-4.

It is evident that the calculation of the fire ignition frequencies is conservative with a total fire ignition frequency of 2.22E-1 out of 2.99E-1 for all bins in a typical nuclear power plant (Table 12.7-1) accounted in only the unscreened fire areas. Eventually, equipment from all plant areas will be used for the fire ignition frequency calculations, which will significantly reduce the ignition frequencies for the unscreened fire areas. To evaluate the uncertainties in the design inputs that are used for fire ignition source counts, sensitivity studies are performed on the fire ignition frequencies, which are documented in Section 11.

12.7.2 Calculation of the Shutdown Fire Ignition Frequency

This section documents the fire ignition frequency calculations for shutdown conditions.

The scope in NUREG/CR-6850 excludes low power/shutdown operations, spent fuel pool accidents, sabotage, and PRA Level 3 estimates of consequence. Therefore, the shutdown fire ignition frequencies are calculated with a different method.

The estimation of fire ignition frequencies in shutdown conditions is performed using the information provided in the document RES/OERAB/S02-01 “Fire Events – Update of

U.S. Operating Experience", 1986 – 1999, (Ref. 12-2). This document expands and updates the information of AEOD/S97-03 "Special Study, Fire Events – Feedback of U.S. Operating Experience", June 1997, (Ref. 12-3). Reference 12-2 summarizes information on fire events that occurred during power operation and during shutdown conditions, and provides estimation of fire frequencies both in power and shutdown operation for different types of buildings and locations.

Table ES-2 "Shutdown Fire Frequencies by Plant Location", Ref. 12-2, summarizes estimated fire frequencies for different plant locations on the basis of the reports gathered from different sources of information described in the report. The Reference 12-2 shutdown fire ignition frequencies are summarized here in Table 12.7-5. The frequencies shown in Table 12.7-5 are per year of shutdown operation.

The definition of buildings in Reference 12-2, as shown in Table 12.7-5, does not correspond identically to the definition of buildings of the ESBWR plant. Therefore, it is necessary to establish a correspondence in order to assign the Reference 12-2 shutdown fire ignition frequencies to the ESBWR buildings. Per Table 12.6-3 and section 12.6.2, only a small number of fire areas are not screened for the shutdown fire PRA analysis. The fire ignition frequencies for these fire areas with the corresponding plant locations in Table 12.7-5 are calculated in Table 12.7-6. A total of shutdown fire ignition frequency of 9.26E-1/shutdown-year (out of a total of 1.41/shutdown-year in Table 12.7-5) has been accounted in these fire areas with the conservative assumptions. That is, about two thirds of all shutdown frequencies listed in Table 12.7-5 are accounted for 15 unscreened fire areas (about 10% of all fire areas) under the shutdown conditions, which is conservative.

In order to compare the shutdown fire risk with the full-power fire risk, the shutdown fire initiating event frequencies are converted from per shutdown year to per calendar year. The conversion factors for each mode are calculated in Table 12.7-7 by assuming a two-year refueling cycle and an outage duration of 548 hours. Therefore, one half shutdown per year (274 hours) is assumed for the shutdown fire initiating event frequency calculations.

Per sections 12.4.2 and 12.6.2, a number of shutdown fire initiating events are postulated. The resulting fire ignition frequencies per shutdown operating mode used in this risk analysis are summarized in Table 12.7-8.

Table 12.7-1

Ignition Source Type Bins from NUREG/CR-6850 Table 6-1

Bin#	Ignition Source Type Bin	Generic Frequency	Location
1	Batteries	7.50E-04	BR
2	Reactor Coolant Pump	6.10E-03	COP
3	Transients and Hotwork	2.00E-03	COP
4	Main Control Board	2.50E-03	CR
5	Cable Fires caused by welding and cutting (Cntrl/Aux/Rx Building)	1.60E-03	CAR
6	Transient fires caused by welding and cutting (Cntrl/Aux/Rx Building)	9.70E-03	CAR
7	Transients (Cntrl/Aux/Rx Building)	3.90E-03	CAR
8	Diesel Generators	2.10E-02	DGR
9	Air Compressors	2.40E-03	XX
10	Battery Chargers	1.80E-03	XX
11	Cable Fires caused by welding and cutting (Plant-Wide)	2.00E-03	XX
12	Cable Run	4.40E-03	XX
13	Dryers	2.60E-03	XX
14	Electric Motors	4.60E-03	XX
15	Electrical Cabinets	4.50E-02	XX
16	High Energy Arcing Faults	1.50E-03	XX
17	Hydrogen Tanks	1.70E-03	XX
18	Junction Boxes	1.90E-03	XX
19	Misc. Hydrogen Fires	2.50E-03	XX
20	Off-gas/H2 Recombiner (BWR)	4.40E-02	XX
21	Pumps	2.10E-02	XX
22	RPS MG Sets	1.60E-03	XX
23a	Transformers (oil filled)	9.90E-03	XX
23b	Transformers (dry)	9.90E-03	XX
24	Transient fires caused by welding and cutting (Plant-Wide)	4.90E-03	XX
25	Transients (Plant-Wide)	9.90E-03	XX
26	Ventilation Subsystems	7.40E-03	XX
27	Transformer - Catastrophic	6.00E-03	TY
28	Transformer - Non Catastrophic	1.20E-02	TY
29	Yard Transformers (others)	2.20E-03	TY
30	Boiler	1.10E-03	TB
31	Cable Fires caused by welding and cutting (Turbine Building)	1.60E-03	TB

Table 12.7-1

Ignition Source Type Bins from NUREG/CR-6850 Table 6-1

Bin#	Ignition Source Type Bin	Generic Frequency	Location
32	Main Feedwater Pumps	1.30E-02	TB
33	Turbine Generator Excitor	3.90E-03	TB
34	Turbine Generator Hydrogen	6.50E-03	TB
35	Turbine Generator Oil	9.50E-03	TB
36	Transient fires caused by welding and cutting (Turbine Building)	8.20E-03	TB
37	Transients (Turbine Building)	8.50E-03	TB
	Total	**2.99E-1**	

Table 12.7-2

Plant Locations and Location Weighting Factors

L	Plant Location	W_L	Description	Basis
BR	Battery Room	1	Plant location(s) where station batteries are located. Does not include other permanent or temporary batteries.	The number of site units that share a common set of batteries.
CAR	Control/Auxiliary/Reactor Building	1	The combination of typically contiguous buildings that contain the emergency core cooling, auxiliary feedwater, emergency electrical distribution system, emergency control circuits, and other safe shutdown related systems. It would include the cable spreading room, emergency or safety related switchgear room, relay room, etc. It would not specifically include the containment where main reactor vessel is located and the fuel handling areas of the plant. Note: in BWRs, this location combination is typically referred to as the Reactor Building.	The number of units in the site divided by the number of shared control / auxiliary / reactor buildings considered as one structure.
COP	Containment (PWR)	0	PWR–The building that houses the reactor core and the rest of the primary system. Refueling floor may be part of this location in many U.S. plants.	The number of units in the site divided by the number of containment buildings.
CR	Control Room	1	Plant location(s) where controls for normal and emergency plant operations are located. The control room envelope may include additional locations typically referred to as: • Auxiliary Electrical Room or Relay Room, where all plant relay logic circuits	The number of units in the site divided by the number of control rooms per site.

Table 12.7-2

Plant Locations and Location Weighting Factors

L	Plant Location	W_L	Description	Basis
DGR	Diesel Generator Rooms	1	Plant location where emergency diesel generators are located. This does not include temporary diesel generators.	The number of units in the site that share a common set of diesel generators.
TB	Turbine Building	1	Plant building that house turbine-generators, its auxiliary systems, and power conversion systems, such as main feedwater, condensate and other systems. Building generally consists of several elevations, including, basement, mezzanine, and turbine deck.	The number of units in the site divided by the number of turbine buildings.
TY	Transformer Yard	1	The area of the yard where station, service, and auxiliary transformers and related items are located. This may also be referred to as the Switchyard.	The number of units in the site that share a common set of switchyards.
XX	Plant-Wide	1	All plant locations inside the fence other than the containment, fuel handling building, office buildings, maintenance yard, maintenance shop, etc.	The number of units per site.

Table 12.7-3

Template for Fire Compartment Ignition Source Data Sheet (ISDS)

Compartment Ignition Sources (FIF)		**Plant Location**	**Weighting Factor**	**Sources in Compartment**	**Sources in Plant Location**
Bin #	Ignition Source	L	WFL	(A)	(B)
1	Batteries	BR	1		15
2	Reactor Coolant Pump	COP	0		0
3	Transients and Hotwork	COP	0		0
4	Main Control Board	CR	0		0
5	Cable Fires caused by welding and cutting (Cntrl/Aux/Rx Building)	CAR	1		2094
6	Transient fires caused by welding and cutting (Cntrl/Aux/Rx Building)	CAR	1		52
7	Transients (Cntrl/Aux/Rx Building)	CAR	1		52
8	Diesel Generators	DGR	1		2
9	Air Compressors	XX	1		4
10	Battery Chargers	XX	1		15
11	Cable Fires caused by welding and cutting (Plant-Wide)	XX	1		526
12	Cable Run	XX	1		2825
13	Dryers	XX	1		2
14	Electric Motors	XX	1		8
15	Electrical Cabinets	XX	1		457
16	High Energy Arcing Faults	XX	1		44
17	Hydrogen Tanks	XX	1		2
18	Junction Boxes	XX	1		2825
19	Misc. Hydrogen Fires	XX	1		0

Table 12.7-3

Template for Fire Compartment Ignition Source Data Sheet (ISDS)

Compartment Ignition Sources (FIF)		**Plant Location**	**Weighting Factor**	**Sources in Compartment**	**Sources in Plant Location**
Bin #	Ignition Source	L	WFL	(A)	(B)
20	Off-gas/H2 Recombiner (BWR)	XX	1		2
21	Pumps	XX	1		38
22	RPS MG Sets	XX	0		0
23a	Transformers (oil filled)	XX	1		0
23b	Transformers (dry)	XX	1		65
24	Transient fires caused by welding and cutting (Plant-Wide)	XX	1		75
25	Transients (Plant-Wide)	XX	1		75
26	Ventilation Subsystems	XX	1		20
27	Transformer - Catastrophic	TY	1		9
28	Transformer - Non Catastrophic	TY	1		8
29	Yard Transformers (others)	TY	1		1
30	Boiler	TB	1		2
31	Cable Fires caused by welding and cutting (Turbine Building)	TB	1		205
32	Main Feedwater Pumps	TB	1		4
33	Turbine Generator Excitor	TB	1		1
34	Turbine Generator Hydrogen	TB	1		1
35	Turbine Generator Oil	TB	1		1
36	Transient fires caused by welding and cutting	TB	1		21

Table 12.7-3

Template for Fire Compartment Ignition Source Data Sheet (ISDS)

Compartment Ignition Sources (FIF)		**Plant Location**	**Weighting Factor**	**Sources in Compartment**	**Sources in Plant Location**
Bin #	Ignition Source	L	WFL	(A)	(B)
	(Turbine Building)				
37	Transients (Turbine Building)	TB	1		21

Notes:

(A) Number of Ignition Sources in Compartment

(B) Total Number of Ignition Sources in Selected Plant Location or in Plant for Plant Wide Components

Ignition Source Frequency: FIF = WFL*WFIS*FF

Compartment Fire Frequency: FL = SUM(FIF)

Table 12.7-4

Summary of Fire Ignition Frequencies for Unscreened Fire Areas

Fire Area	Compartment Description	Fire Ignition Freq (/yr)
F1110	HCU A	3.72E-04
F1120	HCU B	4.05E-04
F1130	HCU C	2.88E-04
F1140	HCU D	2.80E-04
F1150	Nonsafety NE quadrant	4.03E-03
F1152	Nonsafety SE quadrant	2.20E-03
F1160	Nonsafety NW quadrant	1.33E-03
F1162	Nonsafety SW quadrant	4.30E-03
F1203	CRD and Containment Access	1.40E-03
F1210	Division I Battery	6.67E-04
F1220	Division II Battery	8.73E-04
F1230	Division III Battery	5.08E-04
F1240	Division IV Battery	4.81E-04
F1262	B Demineralizers	2.68E-04
F1311	Division I Electrical	3.69E-03
F1321	Division II Electrical	3.65E-03
F1331	Division III Electrical	3.62E-03
F1341	Division IV Electrical	3.61E-03
F1600	Refueling Floor and Common Access	2.62E-04
F1770	Main Steam Tunnel	2.85E-04
F2100	New and Spent Fuel Handling	2.34E-03
F3110	Division I Electrical	1.40E-03
F3120	Division II Electrical	1.39E-03
F3130	Division III Electrical	1.32E-03
F3140	Division IV Electrical	1.32E-03

Table 12.7-4

Summary of Fire Ignition Frequencies for Unscreened Fire Areas

Fire Area	Compartment Description	Fire Ignition Freq (/yr)
F3270	Main Control Room Complex	3.47E-03
F3301	Non-1E Electrical	4.93E-03
F3302	Non-1E Electrical	5.32E-03
F4100	Turbine Equipment	2.89E-02
F4103	Feedwater Pumps	1.47E-02
F4250	Reactor Component Cooling Water A	2.98E-03
F4260	Reactor Component Cooling Water B	2.98E-03
F4271	Phase A Main Transformer	2.36E-03
F4272	Phase B Main Transformer	2.36E-03
F4273	Phase C Main Transformer	2.36E-03
F4307	Turbine EHC	8.94E-04
F4308	Turbine Lube Oil	1.04E-02
F4350	Instrument Air A	1.40E-03
F4360	Instrument Air B	1.40E-03
F4550	Chilled Water A	1.35E-03
F4560	Chilled Water B	1.35E-03
F5100	Corridors	1.06E-03
F5150	Batteries A	4.46E-04
F5154	Diesel Generator A	1.37E-02
F5156	D-G Electrical Equipment A	1.97E-04
F5157	Reserve Auxiliary Transformer A	2.36E-03
F5158	Unit Auxiliary Transformer A	2.36E-03
F5160	Batteries B	4.46E-04
F5164	Diesel Generator B	1.37E-02
F5166	D-G Electrical Equipment B	1.97E-04
F5167	Reserve Auxiliary Transformer B	2.36E-03

Table 12.7-4

Summary of Fire Ignition Frequencies for Unscreened Fire Areas

Fire Area	Compartment Description	Fire Ignition Freq (/yr)
F5168	Unit Auxiliary Transformer B	2.36E-03
F5301	Battery C	2.09E-04
F5302	Electrical Equipment C	2.25E-03
F5303	Electronic Equipment	3.96E-04
F5350	Lower Electrical Equipment A	1.24E-03
F5360	Lower Electrical Equipment B	1.25E-03
F5550	Upper Electrical Equipment A	7.67E-03
F5560	Upper Electrical Equipment B	7.57E-03
F7100	Pump House	5.12E-03
F7300	Service Water / Water Treatment Building	7.05E-03
F9150	Cable Tunnel A	7.04E-04
F9160	Cable Tunnel B	9.03E-04
FDPS	DPS Room (assumed)	5.10E-04
FFPE	Fire pump enclosure (primary)	2.43E-03
FSWYD	Switchyard	1.80E-02
Total		2.22E-01

Table 12.7-5

Shutdown Fire Frequencies By Plant Location

Plant Location	Shutdown Fire Frequencies (/Shutdown-Year)		
	5%	Mean	95%
Containment	8.93E-04	2.30E-01	8.70E-01
Reactor building	1.30E-03	3.30E-01	1.30E+00
Auxiliary building	1.10E-03	2.80E-01	1.10E+00
Turbine building	1.40E-03	3.60E-01	1.40E+00
Control room	8.90E-05	2.80E-02	8.70E-02
Cable spreading room	1.30E-05	3.20E-03	1.20E-02
Switchgear room	2.00E-04	5.20E-02	2.00E-01
EDG building	2.40E-04	6.20E-02	2.40E-01
SWS pumphouse	5.10E-05	1.30E-02	5.00E-02
Switchyard	2.00E-04	5.20E-02	2.00E-01
Battery room	1.30E-05	3.20E-03	1.20E-02

Note:
This table is reproduced here from Table ES-2 “Shutdown Fire Frequencies by Plant Location”, Reference 12-2.

Table 12.7-6

Shutdown Fire Frequencies By Fire Area

Fire Area	First Corresponding Plant Location	Assumed Fraction at 1st Plant Location	SD Fire Frequency at 1st Location	Second Corresponding Plant Location	Assumed Fraction at 2nd Plant Location	SD Fire Freq at 2nd Plant Location	Shutdown Fire Freq (/SD-year)
F1152	Reactor building	25.0%	3.30E-01	Battery room	12.5%	3.20E-03	8.29E-02
F1162	Reactor building	25.0%	3.30E-01	Battery room	12.5%	3.20E-03	8.29E-02
F3301	Auxiliary building	50.0%	2.80E-01				1.40E-01
F3302	Auxiliary building	50.0%	2.80E-01				1.40E-01
F4100	Turbine building	50.0%	3.60E-01				1.80E-01
F4250	Turbine building	12.5%	3.60E-01				4.50E-02
F4260	Turbine building	12.5%	3.60E-01				4.50E-02
F4350	Turbine building	12.5%	3.60E-01				4.50E-02
F4360	Turbine building	12.5%	3.60E-01				4.50E-02
F5550	Switchgear room	50.0%	5.20E-02				2.60E-02
F5560	Switchgear room	50.0%	5.20E-02				2.60E-02
F7300	SWS pumphouse	100.0%	1.30E-02				1.30E-02
F9150	Cable spreading room	50.0%	3.20E-03				1.60E-03
F9160	Cable spreading room	50.0%	3.20E-03				1.60E-03
FSWYD	Switchyard	100.0%	5.20E-02				5.20E-02
						Total	9.26E-01

Table 12.7-7

Operating Mode Durations

Description	Duration (Hrs)	Fraction per outage	Fraction per calendar year (Note 1)
Mode 4	8	0.0146	4.566E-04
Mode 5	192	0.3504	1.096E-02
Mode 5-Open	48	0.0876	2.740E-03
Mode 6-Unflooded	60	0.1095	3.425E-03
Mode 6-Flooded	240	0.4380	1.370E-02
Total	548	1.00	3.128E-02

Note:
1. A two-year refueling cycle is assumed for the ESBWR plants.

Table 12.7-8

Shutdown Fire Ignition Frequencies Per Operating Mode

Shutdown Fire Initiator	Exposing Area	Exposed Area	Exposing Area Fire Frequency	Fire Barrier Failure Probability	Frequency (/SD-Year)	Conversion Factor	Frequency (/Year)	Description	Corresponding Internal Events Shutdown Initiator
%F1152_F1162_M5	F1152	F1162	8.29E-02	7.40E-03	6.13E-04	1.096E-02	6.72E-06	Loss of RWCU/SDC due to fire propagation between F1152 and F1162 - mode 5	%M5-G31
%F1152_F1162_M5O	F1152	F1162	8.29E-02	7.40E-03	6.13E-04	2.740E-03	1.68E-06	Loss of RWCU/SDC due to fire propagation between F1152 and F1162 - mode 5O	%M5O_G31
%F1152_F1162_M6U	F1152	F1162	8.29E-02	7.40E-03	6.13E-04	3.425E-03	2.10E-06	Loss of RWCU/SDC due to fire propagation between F1152 and F1162 - mode 6U	%M6U_G31
%F3301_F3302_M5	F3301	F3302	1.40E-01	1.10E-04	1.54E-05	1.096E-02	1.69E-07	Loss of RWCU/SDC due to fire propagation between F3301 and F3302 - mode 5	%M5-G31
%F3301_F3302_M5O	F3301	F3302	1.40E-01	1.10E-04	1.54E-05	2.740E-03	4.22E-08	Loss of RWCU/SDC due to fire propagation between F3301 and F3302 - mode 5O	%M5O_G31
%F3301_F3302_M6U	F3301	F3302	1.40E-01	1.10E-04	1.54E-05	3.425E-03	5.27E-08	Loss of RWCU/SDC due to fire propagation between F3301 and F3302 - mode 6U	%M6U_G31
%F4100_M5	F4100	N/A	1.80E-01	1	1.80E-01	1.096E-02	1.97E-03	Loss of RWCU/SDC due to fire in fire area F4100 - mode 5	%M5-G31
%F4100_M5O	F4100	N/A	1.80E-01	1	1.80E-01	2.740E-03	4.93E-04	Loss of RWCU/SDC due to fire in fire area F4100 - mode 5O	%M5O_G31
%F4100_M6U	F4100	N/A	1.80E-01	1	1.80E-01	3.425E-03	6.16E-04	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U	%M6U_G31
%F4250_F4260_M5	F4250	F4260	4.50E-02	1.20E-03	5.40E-05	1.096E-02	5.92E-07	Loss of RWCU/SDC due to fire propagation between F4250 and F4260 - mode 5	%M5-G31
%F4250_F4260_M5O	F4250	F4260	4.50E-02	1.20E-03	5.40E-05	2.740E-03	1.48E-07	Loss of RWCU/SDC due to fire propagation between F4250 and F4260 - mode 5O	%M5O_G31
%F4250_F4260_M6U	F4250	F4260	4.50E-02	1.20E-03	5.40E-05	3.425E-03	1.85E-07	Loss of RWCU/SDC due to fire propagation between F4250 and F4260 - mode 6U	%M6U_G31
%F4350_F4360_M5	F4350	F4360	4.50E-02	1.20E-03	5.40E-05	1.096E-02	5.92E-07	Loss of RWCU/SDC due to fire propagation between F4350 and F4360 - mode 5	%M5-G31
%F4350_F4360_M5O	F4350	F4360	4.50E-02	1.20E-03	5.40E-05	2.740E-03	1.48E-07	Loss of RWCU/SDC due to fire propagation between F4350 and F4360 - mode 5O	%M5O_G31
%F4350_F4360_M6U	F4350	F4360	4.50E-02	1.20E-03	5.40E-05	3.425E-03	1.85E-07	Loss of RWCU/SDC due to fire propagation between F4350 and F4360 - mode 6U	%M6U_G31
%F5550_F5560_M5	F5550	F5560	2.60E-02	1.60E-04	4.16E-06	1.096E-02	4.56E-08	Loss of RWCU/SDC due to fire propagation between F5550 and F5560 - mode 5	%M5-G31
%F5550_F5560_M5O	F5550	F5560	2.60E-02	1.60E-04	4.16E-06	2.740E-03	1.14E-08	Loss of RWCU/SDC due to fire propagation between F5550 and F5560 - mode 5O	%M5O_G31

Table 12.7-8

Shutdown Fire Ignition Frequencies Per Operating Mode

Shutdown Fire Initiator	Exposing Area	Exposed Area	Exposing Area Fire Frequency	Fire Barrier Failure Probability	Frequency (/SD-Year)	Conversion Factor	Frequency (/Year)	Description	Corresponding Internal Events Shutdown Initiator
%F5550_F5560_M6U	F5550	F5560	2.60E-02	1.60E-04	4.16E-06	3.425E-03	1.42E-08	Loss of RWCU/SDC due to fire propagation between F5550 and F5560 - mode 6U	%M6U_G31
%F7300_M5	F7300	N/A	1.30E-02	1	1.30E-02	1.096E-02	1.42E-04	Loss of service water due to fire in fire area F7300 - mode 5	%M5_LPSWS
%F7300_M5O	F7300	N/A	1.30E-02	1	1.30E-02	2.740E-03	3.56E-05	Loss of service water due to fire in fire area F7300 - mode 5O	%M5O_LPSWS
%F7300_M6U	F7300	N/A	1.30E-02	1	1.30E-02	3.425E-03	4.45E-05	Loss of service water due to fire in fire area F7300 - mode 6U	%M6U_LPSWS
%F9150_F9160_M5	F9150	F9160	1.60E-03	1.20E-03	1.92E-06	1.096E-02	2.10E-08	Loss of preferred power due to fire propagation between F9150 and F9160 - mode 5	%M5-LOPP
%F9150_F9160_M5O	F9150	F9160	1.60E-03	1.20E-03	1.92E-06	2.740E-03	5.26E-09	Loss of preferred power due to fire propagation between F9150 and F9160 - mode 5O	%M5O_LOPP
%F9150_F9160_M6U	F9150	F9160	1.60E-03	1.20E-03	1.92E-06	3.425E-03	6.58E-09	Loss of preferred power due to fire propagation between F9150 and F9160 - mode 6U	%M6U_LOPP
%FSWYD_M5	FSWYD	N/A	5.20E-02	1	5.20E-02	1.096E-02	5.70E-04	Loss of preferred power due to fire in SWYD areas - mode 5	%M5-LOPP
%FSWYD_M5O	FSWYD	N/A	5.20E-02	1	5.20E-02	2.740E-03	1.42E-04	Loss of preferred power due to fire in SWYD areas - mode 5O	%M5O_LOPP
%FSWYD_M6U	FSWYD	N/A	5.20E-02	1	5.20E-02	3.425E-03	1.78E-04	Loss of preferred power due to fire in SWYD areas - mode 6U	%M6U_LOPP

12.8 CALCULATION OF CORE DAMAGE FREQUENCIES AND LARGE RELEASE FREQUENCIES

The calculation of the fire induced core damage frequency and large release frequency for each fire scenario requires the determination of the type of initiating event resulting from the fire damage as well as the fire-induced damage to mitigating systems credited in the PRA. Mitigating systems in the PRA include both safety and non-safety equipment.

The fire ignition frequencies for each fire area are discussed in the previous section. A fire in each of the analyzed fire areas of this analysis is assumed to damage all equipment in the area. The sections below describe the type of initiating event that best represents each fire scenario, and the associated core damage accident sequence frequency quantification.

The internal events PRA accident sequence structures, system fault trees, and success criteria are used in the calculation of the fire CDF. The CDF quantifications are performed at a quantification truncation limit of 1E-15/yr.

Both at-power and shutdown fire-induced accident sequences are discussed.

12.8.1 Modifications to Internal Events PRA Models

Two modifications to the Level 1 internal events PRA model have been made for full-power fire PRA model development. Both modifications have negligible impact on the baseline CDF due to the redundancy in the system designs.

In the Level 1 internal events model, the power supplies to nonsafety-related DCIS system (C62) were assumed to be safety-related Div I R13 UPS buses. However, this assumption does not meet the separation criteria. For certain fire scenario, this assumption could result in biased fire risk results for some fire areas. Therefore, for the fire analysis, the power supplies to nonsafety-related DCIS system has been changed to nonsafety-related UPS buses.

The other model change is for the power supply to the plant service water fan 2A. For symmetry, it is assumed that the service water fan 2A is powered from the plant-investment-protection (PIP) bus 1000A3.

The ESBWR internal events PRA models do not take credit for the manual scram in the ATWS sequences, which would result in unrealistic significance of the ATWS sequences in the fire models. Therefore, an operator action for manual scram (REC_MANSCRAM) is credited in the fire PRA models for software failure-related ATWS sequences only. The probability of this event is assumed to be 1.77E-2, which is consistent with skill-based operator actions in a 30-minute time window in Section 6.

12.8.2 Development of Fire-Induced Risk Model

The fire PRA models are based on the following internal events PRA models:

- Level 1 At-Power Internal Events PRA model documented in the revision 2 of NEDO-33201 Section 7

- Level 2 At-Power Internal Events PRA model documented in the revision 2 of NEDO-33201 Section 8
- Shutdown Internal Events PRA model documented in the revision 2 of NEDO-33201 Section 16

All fire-susceptible components in the subject fire area are assumed to fail for a postulated fire. A list of the failed components for a postulated fire is generated from the mapping developed from the basic events to components, from the components to rooms, and from rooms to fire areas.

The failures of cables are evaluated for their impact on component failures. For the majority of the cable routing developed in task 3, the failure of cable induced by a fire in any room on the route is assumed to result in the failure of the subject component. For some safety-related valves, redundant signals are supplied to actuate the valves. Therefore, the failure of one control signal would not result in a failure of the component. In this case, the particular signal controlled by the cable is failed instead of the component.

For each fire scenario, the corresponding initiating event in the internal events PRA model is assigned with the evaluation of all failed components in the affected fire area(s). NEDE/NEDO-33386 Rev. 0 Sections 4.1, 4.2, and 4.3 document the bases for the fire-induced component failures.

12.8.3 Calculation of Full-Power Core Damage Frequencies

The following paragraphs describe the initiating events and the equipment damage assumed for fire scenarios defined during power operation. Table 12.8-1 summarizes the damage caused by the fire in each selected location.

12.8.3.1 Control Building, Q-DCIS Electrical Rooms

A General Transient initiating event is assumed in the safety-related Q-DCIS electrical rooms. A fire-induced inadvertent opening of an SRV (IORV) is not possible in these rooms because of the specific ESBWR design.

Failure of the corresponding safety system division is assumed for a fire in each of the Q-DCIS areas.

The existence of fire detection and suppression systems, fire barriers, and adequate monitoring and supervision allow the assumption that fire propagation to the neighboring zones separated by those barriers is a relatively negligible contribution. Nevertheless, potential inter-division propagation cases are considered in this analysis.

12.8.3.2 Control Building, N-DCIS Electrical Rooms and DPS Room

A loss of feedwater initiating event is assumed in the nonsafety-Related N-DCIS electrical rooms since feedwater and condensate system control cabinets are located in both N-DCIS rooms. A fire in room 3301 fails N-DCIS train A and a fire in room 3302 fails N-DCIS train B. There is a corridor area between the two N-DCIS rooms.

The DPS cabinet is located in the DPS room (a separate fire area), which is enclosed by N-DCIS room 3301. A fire in the DPS room will result in loss of all DPS control signals, which is a backup to safety-related Q-DCIS and RPS.

12.8.3.3 Main Control Room

In general, operator actions are minimized to improve the safety of ESBWR plants. Since the main control room (MCR) communicates with the DCIS rooms via fibers, no spurious actuation will originate from a MCR fire. The remote shutdown panels give the operators redundant locations to perform safe shutdown-related functions. However, these actions are for defense-in-depth. The performance of the compensatory manual actions for safe shutdown is not credited in the ESBWR fire PRA model for a postulated fire in the main control room. Instead, all operator actions are assumed failed for an MCR fire.

The following address the relationship between the MCR and the remote shutdown panel and other design features of the main control room:

- If the MCR evacuation is necessary, the remote shutdown panels provide complete redundancy in terms of control and monitoring for safe shutdown functions. Although not all the detailed designs are available, the remote shutdown panels are designed to be located in the reactor building.
- The transfer of operations from the MCR to the remote shutdown panels is not required since the remote shutdown panels are designed to have all the function available at the MCR. The ESBWR design features as described in DCD Tier 2 Section 7.1.3 help minimize the adverse affect on safe shutdown due to fire-induced spurious actuations.
- The MCR is located in the control building (fire area F3270) and remote shutdown panels are located in separate fire areas in the reactor building. The MCR has its own dedicated ventilation system (CRHAVS) and the remote shutdown panels ventilation system will be using the reactor building ventilation system (CLAVS).
- The ESBWR MCR design does not have main control boards as in a traditional nuclear power plant. The safety-related and nonsafety-related electrical cabinets are located in the separate DCIS rooms, which are in different fire areas. The MCR communicate with these DCIS rooms via fiber-optic cables. The cabinets in MCR are the control consoles and the wide display panels. Therefore only low voltage and low current equipment will be included in the MCR. Administrative procedures will be used to limit the amount of transient loads that can be brought into the MCR. The weighting factor on transient ignition source is increased to account for continuous occupation.
- The MCR and remote shutdown panels are located in totally different buildings. No smoke propagation from MCR to other fire areas is postulated since the MCR has its own ventilation system.
- The HFE process ultimately decides the hard-wired controls in the MCR. At this time, the SCRAM and MSIV closure will have hard-wired controls in the MCR,

which does not affect the PRA model. The HFE group has been recommended not to include other hard-wired controls because of the potential for spurious operations due to fires. One PRA assumption is that there will be no controls in the MCR that can induce undesirable spurious operations that affect the PRA.

A General Transient initiating event is assumed for the control room fire analysis. A fire-induced inadvertent opening of an SRV (IORV) in this room is not possible because of the ESBWR optical fiber design.

12.8.3.4 Reactor Building Divisional Zones

With the ESBWR design to prevent spurious actuations, a single fire in these areas cannot cause an inadvertent opening of an SRV (IORV). For conservatism, it is conservatively assumed that a fire propagation scenario between these fire areas could result in spurious actuations, which lead to IORV. This spurious operation disables the ICS while preserving the full requirement for depressurizing the plant. If multiple valves are opened due to the fire, depressurization to allow passive GDCS to operate becomes increasingly more reliable. However, credit is not taken for the spurious failures to depressurize the RCS.

Failure of the corresponding safety system division is assumed for a fire in each of the reactor building divisional areas. Failure of the RWCU and CRD systems, which are located in this building, is based on the component locations and the associated cable routing.

The existence of fire detection and suppression systems, fire barriers, and adequate monitoring and supervision means that it can be assumed that fire propagation to the neighboring zones separated by those barriers is a relatively negligible contribution. Nevertheless, potential inter-division propagation cases are considered in this analysis.

12.8.3.5 Non-divisional Areas of Electrical Building

A general transient initiating event is assumed for a fire in these areas.

The existence of fire detection and suppression systems, fire barriers, and adequate monitoring and supervision means that it can be assumed that fire propagation to the neighboring zones separated by those barriers is a relatively negligible contribution. Nevertheless, potential inter-division propagation cases are considered in this analysis.

12.8.3.6 Turbine Building

A fire in the turbine building general area (F4100) is assumed to fail the feedwater and condensate systems; as such, the loss of feedwater initiator is assumed for a turbine building fire. In addition, the analysis assumes complete failure of the instrument air system assuming the cables are routed through F4100.

A fire in the feedwater pump room (F4103) also results in a loss of feedwater initiator. However, only the feedwater system is impacted in this scenario.

Fires in the EHC room and the turbine lube oil room would also result in a general transient initiating event. No other PRA components are impacted for these scenarios.

A fire in each of the RCCW and IAS areas in the turbine building is also assumed to result in a general transient initiating event.

The existence of fire detection and extinction systems, firewall barriers, and adequate monitoring and supervision means that it can be assumed that fire propagation to the neighboring zones separated by those barriers is a relatively negligible contribution. Nevertheless, potential inter-division propagation cases are considered in this analysis.

12.8.3.7 Other Buildings

A general transient initiating event is assumed for fires in the fuel building. The fire is assumed to fail the FAPCS system.

A loss of plant service water initiating event is assumed for fires in the service water building (F7300). No other PRA components are damaged.

A loss of feedwater initiator is assumed for a fire in the pumphouse area (F7100). This fire scenario is assumed to result in the loss of the circulating water system, which in turn fails the feedwater and condensate system. No other PRA components are damaged.

A general transient initiating event is assumed for a fire in the fire protection enclosure (fire area FFPE). All components in the fire protection system are assumed to be damaged, which is conservative. The primary and secondary fire protection system pumps are going to be separated in different fire areas.

A fire in the cable tunnels can also result in plant trip. A general transient initiating event is assumed for these scenarios.

12.8.3.8 Fire Propagation Scenarios

The fire propagation scenarios are discussed in section 12.3.3. Due to the difference in the fire-induced initiators, the most limiting initiator for the two adjacent fire areas is selected for the fire propagation scenarios. Typically a loss of feedwater initiator is assumed rather than a general transient.

Moreover, for the fire propagation scenarios in reactor building, an inadvertent opening of relief valve (IORV) initiator is assumed. The fire propagation between the two cable tunnels is simulated with a loss of preferred offsite power initiator, which is more limiting than a general transient.

12.8.4 Calculation of Shutdown Core Damage Frequencies

Table 12.8-2 summarizes the damage states caused by the postulated fire in each fire scenario. The baseline shutdown PRA model is based on the Level 1 Full-Power PRA model with no new system model. Therefore, the fire-induced risk model used for Level 1 Full-Power fire PRA model is still applicable.

The baseline shutdown model credits some additional recovery actions listed in Table 16.3-5. A postulated fire that results in a shutdown initiating event is assumed to defeat these additional recovery actions. Therefore, the master flag file used in baseline shutdown PRA model is modified to include the failure of these recovery actions for the fire analyses.

There are some potential limitations of the fire protection system (FPS). In a postulated fire scenario, it is likely the FPS pumps are in use for the fire suppression purpose even though they are in the event trees for low-pressure injection. Part of the inventories in the FPS water storage tanks would be used for the fire suppression purpose. However, the availability of the FPS pumps for low-pressure makeup is not a concern since the FPS design includes multiple pumps for redundancy. Per DCD Section 9.5.1.4, each primary firewater storage tank has sufficient capacity to meet the maximum firewater demand of the system for a period of 120 minutes. The primary, Seismic Category I, firewater storage tanks provide post-accident makeup water to the IC/PCC pools and Spent Fuel Pool using FAPCS piping. The primary firewater storage tanks have sufficient capacity to meet the total demand from 72 hours up to 7 days. After 7 days, on-site or offsite makeup sources can be used. The operator action to make up the inventory is already modeled for the FPS. In summary, the potential limitations of the FPS are not a concern to the fire analyses.

The dominant shutdown fire scenarios are described as follows.

12.8.4.1 Turbine Building General Area (F4100)

A fire in the turbine building general area (fire area F4100) is assumed to result in a complete failure of the service air system due to cable failures, which resulted in the closure of all RWCU containment isolation valves outside the containment. This is conservative since this fire scenario could be invalidated by implementing the separation criteria on the cabling for instrument air system in the detail designs.

Other systems failed by a postulated fire in F4100 include condensate and feedwater system, TCCWS, Service Air system, and UPS buses in turbine building, etc. All these failures make fire area F4100 a significant risk contributor to the shutdown fire risk.

The cabling for reactor component cooling water (RCCW) system and plant service water (PSW) system is assumed not to be failed by a fire in F4100 since these two systems have been identified as part of the Regulatory Treatment of Non-Safety System (RTNSS) program. The design requirements for RTNSS systems assure that a postulated fire would not damage both trains. Moreover, the cable routing can easily bypass the turbine building general areas.

It is conservatively assumed that 50% of total fire ignition frequency in the turbine building is applicable to the turbine building general area (fire area F4100) since this fire area covers a large portion of the turbine building. This results in a shutdown frequency of 1.8E-1/shutdown-year for F4100. Realistically the F4100 fire ignition frequency could be much lower than this value.

12.8.4.2 Service Water Building (F7300)

A fire in the service water building (fire area F7300) is assumed to result in a complete failure of the plant service water (PSW) system, which results in the loss of decay heat removal. This fire scenario is conservative since the components in this fire area should be well separated into four sub-areas. It is highly unlikely to have a fire big enough to damage all the components at the same time.

A postulated fire in F7300 is a significant risk contributor to the shutdown fire risk due to the fact that the failure of PSWS results in the failures of RCCW, TCCW, and RWCU/SDC.

12.8.4.3 Switchyard

A fire in the switchyard is conservatively assumed to result in loss of decay heat removal. The transfer from the offsite power to diesel generators is assumed to be not fast enough to prevent the failure of RWCU system, which is conservative.

Since no PRA component is located in the switchyard and the baseline contribution of loss of preferred power is low, the risk impact due to switchyard fires is not significant.

12.8.4.4 Fire Propagation Scenarios

The fire propagation scenario for F1152 and F1162 is conservative since a postulated fire in one of the RWCU pump rooms has to pass through an access tunnel with two non-fire doors, a corridor area, a fire door between the two fire areas, another corridor area, and another access tunnel with two non-fire doors to the other RWCU pump room.

Other postulated fire propagation scenarios are also very conservative in that a fire has to propagate through a third fire area to result in a shutdown initiating event (e.g., a fire in control building that fails components in both room 3301 and 3302 has to pass through the corridor which is another fire area F3100).

However, even with the conservative modeling, the total shutdown risk contribution from all the fire propagation scenarios is not significant, which is shown in the shutdown fire risk results.

12.8.4.5 Other Considerations

A fire in main control room (MCR) will not result in a shutdown initiator. The ESBWR main control room (MCR) is designed differently from the traditional main control room. The ESBWR MCR controls are connected to the back panel rooms via fiber-optic cables, which are unaffected by the MCR fire. The loss (including melting) of the cables or Visual Display Units (VDUs) will not cause inadvertent actuations or affect the automatic actions associated with safety and nonsafety equipment. The fires in the back panel rooms are evaluated separately with consideration of the impact on the operability of automatic systems.

Note for all shutdown fire scenarios, all the operator actions are assumed to be failed for conservatism.

12.8.5 Calculation of Large Release Frequencies

The quantification of the large release frequencies is similar to the core damage frequency calculations with the addition of the Level 2 fault tree models and phenomenological point estimates. The fire-induced risk model used for Level 1 quantification is not changed since the component selection and cable selection tasks have already considered all components that include the Level 2 components.

Similar to baseline shutdown PRA results, all evaluated shutdown fire core damage events are assumed to result in a large release because of the potential for the containment being open during the outage.

Table 12.8-1

Damage States for Postulated Full-Power Fire Scenarios

Fire Scenario	Description	Initiating Event	Damage States
F1110	HCU A	%T-GEN	A postulated fire in F1110 fails ARI. It also fails Div I safety-related control signals.
F1120	HCU B	%T-GEN	A postulated fire in F1120 fails ARI and train B RWCU/SDC containment isolation valves outside containment. It also fails part of DPS signals and Div II safety-related control signals.
F1130	HCU C	%T-GEN	A postulated fire in F1130 fails train A RWCU/SDC containment isolation valves outside containment. It also fails ARI train A signals, part of DPS signals and Div III safety-related control signals.
F1140	HCU D	%T-GEN	A postulated fire in F1140 does not fail PRA components directly, but fails the ARI train B signals and Div IV safety-related control signals.
F1150	Nonsafety NE quadrant	%T-GEN	A postulated fire in F1150 fails RWCU train A, CRD Panel A, 480VAC R12-C31, etc. It also fails Div I safety-related control signals.
F1152	Nonsafety SE quadrant	%T-GEN	A postulated fire in F1152 fails RWCU train A, some FAPCS train A components, 480VAC R12-C31, CRD pump A, some DPS control signals, etc.
F1160	Nonsafety NW quadrant	%T-GEN	A postulated fire in F1160 fails RWCU train B, CRD Panel D, 480VAC R12-D31, etc. It also fails part of DPS signals and Div IV safety-related control signals.
F1162	Nonsafety SW quadrant	%T-GEN	A postulated fire in F1162 fails RWCU train B, some FAPCS train B components, 480VAC R12-B31, CRD pump B, some DPS control signals, etc.
F1203	CRD and Containment Access	%T-GEN	A postulated fire in F1203 fails CRD system. It also fails some Div II safety-related control signals.

Table 12.8-1

Damage States for Postulated Full-Power Fire Scenarios

Fire Scenario	Description	Initiating Event	Damage States
F1210	Division I Battery	%T-GEN	A postulated fire in F1210 fails Div I batteries. It also fails Div I safety-related control signals.
F1220	Division II Battery	%T-GEN	A postulated fire in F1220 fails Div II batteries. It also fails Div II safety-related control signals.
F1230	Division III Battery	%T-GEN	A postulated fire in F1230 fails Div III batteries. It also fails Div III safety-related control signals and the control signal for CRD pump A.
F1240	Division IV Battery	%T-GEN	A postulated fire in F1240 fails Div IV batteries. It also fails Div IV safety-related control signals and the control signal for CRD pump B.
F1262	B Demineralizers	%T-GEN	A postulated fire in F1262 fails RWCU/SDC train B.
F1311	Division I Electrical	%T-GEN	A postulated fire in F1311 fails Div I safety-related RMUs and load drivers, Div I UPS buses, SLC train A, etc. It also fails Div I safety-related control signals and some DPS control signals.
F1321	Division II Electrical	%T-GEN	A postulated fire in F1321 fails Div II safety-related RMUs and load drivers, Div II UPS buses, SLC train B, etc. It also fails Div II safety-related control signals and some DPS control signals.
F1331	Division III Electrical	%T-GEN	A postulated fire in F1331 fails Div III safety-related RMUs and load drivers, Div III UPS buses, SLC train A, etc. It also fails Div III safety-related control signals and some DPS control signals.
F1341	Division IV Electrical	%T-GEN	A postulated fire in F1341 fails Div IV safety-related RMUs and load drivers, Div IV UPS buses, SLC train B, etc. It also fails Div IV safety-related control signals and some DPS control signals.
F1600	Refueling Floor and Common Access	%T-GEN	A postulated fire in F1600 fails containment vent valves.

Table 12.8-1

Damage States for Postulated Full-Power Fire Scenarios

Fire Scenario	Description	Initiating Event	Damage States
F1770	Main Steam Tunnel	%T-GEN	A postulated fire in F1770 fails MSIV outside containment.
F2100	New and Spent Fuel Handling	%T-GEN	A postulated fire in F2100 fails FAPCS.
F3110	Division I Electrical	%T-GEN	A postulated fire in F3110 fails Div I safety-related control signals.
F3120	Division II Electrical	%T-GEN	A postulated fire in F3120 fails Div II safety-related control signals.
F3130	Division III Electrical	%T-GEN	A postulated fire in F3130 fails Div III safety-related control signals.
F3140	Division VI Electrical	%T-GEN	A postulated fire in F3140 fails Div IV safety-related control signals.
F3270	Main Control Room Complex	%T-GEN	A postulated fire in F3270 fails all operator actions.
F3301	Non-1E Electrical	%T-FDW	A postulated fire in F3301 fails RWCU train A, FAPCS train A, CRD pump A, condensate and feedwater system, RCCWS train A, PSWS train A, Fire protection system pump U43-P1B, etc.
F3302	Non-1E Electrical	%T-FDW	A postulated fire in F3302 fails RWCU train B, FAPCS train B, CRD pump B, condensate and feedwater system, RCCWS train B, PSWS train B, Fire protection system pump U43-P2B, etc.
F4100	Turbine Equipment	%T-FDW	A postulated fire in F4100 fails condensate and feedwater system, TCCWS, Instrument Air system, and Service Air system, UPS buses in turbine building, etc.
F4103	Feedwater Pumps	%T-FDW	A postulated fire in F4103 fails feedwater.
F4250	Reactor Component Cooling Water A	%T-GEN	A postulated fire in F4250 fails RCCWS train A.
F4260	Reactor Component Cooling Water B	%T-GEN	A postulated fire in F4260 fails RCCWS train B.

Table 12.8-1

Damage States for Postulated Full-Power Fire Scenarios

Fire Scenario	Description	Initiating Event	Damage States
F4271	Phase A Main Transformer	%T-GEN	A postulated fire in F4271 fails the main transformer. But no PRA component is impacted.
F4272	Phase B Main Transformer	%T-GEN	A postulated fire in F4272 fails the main transformer. But no PRA component is impacted.
F4273	Phase C Main Transformer	%T-GEN	A postulated fire in F4273 fails the main transformer. But no PRA component is impacted.
F4307	Turbine EHC	%T-GEN	A postulated fire in F4307 causes the turbine and plant trip. But no PRA component is impacted.
F4308	Turbine Lube Oil	%T-GEN	A postulated fire in F4308 causes the turbine and plant trip. But no PRA component is impacted.
F4350	Instrument Air A	%T-GEN	A postulated fire in F4350 fails Instrument Air train A.
F4360	Instrument Air B	%T-GEN	A postulated fire in F4360 fails Instrument Air train B.
F4550	Chilled Water A	%T-GEN	A postulated fire in F4550 fails nuclear-island chiller water train A.
F4560	Chilled Water B	%T-GEN	A postulated fire in F4560 fails nuclear-island chiller water train B.
F5100	Corridors	%T-GEN	A postulated fire in F5100 fails the power cables routed through this area.
F5150	Batteries A	%T-GEN	A postulated fire in F5150 fails nonsafety-related A batteries.
F5154	Diesel Generator A	%T-GEN	A postulated fire in F5154 fails Diesel Generator A.
F5156	D-G Electrical Equipment A	%T-GEN	A postulated fire in F5156 fails Diesel Generator A.
F5157	Reserve Auxiliary Transformer A	%T-GEN	A postulated fire in F5157 fails RAT A.
F5158	Unit Auxiliary Transformer A	%T-GEN	A postulated fire in F5158 fails UAT A.
F5160	Batteries B	%T-GEN	A postulated fire in F5160 fails nonsafety-related B batteries.

Table 12.8-1

Damage States for Postulated Full-Power Fire Scenarios

Fire Scenario	Description	Initiating Event	Damage States
F5164	Diesel Generator B	%T-GEN	A postulated fire in F5164 fails Diesel Generator B.
F5166	D-G Electrical Equipment B	%T-GEN	A postulated fire in F5166 fails Diesel Generator B.
F5167	Reserve Auxiliary Transformer B	%T-GEN	A postulated fire in F5167 fails RAT B.
F5168	Unit Auxiliary Transformer B	%T-GEN	A postulated fire in F5158 fails UAT B.
F5301	Battery C	%T-GEN	A postulated fire in F5301 fails nonsafety-related C battery.
F5302	Electrical Equipment C	%T-GEN	A postulated fire in F5302 fails nonsafety-related train C UPS.
F5303	Electronic Equipment	%T-GEN	A postulated fire in F5303 fails the power cables routed through this area.
F5350	Lower Electrical Equipment A	%T-GEN	A postulated fire in F5350 fails train A 13.8 kV switchgears.
F5360	Lower Electrical Equipment B	%T-GEN	A postulated fire in F5360 fails train B 13.8 kV switchgears.
F5550	Upper Electrical Equipment A	%T-GEN	A postulated fire in F5550 fails all train A 6.9kV switchgear, load centers and MCCs. It also fails the nonsafety train A DC buses and UPS. As a result of failure of DC buses, DG A is also failed.
F5560	Upper Electrical Equipment B	%T-GEN	A postulated fire in F5560 fails all train B 6.9kV switchgear, load centers and MCCs. It also fails the nonsafety train B DC buses and UPS. As a result of failure of DC buses, DG B is also failed.
F7100	Pump House	%T-FDW	A postulated fire in F7100 fails the circulating water system.
F7300	Service Water / Water Treatment Building	%T-SW	A postulated fire in F7300 fails the plant service water system.
F9150	Cable Tunnel A	%T-GEN	A postulated fire in F9150 fails all the cabling for train A components of nonsafety-related systems including all the power cables.

Table 12.8-1

Damage States for Postulated Full-Power Fire Scenarios

Fire Scenario	Description	Initiating Event	Damage States
F9160	Cable Tunnel B	%T-GEN	A postulated fire in F9160 fails all the cabling for train B components of nonsafety-related systems including all the power cables.
FDPS	DPS Room (assumed)	%T-GEN	A postulated fire in FDPS fails the DPS system.
FFPE	Fire pump enclosure (primary)	%T-GEN	A postulated fire in FFPE fails the fire protection system.
FSWYD	Switchyard (assumed)	%T-LOPP-SC	No PRA component is failed. Assumed no recovery of offsite power due to the fire.

Table 12.8-2

Damage States for Postulated Shutdown Fire Scenarios

Shutdown Fire Initiator	Description	Initiating Event	Damage States
%F1152_F1162_M5	Loss of RWCU/SDC due to fire propagation between F1152 and F1162 - mode 5	%M5-G31	A postulated fire in F1152 fails RWCU train A, some FAPCS train A components, 480VAC R12-C31, CRD pump A, some DPS control signals, etc. A postulated fire in F1162 fails RWCU train B, some FAPCS train B components, 480VAC R12-B31, CRD pump B, some DPS control signals, etc.
%F1152_F1162_M5O	Loss of RWCU/SDC due to fire propagation between F1152 and F1162 - mode 5O	%M5O_G31	
%F1152_F1162_M6U	Loss of RWCU/SDC due to fire propagation between F1152 and F1162 - mode 6U	%M6U_G31	
%F3301_F3302_M5	Loss of RWCU/SDC due to fire propagation between F3301 and F3302 - mode 5	%M5-G31	A postulated fire in F3301 fails RWCU train A, FAPCS train A, CRD pump A, condensate and feedwater system, RCCWS train A, PSWS train A, Fire protection system pump U43-P1B, etc. A postulated fire in F3302 fails RWCU train B, FAPCS train B, CRD pump B, condensate and feedwater system, RCCWS train B, PSWS train B, Fire protection system pump U43-P2B, etc.
%F3301_F3302_M5O	Loss of RWCU/SDC due to fire propagation between F3301 and F3302 - mode 5O	%M5O_G31	

Table 12.8-2

Damage States for Postulated Shutdown Fire Scenarios

Shutdown Fire Initiator	Description	Initiating Event	Damage States
%F3301_F3302_M6U	Loss of RWCU/SDC due to fire propagation between F3301 and F3302 - mode 6U	%M6U_G31	
%F4100_M5	Loss of RWCU/SDC due to fire in fire area F4100 - mode 5	%M5-G31	A postulated fire in F4100 fails condensate and feedwater system, TCCWS, Instrument Air system, and Service Air system, UPS buses in turbine building, etc.
%F4100_M5O	Loss of RWCU/SDC due to fire in fire area F4100 - mode 5O	%M5O_G31	
%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U	%M6U_G31	
%F4250_F4260_M5	Loss of RWCU/SDC due to fire propagation between F4250 and F4260 - mode 5	%M5-G31	A postulated fire in F4250 fails RCCWS train A. A postulated fire in F4260 fails RCCWS train B.
%F4250_F4260_M5O	Loss of RWCU/SDC due to fire propagation between F4250 and F4260 - mode 5O	%M5O_G31	
%F4250_F4260_M6U	Loss of RWCU/SDC due to fire propagation between F4250 and F4260 - mode 6U	%M6U_G31	
%F4350_F4360_M5	Loss of RWCU/SDC due to fire propagation between F4350 and F4360 - mode 5	%M5-G31	A postulated fire in F4350 fails Instrument Air train A. A postulated fire in F4360 fails Instrument

Table 12.8-2

Damage States for Postulated Shutdown Fire Scenarios

Shutdown Fire Initiator	Description	Initiating Event	Damage States
%F4350_F4360_M5O	Loss of RWCU/SDC due to fire propagation between F4350 and F4360 - mode 5O	%M5O_G31	Air train B.
%F4350_F4360_M6U	Loss of RWCU/SDC due to fire propagation between F4350 and F4360 - mode 6U	%M6U_G31	
%F5550_F5560_M5	Loss of RWCU/SDC due to fire propagation between F5550 and F5560 - mode 5	%M5-G31	A postulated fire in F5550 fails all train A 6.9kV switchgear, load centers and MCCs. It also fails the nonsafety train A DC buses and UPS. As a result of failure of DC buses, DG A is also failed. A postulated fire in F5560 fails all train B 6.9kV switchgear, load centers and MCCs. It also fails the nonsafety train B DC buses and UPS. As a result of failure of DC buses, DG B is also failed.
%F5550_F5560_M5O	Loss of RWCU/SDC due to fire propagation between F5550 and F5560 - mode 5O	%M5O_G31	
%F5550_F5560_M6U	Loss of RWCU/SDC due to fire propagation between F5550 and F5560 - mode 6U	%M6U_G31	
%F7300_M5	Loss of service water due to fire in fire area F7300 - mode 5	%M5_LPSWS	A postulated fire in F7300 fails the plant service water system.
%F7300_M5O	Loss of service water due to fire in fire area F7300 - mode 5O	%M5O_LPSWS	
%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U	%M6U_LPSWS	

Table 12.8-2

Damage States for Postulated Shutdown Fire Scenarios

Shutdown Fire Initiator	Description	Initiating Event	Damage States
%F9150_F9160_M5	Loss of preferred power due to fire propagation between F9150 and F9160 - mode 5	%M5-LOPP	A postulated fire in F9150 fails all the cabling for train A components of nonsafety-related systems including all the power cables. A postulated fire in F9160 fails all the cabling for train B components of nonsafety-related systems including all the power cables.
%F9150_F9160_M5O	Loss of preferred power due to fire propagation between F9150 and F9160 - mode 5O	%M5O_LOPP	
%F9150_F9160_M6U	Loss of preferred power due to fire propagation between F9150 and F9160 - mode 6U	%M6U_LOPP	
%FSWYD_M5	Loss of preferred power due to fire in SWYD areas - mode 5	%M5-LOPP	No PRA component is failed. Assumed no recovery of offsite power due to the fire.
%FSWYD_M5O	Loss of preferred power due to fire in SWYD areas - mode 5O	%M5O_LOPP	
%FSWYD_M6U	Loss of preferred power due to fire in SWYD areas - mode 6U	%M6U_LOPP	

12.9 RESULTS

12.9.1 Baseline Fire PRA Results

The core damage frequency (CDF) and large release frequency (LRF) results of the ESBWR probabilistic internal fires analysis are summarized in the following tables:

- CDF Contribution of Full-Power Fire Scenarios (Table 12.9-1)
- LRF Contribution of Full-Power Fire Scenarios (Table 12.9-2)
- CDF Contribution of Shutdown Fire Scenarios (Table 12.9-3)

Each table lists the fire area, fire scenario initiation frequency, and the resulting core damage frequency.

Quantified with a truncation limit of 1E-15/yr, the total CDF for all full-power fire scenarios is 8.058E-9/yr. The total LRF for all full-power fire scenarios is 4.834E-10/yr. With the same truncation limit, the total CDF for all shutdown fire scenarios is 2.712E-8/yr.

The top 200 cutsets for the internal fire CDF are listed in the following tables:

- Table 12.9-4 for the full-power internal fires CDF cutsets
- Table 12.9-5 for the shutdown internal fires CDF cutsets

The risk importance measures for the internal fire CDF are listed as follows. The significant basic events (i.e., basic events that have a FV importance greater than 0.005 or a RAW importance greater than 2) are included in the tables.

- Table 12.9-6 for the full-power internal fires CDF significant basic events
- Table 12.9-7 for the shutdown internal fires CDF significant basic events

This is a screening analysis that incorporates a number of conservative assumptions (refer to Section 12.2). For these reasons, it is inappropriate to add these fire CDF results to the internal events core damage frequencies.

12.9.2 Sensitivity Study Fire PRA Results

Sensitivity studies for fire PRA results are included in Section 11, which includes the following topics:

- Focused full-power fire CDF
- Focused full-power fire LRF
- Focused shutdown fire CDF
- Sensitivity studies for full-power CDF/LRF
- Sensitivity studies for shutdown CDF

The importance of nonsafety-related systems in the fire analyses is demonstrated in the sensitivity studies for the focused full-power and shutdown fire cases.

Table 12.9-1
Full Power Core Damage Frequency Due to Internal Fires

Fire Scenarios (see note)	IE Frequency (/yr)	CCDP	Fire CDF (/yr)	% Fire CDF
F1110	3.72E-04	1.52E-09	5.67E-13	0.01%
F1120	4.05E-04	1.52E-09	6.18E-13	0.01%
F1130	2.89E-04	1.16E-09	3.34E-13	0.00%
F1140	2.80E-04	1.15E-09	3.23E-13	0.00%
F1150	4.03E-03	6.35E-09	2.56E-11	0.32%
F1152	2.20E-03	7.06E-09	1.55E-11	0.19%
F1160	1.33E-03	4.16E-08	5.53E-11	0.69%
F1162	4.30E-03	6.30E-09	2.71E-11	0.34%
F1203	1.40E-03	6.36E-09	8.91E-12	0.11%
F1210	6.67E-04	2.14E-09	1.43E-12	0.02%
F1210_F1150	1.80E-06	4.04E-07	7.27E-13	0.01%
F1210_F1230	4.93E-06	2.43E-07	1.20E-12	0.01%
F1210_F1240	4.93E-06	2.40E-07	1.18E-12	0.01%
F1210_F1311	1.80E-06	3.97E-07	7.15E-13	0.01%
F1220	8.73E-04	2.05E-08	1.79E-11	0.22%
F1220_F1162	2.36E-06	1.41E-06	3.34E-12	0.04%
F1220_F1203	1.05E-06	1.18E-06	1.24E-12	0.02%
F1220_F1230	6.46E-06	1.23E-06	7.97E-12	0.10%
F1220_F1240	6.46E-06	1.23E-06	7.96E-12	0.10%
F1220_F1321	2.36E-06	1.41E-06	3.33E-12	0.04%
F1230	5.08E-04	7.57E-09	3.85E-12	0.05%
F1230_F1152	1.37E-06	1.69E-07	2.32E-13	0.00%
F1230_F1210	3.76E-06	2.31E-07	8.68E-13	0.01%
F1230_F1220	3.76E-06	1.22E-06	4.59E-12	0.06%
F1230_F1262	6.10E-07	1.27E-07	7.77E-14	0.00%
F1230_F1331	1.37E-06	1.65E-07	2.27E-13	0.00%

Table 12.9-1

Full Power Core Damage Frequency Due to Internal Fires

Fire Scenarios (see note)	IE Frequency (/yr)	CCDP	Fire CDF (/yr)	% Fire CDF
F1240	4.81E-04	7.51E-09	3.61E-12	0.04%
F1240_F1160	1.30E-06	1.98E-06	2.57E-12	0.03%
F1240_F1210	3.56E-06	2.28E-07	8.10E-13	0.01%
F1240_F1220	3.56E-06	1.22E-06	4.34E-12	0.05%
F1240_F1341	1.30E-06	1.65E-07	2.14E-13	0.00%
F1262	2.67E-04	1.16E-09	3.09E-13	0.00%
F1311	3.69E-03	2.52E-07	9.31E-10	11.55%
F1311_F1150	9.95E-06	4.88E-07	4.86E-12	0.06%
F1311_F1210	9.95E-06	4.75E-07	4.72E-12	0.06%
F1311_F1331	2.73E-05	5.44E-07	1.48E-11	0.18%
F1311_F1341	2.73E-05	5.44E-07	1.48E-11	0.18%
F1321	3.65E-03	2.53E-07	9.22E-10	11.45%
F1321_F1162	9.86E-06	4.72E-07	4.65E-12	0.06%
F1321_F1203	2.70E-05	1.45E-06	3.92E-11	0.49%
F1321_F1220	9.86E-06	1.44E-06	1.42E-11	0.18%
F1321_F1341	2.70E-05	5.40E-07	1.46E-11	0.18%
F1331	3.62E-03	9.88E-09	3.58E-11	0.44%
F1331_F1152	9.78E-06	2.82E-07	2.76E-12	0.03%
F1331_F1203	2.68E-05	1.25E-06	3.36E-11	0.42%
F1331_F1230	9.78E-06	2.72E-07	2.66E-12	0.03%
F1331_F1311	2.68E-05	5.44E-07	1.46E-11	0.18%
F1341	3.61E-03	2.89E-09	1.04E-11	0.13%
F1341_F1160	9.74E-06	2.19E-06	2.13E-11	0.26%
F1341_F1240	9.74E-06	2.68E-07	2.61E-12	0.03%
F1341_F1311	2.67E-05	5.44E-07	1.45E-11	0.18%
F1341_F1321	2.67E-05	5.39E-07	1.44E-11	0.18%
F1600	2.62E-04	1.38E-09	3.62E-13	0.00%

Table 12.9-1

Full Power Core Damage Frequency Due to Internal Fires

Fire Scenarios (see note)	IE Frequency (/yr)	CCDP	Fire CDF (/yr)	% Fire CDF
F1770	2.85E-04	2.68E-07	7.63E-11	0.95%
F2100	2.34E-03	2.26E-09	5.29E-12	0.07%
F3110	1.40E-03	2.51E-07	3.52E-10	4.36%
F3110_F3100	1.04E-05	2.50E-07	2.60E-12	0.03%
F3110_F3130	1.68E-06	3.00E-07	5.04E-13	0.01%
F3110_F3270	3.79E-06	2.50E-07	9.46E-13	0.01%
F3120	1.39E-03	2.51E-07	3.49E-10	4.33%
F3120_F3101	1.03E-05	2.50E-07	2.57E-12	0.03%
F3120_F3140	1.67E-06	2.99E-07	5.00E-13	0.01%
F3120_F3270	1.67E-06	2.50E-07	4.17E-13	0.01%
F3130	1.32E-03	2.20E-09	2.90E-12	0.04%
F3130_F3101	9.80E-06	7.99E-10	7.83E-15	0.00%
F3130_F3110	1.59E-06	2.99E-07	4.76E-13	0.01%
F3130_F3270	3.58E-06	0.00E+00	0	0.00%
F3140	1.32E-03	2.19E-09	2.90E-12	0.04%
F3140_F3100	9.78E-06	7.99E-10	7.81E-15	0.00%
F3140_F3120	1.59E-06	2.98E-07	4.75E-13	0.01%
F3140_F3270	1.59E-06	0.00E+00	0	0.00%
F3270	3.47E-03	8.49E-09	2.95E-11	0.37%
F3301	4.93E-03	4.46E-08	2.20E-10	2.73%
F3301_F3100	3.65E-05	4.19E-08	1.53E-12	0.02%
F3301_F3101	1.33E-05	4.09E-08	5.44E-13	0.01%
F3301_F3110	5.92E-06	3.30E-07	1.96E-12	0.02%
F3301_F3130	5.92E-06	1.11E-07	6.59E-13	0.01%
F3301_F3270	5.92E-06	4.04E-08	2.39E-13	0.00%
F3301_FDPS	3.65E-05	1.06E-05	3.89E-10	4.82%
F3302	5.32E-03	4.66E-08	2.48E-10	3.07%

Table 12.9-1

Full Power Core Damage Frequency Due to Internal Fires

Fire Scenarios (see note)	IE Frequency (/yr)	CCDP	Fire CDF (/yr)	% Fire CDF
F3302_F3100	3.94E-05	4.30E-08	1.69E-12	0.02%
F3302_F3110	6.38E-06	4.03E-07	2.57E-12	0.03%
F3302_F3130	6.38E-06	1.83E-07	1.17E-12	0.01%
F3302_F3270	6.38E-06	4.10E-08	2.62E-13	0.00%
F3302_F9150	6.38E-06	6.19E-07	3.95E-12	0.05%
F4100	2.89E-02	2.30E-08	6.64E-10	8.24%
F4100_F1770	3.47E-05	2.39E-07	8.29E-12	0.10%
F4100_F4103	2.14E-04	2.08E-08	4.46E-12	0.06%
F4100_F4250	2.14E-04	4.81E-08	1.03E-11	0.13%
F4100_F4260	2.14E-04	2.13E-08	4.55E-12	0.06%
F4100_F4350	2.14E-04	2.08E-08	4.46E-12	0.06%
F4100_F4360	2.14E-04	2.08E-08	4.46E-12	0.06%
F4100_F4550	2.14E-04	2.11E-08	4.53E-12	0.06%
F4100_F4560	2.14E-04	2.11E-08	4.52E-12	0.06%
F4100_F4651	2.14E-04	2.08E-08	4.46E-12	0.06%
F4100_F4661	2.14E-04	2.08E-08	4.46E-12	0.06%
F4103	1.48E-02	1.81E-08	2.67E-10	3.32%
F4103_F4100	1.09E-04	2.03E-08	2.21E-12	0.03%
F4250	2.98E-03	6.29E-09	1.88E-11	0.23%
F4260	2.98E-03	1.98E-09	5.91E-12	0.07%
F4271	2.36E-03	1.71E-09	4.03E-12	0.05%
F4272	2.36E-03	1.71E-09	4.03E-12	0.05%
F4273	2.36E-03	1.71E-09	4.03E-12	0.05%
F4307	8.94E-04	1.56E-09	1.40E-12	0.02%
F4308	1.04E-02	1.78E-09	1.85E-11	0.23%
F4350	1.40E-03	1.77E-09	2.47E-12	0.03%
F4360	1.40E-03	1.63E-09	2.28E-12	0.03%

Table 12.9-1

Full Power Core Damage Frequency Due to Internal Fires

Fire Scenarios (see note)	IE Frequency (/yr)	CCDP	Fire CDF (/yr)	% Fire CDF
F4550	1.35E-03	1.75E-09	2.36E-12	0.03%
F4560	1.35E-03	1.80E-09	2.43E-12	0.03%
F5100	1.06E-03	4.90E-08	5.19E-11	0.64%
F5150	4.46E-04	2.31E-08	1.03E-11	0.13%
F5154	1.37E-02	1.86E-09	2.55E-11	0.32%
F5156	1.97E-04	1.13E-09	2.23E-13	0.00%
F5157	2.36E-03	1.71E-09	4.03E-12	0.05%
F5158	2.36E-03	2.03E-09	4.80E-12	0.06%
F5160	4.46E-04	1.80E-09	8.04E-13	0.01%
F5164	1.37E-02	1.86E-09	2.55E-11	0.32%
F5166	1.97E-04	1.13E-09	2.23E-13	0.00%
F5167	2.36E-03	1.71E-09	4.03E-12	0.05%
F5168	2.36E-03	1.73E-09	4.08E-12	0.05%
F5301	2.09E-04	1.15E-09	2.40E-13	0.00%
F5302	2.25E-03	1.71E-09	3.85E-12	0.05%
F5303	3.96E-04	7.75E-09	3.07E-12	0.04%
F5350	1.24E-03	4.89E-08	6.07E-11	0.75%
F5360	1.25E-03	8.20E-09	1.02E-11	0.13%
F5550	7.67E-03	5.54E-08	4.25E-10	5.27%
F5550_F5100	5.67E-05	5.04E-08	2.86E-12	0.04%
F5550_F5350	9.20E-06	4.78E-08	4.39E-13	0.01%
F5550_F5650	2.07E-05	4.88E-08	1.01E-12	0.01%
F5560	7.57E-03	1.14E-08	8.61E-11	1.07%
F5560_F5100	5.60E-05	9.14E-08	5.12E-12	0.06%
F5560_F5360	9.08E-06	7.72E-09	7.01E-14	0.00%
F5560_F5660	2.04E-05	8.15E-09	1.66E-13	0.00%
F7100	5.12E-03	1.71E-08	8.75E-11	1.09%

Table 12.9-1

Full Power Core Damage Frequency Due to Internal Fires

Fire Scenarios (see note)	IE Frequency (/yr)	CCDP	Fire CDF (/yr)	% Fire CDF
F7300	7.05E-03	9.23E-08	6.51E-10	8.07%
F9150	7.04E-04	1.41E-07	9.96E-11	1.24%
F9150_F9160	8.45E-07	1.19E-04	1.00E-10	1.24%
F9160	9.03E-04	2.91E-07	2.63E-10	3.26%
F9160_F9150	1.08E-06	1.19E-04	1.29E-10	1.60%
FDPS	5.10E-04	3.49E-07	1.78E-10	2.21%
FDPS_F3301	3.77E-06	1.06E-05	4.00E-11	0.50%
FFPE	2.43E-03	1.72E-09	4.19E-12	0.05%
FSWYD	1.80E-02	3.92E-08	7.05E-10	8.75%

Note: The fire scenarios named as “FXXXX_FYYYY” are postulated for fire propagation cases with “FXXXX” as the exposing fire area and “FYYYY” as the exposed fire area.

Table 12.9-2

Full Power Large Release Frequency Due to Internal Fires

Fire Scenarios (see note)	IE Frequency (/yr)	CLRP	Fire LRF (/yr)	%Fire LRF
F1110	3.72E-04	0.00E+00	0.00E+00	0.00%
F1120	4.05E-04	0.00E+00	0.00E+00	0.00%
F1130	2.89E-04	0.00E+00	0.00E+00	0.00%
F1140	2.80E-04	0.00E+00	0.00E+00	0.00%
F1150	4.03E-03	2.28E-10	9.19E-13	0.20%
F1152	2.20E-03	4.16E-10	9.15E-13	0.20%
F1160	1.33E-03	3.32E-08	4.42E-11	9.59%
F1162	4.30E-03	1.69E-10	7.26E-13	0.16%
F1203	1.40E-03	5.68E-11	7.95E-14	0.02%
F1210	6.67E-04	3.19E-11	2.13E-14	0.00%
F1210_F1150	1.80E-06	1.01E-08	1.82E-14	0.00%
F1210_F1230	4.93E-06	2.45E-07	1.21E-12	0.26%
F1210_F1240	4.93E-06	2.42E-07	1.20E-12	0.26%
F1210_F1311	1.80E-06	1.01E-08	1.82E-14	0.00%
F1220	8.73E-04	2.05E-08	1.79E-11	3.89%
F1220_F1162	2.36E-06	1.41E-06	3.34E-12	0.72%
F1220_F1203	1.05E-06	1.19E-06	1.25E-12	0.27%
F1220_F1230	6.46E-06	1.23E-06	7.95E-12	1.73%
F1220_F1240	6.46E-06	1.23E-06	7.95E-12	1.73%
F1220_F1321	2.36E-06	1.41E-06	3.33E-12	0.72%
F1230	5.08E-04	5.58E-11	2.84E-14	0.01%
F1230_F1152	1.37E-06	3.89E-09	5.33E-15	0.00%
F1230_F1210	3.76E-06	2.32E-07	8.73E-13	0.19%
F1230_F1220	3.76E-06	1.22E-06	4.59E-12	1.00%
F1230_F1262	6.10E-07	0.00E+00	0.00E+00	0.00%
F1230_F1331	1.37E-06	0.00E+00	0.00E+00	0.00%

Table 12.9-2

Full Power Large Release Frequency Due to Internal Fires

Fire Scenarios (see note)	IE Frequency (/yr)	CLRP	Fire LRF (/yr)	%Fire LRF
F1240	4.81E-04	4.98E-11	2.40E-14	0.01%
F1240_F1160	1.30E-06	1.47E-06	1.92E-12	0.42%
F1240_F1210	3.56E-06	2.31E-07	8.23E-13	0.18%
F1240_F1220	3.56E-06	1.22E-06	4.34E-12	0.94%
F1240_F1341	1.30E-06	0.00E+00	0.00E+00	0.00%
F1262	2.67E-04	0.00E+00	0.00E+00	0.00%
F1311	3.69E-03	3.14E-09	1.16E-11	2.52%
F1311_F1150	9.95E-06	2.98E-09	2.97E-14	0.01%
F1311_F1210	9.95E-06	1.20E-08	1.20E-13	0.03%
F1311_F1331	2.73E-05	4.24E-08	1.16E-12	0.25%
F1311_F1341	2.73E-05	4.24E-08	1.16E-12	0.25%
F1321	3.65E-03	2.58E-09	9.42E-12	2.05%
F1321_F1162	9.86E-06	2.49E-09	2.46E-14	0.01%
F1321_F1203	2.70E-05	1.43E-08	3.87E-13	0.08%
F1321_F1220	9.86E-06	1.44E-06	1.42E-11	3.07%
F1321_F1341	2.70E-05	4.21E-08	1.14E-12	0.25%
F1331	3.62E-03	2.83E-10	1.03E-12	0.22%
F1331_F1152	9.78E-06	1.09E-08	1.06E-13	0.02%
F1331_F1203	2.68E-05	1.28E-08	3.43E-13	0.07%
F1331_F1230	9.78E-06	7.94E-10	7.77E-15	0.00%
F1331_F1311	2.68E-05	4.24E-08	1.14E-12	0.25%
F1341	3.61E-03	1.67E-10	6.02E-13	0.13%
F1341_F1160	9.74E-06	1.60E-06	1.56E-11	3.39%
F1341_F1240	9.74E-06	7.98E-10	7.77E-15	0.00%
F1341_F1311	2.67E-05	4.24E-08	1.13E-12	0.25%
F1341_F1321	2.67E-05	4.18E-08	1.12E-12	0.24%
F1600	2.62E-04	2.28E-10	5.98E-14	0.01%

Table 12.9-2

Full Power Large Release Frequency Due to Internal Fires

Fire Scenarios (see note)	IE Frequency (/yr)	CLRP	Fire LRF (/yr)	%Fire LRF
F1770	2.85E-04	3.40E-09	9.70E-13	0.21%
F2100	2.34E-03	1.31E-10	3.06E-13	0.07%
F3110	1.40E-03	2.58E-09	3.61E-12	0.78%
F3110_F3100	1.04E-05	2.49E-09	2.59E-14	0.01%
F3110_F3130	1.68E-06	2.51E-09	4.21E-15	0.00%
F3110_F3270	3.79E-06	2.51E-09	9.52E-15	0.00%
F3120	1.39E-03	2.58E-09	3.58E-12	0.78%
F3120_F3101	1.03E-05	2.49E-09	2.57E-14	0.01%
F3120_F3140	1.67E-06	2.52E-09	4.21E-15	0.00%
F3120_F3270	1.67E-06	2.52E-09	4.21E-15	0.00%
F3130	1.32E-03	8.04E-12	1.06E-14	0.00%
F3130_F3101	9.80E-06	0.00E+00	0.00E+00	0.00%
F3130_F3110	1.59E-06	2.51E-09	3.99E-15	0.00%
F3130_F3270	3.58E-06	0.00E+00	0.00E+00	0.00%
F3140	1.32E-03	8.04E-12	1.06E-14	0.00%
F3140_F3100	9.78E-06	0.00E+00	0.00E+00	0.00%
F3140_F3120	1.59E-06	2.51E-09	3.99E-15	0.00%
F3140_F3270	1.59E-06	0.00E+00	0.00E+00	0.00%
F3270	3.47E-03	3.87E-09	1.34E-11	2.91%
F3301	4.93E-03	5.49E-10	2.71E-12	0.59%
F3301_F3100	3.65E-05	1.46E-10	5.33E-15	0.00%
F3301_F3101	1.33E-05	0.00E+00	0.00E+00	0.00%
F3301_F3110	5.92E-06	2.51E-09	1.48E-14	0.00%
F3301_F3130	5.92E-06	0.00E+00	0.00E+00	0.00%
F3301_F3270	5.92E-06	0.00E+00	0.00E+00	0.00%
F3301_FDPS	3.65E-05	1.41E-07	5.15E-12	1.12%
F3302	5.32E-03	6.09E-10	3.24E-12	0.70%

Table 12.9-2

Full Power Large Release Frequency Due to Internal Fires

Fire Scenarios (see note)	IE Frequency (/yr)	CLRP	Fire LRF (/yr)	%Fire LRF
F3302_F3100	3.94E-05	1.52E-10	5.98E-15	0.00%
F3302_F3110	6.38E-06	2.50E-09	1.60E-14	0.00%
F3302_F3130	6.38E-06	0.00E+00	0.00E+00	0.00%
F3302_F3270	6.38E-06	0.00E+00	0.00E+00	0.00%
F3302_F9150	6.38E-06	1.51E-07	9.65E-13	0.21%
F4100	2.89E-02	1.92E-09	5.56E-11	12.08%
F4100_F1770	3.47E-05	2.66E-09	9.24E-14	0.02%
F4100_F4103	2.14E-04	1.54E-09	3.30E-13	0.07%
F4100_F4250	2.14E-04	4.25E-09	9.10E-13	0.20%
F4100_F4260	2.14E-04	1.54E-09	3.30E-13	0.07%
F4100_F4350	2.14E-04	1.54E-09	3.30E-13	0.07%
F4100_F4360	2.14E-04	1.54E-09	3.30E-13	0.07%
F4100_F4550	2.14E-04	1.54E-09	3.30E-13	0.07%
F4100_F4560	2.14E-04	1.54E-09	3.30E-13	0.07%
F4100_F4651	2.14E-04	1.54E-09	3.30E-13	0.07%
F4100_F4661	2.14E-04	1.54E-09	3.30E-13	0.07%
F4103	1.48E-02	2.80E-10	4.14E-12	0.90%
F4103_F4100	1.09E-04	1.53E-09	1.66E-13	0.04%
F4250	2.98E-03	5.75E-11	1.71E-13	0.04%
F4260	2.98E-03	9.30E-12	2.77E-14	0.01%
F4271	2.36E-03	9.21E-12	2.17E-14	0.00%
F4272	2.36E-03	9.21E-12	2.17E-14	0.00%
F4273	2.36E-03	9.21E-12	2.17E-14	0.00%
F4307	8.94E-04	7.92E-12	7.08E-15	0.00%
F4308	1.04E-02	1.51E-11	1.57E-13	0.03%
F4350	1.40E-03	8.24E-12	1.15E-14	0.00%
F4360	1.40E-03	8.24E-12	1.15E-14	0.00%

Table 12.9-2

Full Power Large Release Frequency Due to Internal Fires

Fire Scenarios (see note)	IE Frequency (/yr)	CLRP	Fire LRF (/yr)	%Fire LRF
F4550	1.35E-03	7.87E-12	1.06E-14	0.00%
F4560	1.35E-03	7.87E-12	1.06E-14	0.00%
F5100	1.06E-03	4.60E-10	4.87E-13	0.11%
F5150	4.46E-04	1.73E-10	7.72E-14	0.02%
F5154	1.37E-02	1.49E-11	2.05E-13	0.04%
F5156	1.97E-04	0.00E+00	0.00E+00	0.00%
F5157	2.36E-03	9.21E-12	2.17E-14	0.00%
F5158	2.36E-03	9.21E-12	2.17E-14	0.00%
F5160	4.46E-04	0.00E+00	0.00E+00	0.00%
F5164	1.37E-02	1.49E-11	2.05E-13	0.04%
F5166	1.97E-04	0.00E+00	0.00E+00	0.00%
F5167	2.36E-03	9.21E-12	2.17E-14	0.00%
F5168	2.36E-03	9.21E-12	2.17E-14	0.00%
F5301	2.09E-04	0.00E+00	0.00E+00	0.00%
F5302	2.25E-03	8.87E-12	2.00E-14	0.00%
F5303	3.96E-04	2.17E-10	8.60E-14	0.02%
F5350	1.24E-03	4.60E-10	5.70E-13	0.12%
F5360	1.25E-03	2.26E-10	2.83E-13	0.06%
F5550	7.67E-03	5.52E-10	4.23E-12	0.92%
F5550_F5100	5.67E-05	1.21E-10	6.85E-15	0.00%
F5550_F5350	9.20E-06	0.00E+00	0.00E+00	0.00%
F5550_F5650	2.07E-05	5.35E-11	1.11E-15	0.00%
F5560	7.57E-03	2.81E-10	2.13E-12	0.46%
F5560_F5100	5.60E-05	4.59E-10	2.57E-14	0.01%
F5560_F5360	9.08E-06	0.00E+00	0.00E+00	0.00%
F5560_F5660	2.04E-05	8.70E-11	1.77E-15	0.00%
F7100	5.12E-03	2.50E-10	1.28E-12	0.28%

Table 12.9-2

Full Power Large Release Frequency Due to Internal Fires

Fire Scenarios (see note)	IE Frequency (/yr)	CLRP	Fire LRF (/yr)	%Fire LRF
F7300	7.05E-03	1.17E-09	8.23E-12	1.79%
F9150	7.04E-04	1.97E-09	1.39E-12	0.30%
F9150_F9160	8.45E-07	1.43E-05	1.20E-11	2.62%
F9160	9.03E-04	1.53E-07	1.38E-10	30.05%
F9160_F9150	1.08E-06	1.43E-05	1.54E-11	3.35%
FDPS	5.10E-04	4.41E-09	2.25E-12	0.49%
FDPS_F3301	3.77E-06	1.19E-07	4.48E-13	0.10%
FFPE	2.43E-03	8.95E-12	2.17E-14	0.00%
FSWYD	1.80E-02	5.82E-10	1.05E-11	2.28%

Note: The fire scenarios named as “FXXXX_FYYYY” are postulated for fire propagation cases with “FXXXX” as the exposing fire area and “FYYYY” as the exposed fire area.

Table 12.9-3

Shutdown Core Damage Frequency Due to Internal Fires

SD Fire Sequences	IE Frequency (/yr)	CCDP	CDF (/yr)	%CDF
F1152_F1162_M5	6.72E-06	8.17E-06	5.496E-11	0.20%
F1152_F1162_M5O	1.68E-06	8.06E-06	1.355E-11	0.05%
F1152_F1162_M6U	2.10E-06	1.69E-04	3.548E-10	1.31%
F3301_F3302_M5	1.69E-07	1.04E-06	1.751E-13	0.00%
F3301_F3302_M5O	4.22E-08	2.88E-07	1.215E-14	0.00%
F3301_F3302_M6U	5.27E-08	1.73E-04	9.141E-12	0.03%
F4100_M5 (see note 1)	1.97E-03	3.02E-07	5.966E-10	2.20%
F4100_M5O (see note 1)	4.93E-04	2.93E-07	1.445E-10	0.53%
F4100_M6U (see note 1)	6.16E-04	2.96E-05	1.823E-08	67.23%
F4250_F4260_M5	5.92E-07	1.33E-06	7.850E-13	0.00%
F4250_F4260_M5O	1.48E-07	1.04E-06	1.540E-13	0.00%
F4250_F4260_M6U	1.85E-07	1.61E-04	2.984E-11	0.11%
F4350_F4360_M5	5.92E-07	2.59E-09	1.533E-15	0.00%
F4350_F4360_M5O	1.48E-07	0.00E+00	0.000E+00	0.00%
F4350_F4360_M6U	1.85E-07	1.96E-05	3.623E-12	0.01%
F5550_F5560_M5	4.56E-08	1.39E-05	6.352E-13	0.00%
F5550_F5560_M5O	1.14E-08	1.33E-05	1.513E-13	0.00%
F5550_F5560_M6U	1.42E-08	1.77E-04	2.526E-12	0.01%
F7300_M5 (see note 2)	1.42E-04	1.60E-06	2.282E-10	0.84%
F7300_M5O (see note 2)	3.56E-05	1.59E-06	5.649E-11	0.21%
F7300_M6U (see note 2)	4.45E-05	1.62E-04	7.232E-09	26.67%
F9150_F9160_M5	2.10E-08	1.21E-05	2.546E-13	0.00%
F9150_F9160_M5O	5.26E-09	1.17E-05	6.140E-14	0.00%
F9150_F9160_M6U	6.58E-09	1.69E-04	1.114E-12	0.00%
FSWYD_M5	5.70E-04	1.86E-10	1.059E-13	0.00%
FSWYD_M5O	1.42E-04	1.45E-09	2.070E-13	0.00%
FSWYD_M6U	1.78E-04	8.76E-07	1.560E-10	0.58%

Notes:

1. Shutdown fire scenario for turbine building general area (F4100) is conservatively assumed. If the cabling for instrument air system is designed with separation criteria, this fire scenario should be screened.
2. Shutdown fire scenario for plant service water area (F7300) is conservatively assumed. The plant service water (PSW) system is part of RTNSS program. Therefore, a fire in a single fire area should not damage both PSW trains. With the final detailed design with separation criteria, this shutdown fire scenario should be screened.

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
1	9.21E-10	3.69E-03	%F1311	
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
2	9.13E-10	3.65E-03	%F1321	
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
3	3.50E-10	1.40E-03	%F3110	
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
4	3.48E-10	1.39E-03	%F3120	
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
5	1.40E-10	2.89E-02	%F4100	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.61E-01	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
6	1.27E-10	5.10E-04	%FDPS	
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
7	1.08E-10	1.08E-06	%F9160_F9150	
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
8	8.71E-11	1.80E-02	%FSWYD	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.61E-01	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
9	8.45E-11	8.45E-07	%F9150_F9160	
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
10	7.14E-11	1.48E-02	%F4103	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.61E-01	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
11	7.05E-11	7.05E-03	%F7300	
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		1.00E-04	C72-CCFSOFTWARE	COMMON CAUSE FAILURE OF DPS PROCESSORS
12	6.98E-11	2.89E-02	%F4100	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.61E-01	XXX-XHE-FO-DEPRESS	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
13	6.98E-11	2.89E-02	%F4100	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		1.61E-01	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
14	4.42E-11	3.65E-05	%F3301_FDPS	
		1.21E-02	C12-BV_-RE-F021B	MISPOSITION OF VALVE F021B
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
15	4.42E-11	3.65E-05	%F3301_FDPS	
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		1.21E-02	P21-BV_-RE-F049B	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
16	4.42E-11	3.65E-05	%F3301_FDPS	
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		1.21E-02	P21-BV_-RE-F050B	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
17	4.35E-11	1.80E-02	%FSWYD	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.61E-01	XXX-XHE-FO-DEPRESS	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
18	4.35E-11	1.80E-02	%FSWYD	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		1.61E-01	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
19	4.20E-11	2.89E-02	%F4100	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
20	3.71E-11	7.67E-03	%F5550	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.61E-01	XXX-XHE-FO-DEPRESS	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
21	3.56E-11	1.48E-02	%F4103	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.61E-01	XXX-XHE-FO-DEPRESS	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
22	3.56E-11	1.48E-02	%F4103	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		1.61E-01	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
23	3.41E-11	7.05E-03	%F7300	
		1.00E+00	B32-NONCONDENSE	Non condensable gasses form in ICS sufficiently to require venting
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.61E-01	XXX-XHE-FO-DEPRESS	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
24	3.41E-11	7.05E-03	%F7300	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.61E-01	XXX-XHE-FO-DEPRESS	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
25	2.94E-11	3.65E-05	%F3301_FDPS	
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		8.07E-03	P41-TRN-RE-PUMP2B	FAILURE TO RESTORE PSW PUMP 2B
26	2.62E-11	1.80E-02	%FSWYD	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
27	2.57E-11	5.32E-03	%F3302	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.61E-01	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
28	2.47E-11	5.12E-03	%F7100	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.61E-01	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
29	2.39E-11	4.93E-03	%F3301	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.61E-01	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
30	2.19E-11	3.65E-05	%F3301_FDPS	
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		6.00E-03	P21-AHU-FS-RCCWB	AIR HANDLING UNIT RCCWS ROOM B FAILS TO START
31	2.15E-11	1.48E-02	%F4103	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
32	2.10E-11	2.89E-02	%F4100	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
33	2.10E-11	2.89E-02	%F4100	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
34	1.85E-11	7.67E-03	%F5550	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.61E-01	XXX-XHE-FO-DEPRESS	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
35	1.85E-11	7.67E-03	%F5550	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.61E-01	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
36	1.85E-11	7.67E-03	%F5550	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		1.61E-01	XXX-XHE-FO-DEPRESS	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
37	1.70E-11	7.05E-03	%F7300	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'
		1.00E+00	B32-NONCONDENSE	Non condensable gasses form in ICS sufficiently to require venting
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		1.61E-01	XXX-XHE-FO-DEPRESS	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
38	1.70E-11	7.05E-03	%F7300	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.00E+00	B32-NONCONDENSE	Non condensable gasses form in ICS sufficiently to require venting
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		1.61E-01	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
39	1.70E-11	7.05E-03	%F7300	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.61E-01	XXX-XHE-FO-DEPRESS	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
40	1.70E-11	7.05E-03	%F7300	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.61E-01	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
41	1.70E-11	7.05E-03	%F7300	
		1.00E+00	B32-NONCONDENSE	Non condensable gasses form in ICS sufficiently to require venting
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.61E-01	XXX-XHE-FO-DEPRESS	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
42	1.70E-11	7.05E-03	%F7300	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		1.61E-01	XXX-XHE-FO-DEPRESS	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
43	1.46E-11	3.65E-05	%F3301_FDPS	
		4.00E-03	C12-MOV-CC-F020B	MOTOR OPER. VALVE F020B FAILS TO OPEN
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
44	1.46E-11	3.65E-05	%F3301_FDPS	
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		4.00E-03	P41-MOV-CC-PMPF004B	MOTOR OPERATED VALVE F004B FAILS TO OPEN
45	1.40E-11	2.89E-02	%F4100	
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		1.00E-04	C72-CCFSOFTWARE	COMMON CAUSE FAILURE OF DPS PROCESSORS
46	1.35E-11	3.65E-05	%F3301_FDPS	

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		3.69E-03	C12-MP_-FS-C001B	MOTOR-DRIVEN PUMP C001B FAILS TO START
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
47	1.31E-11	1.80E-02	%FSWYD	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
48	1.31E-11	1.80E-02	%FSWYD	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
49	1.28E-11	5.32E-03	%F3302	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.61E-01	XXX-XHE-FO-DEPRESS	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
50	1.28E-11	5.32E-03	%F3302	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		1.61E-01	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
51	1.24E-11	5.12E-03	%F7100	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.61E-01	XXX-XHE-FO-DEPRESS	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
52	1.24E-11	5.12E-03	%F7100	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		1.61E-01	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
53	1.23E-11	1.08E-06	%F9160_F9150	
		1.14E-05	R13-INV-FC-CCFSR_ALL	CCF of all components in group 'R13-INV-FC-CCFSR'
54	1.19E-11	4.93E-03	%F3301	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.61E-01	XXX-XHE-FO-DEPRESS	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
55	1.19E-11	4.93E-03	%F3301	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.61E-01	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
56	1.15E-11	7.67E-03	%F5550	
		6.00E-03	B21-SRV-OO-ANYSRV1	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
57	1.15E-11	7.67E-03	%F5550	
		6.00E-03	B21-SRV-OO-ANYSRV10	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
58	1.15E-11	7.67E-03	%F5550	
		6.00E-03	B21-SRV-OO-ANYSRV11	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
59	1.15E-11	7.67E-03	%F5550	
		6.00E-03	B21-SRV-OO-ANYSRV12	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
60	1.15E-11	7.67E-03	%F5550	
		6.00E-03	B21-SRV-OO-ANYSRV13	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
61	1.15E-11	7.67E-03	%F5550	
		6.00E-03	B21-SRV-OO-ANYSRV14	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
62	1.15E-11	7.67E-03	%F5550	
		6.00E-03	B21-SRV-OO-ANYSRV15	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
63	1.15E-11	7.67E-03	%F5550	
		6.00E-03	B21-SRV-OO-ANYSRV16	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
64	1.15E-11	7.67E-03	%F5550	
		6.00E-03	B21-SRV-OO-ANYSRV17	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
65	1.15E-11	7.67E-03	%F5550	
		6.00E-03	B21-SRV-OO-ANYSRV18	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
66	1.15E-11	7.67E-03	%F5550	
		6.00E-03	B21-SRV-OO-ANYSRV2	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
67	1.15E-11	7.67E-03	%F5550	
		6.00E-03	B21-SRV-OO-ANYSRV3	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
68	1.15E-11	7.67E-03	%F5550	
		6.00E-03	B21-SRV-OO-ANYSRV4	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
69	1.15E-11	7.67E-03	%F5550	
		6.00E-03	B21-SRV-OO-ANYSRV5	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
70	1.15E-11	7.67E-03	%F5550	
		6.00E-03	B21-SRV-OO-ANYSRV6	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
71	1.15E-11	7.67E-03	%F5550	
		6.00E-03	B21-SRV-OO-ANYSRV7	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
72	1.15E-11	7.67E-03	%F5550	
		6.00E-03	B21-SRV-OO-ANYSRV8	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
73	1.15E-11	7.67E-03	%F5550	
		6.00E-03	B21-SRV-OO-ANYSRV9	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
74	1.11E-11	7.67E-03	%F5550	

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
75	1.09E-11	3.65E-05	%F3301_FDPS	
		3.00E-03	C12-SYS-TM-TRAINB	TRAIN B IN MAINTENANCE
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
76	1.07E-11	1.48E-02	%F4103	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
77	1.07E-11	1.48E-02	%F4103	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
78	1.06E-11	7.05E-03	%F7300	
		6.00E-03	B21-SRV-OO-ANYSRV1	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
79	1.06E-11	7.05E-03	%F7300	
		6.00E-03	B21-SRV-OO-ANYSRV10	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
80	1.06E-11	7.05E-03	%F7300	
		6.00E-03	B21-SRV-OO-ANYSRV11	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
81	1.06E-11	7.05E-03	%F7300	
		6.00E-03	B21-SRV-OO-ANYSRV12	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
82	1.06E-11	7.05E-03	%F7300	
		6.00E-03	B21-SRV-OO-ANYSRV13	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
83	1.06E-11	7.05E-03	%F7300	
		6.00E-03	B21-SRV-OO-ANYSRV14	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
84	1.06E-11	7.05E-03	%F7300	
		6.00E-03	B21-SRV-OO-ANYSRV15	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
85	1.06E-11	7.05E-03	%F7300	
		6.00E-03	B21-SRV-OO-ANYSRV16	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
86	1.06E-11	7.05E-03	%F7300	
		6.00E-03	B21-SRV-OO-ANYSRV17	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
87	1.06E-11	7.05E-03	%F7300	
		6.00E-03	B21-SRV-OO-ANYSRV18	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
88	1.06E-11	7.05E-03	%F7300	
		6.00E-03	B21-SRV-OO-ANYSRV2	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
89	1.06E-11	7.05E-03	%F7300	
		6.00E-03	B21-SRV-OO-ANYSRV3	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
90	1.06E-11	7.05E-03	%F7300	
		6.00E-03	B21-SRV-OO-ANYSRV4	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
91	1.06E-11	7.05E-03	%F7300	
		6.00E-03	B21-SRV-OO-ANYSRV5	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
92	1.06E-11	7.05E-03	%F7300	

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		6.00E-03	B21-SRV-OO-ANYSRV6	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
93	1.06E-11	7.05E-03	%F7300	
		6.00E-03	B21-SRV-OO-ANYSRV7	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
94	1.06E-11	7.05E-03	%F7300	
		6.00E-03	B21-SRV-OO-ANYSRV8	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
95	1.06E-11	7.05E-03	%F7300	
		6.00E-03	B21-SRV-OO-ANYSRV9	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
96	1.03E-11	7.05E-03	%F7300	
		1.00E+00	B32-NONCONDENSE	Non condensable gasses form in ICS sufficiently to require venting
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
97	1.03E-11	7.05E-03	%F7300	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
98	9.61E-12	8.45E-07	%F9150_F9160	
		1.14E-05	R13-INV-FC-CCFSR_ALL	CCF of all components in group 'R13-INV-FC-CCFSR'
99	8.76E-12	3.65E-05	%F3301_FDPS	
		2.40E-03	C12-MP_-FS-C001BOIL	MOTOR-DRIVEN AUX. OIL PUMP FOR C001B FAILS TO START
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
100	8.71E-12	1.80E-02	%FSWYD	
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		1.00E-04	C72-CCFSOFTWARE	COMMON CAUSE FAILURE OF DPS PROCESSORS
101	8.58E-12	2.85E-04	%F1770	
		1.00E+00	B32-NONCONDENSE	Non condensable gasses form in ICS sufficiently to require venting
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
102	8.58E-12	2.85E-04	%F1770	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
103	8.55E-12	3.65E-05	%F3301_FDPS	
		4.84E-02	C12-BV_-RE-F013A	MISPOSITION OF VALVE F013A
		4.84E-02	C12-BV_-RE-F013B	MISPOSITION OF VALVE F013B
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
104	8.55E-12	3.65E-05	%F3301_FDPS	
		4.84E-02	C12-BV_-RE-F013A	MISPOSITION OF VALVE F013A
		4.84E-02	C12-BV_-RE-F015B	MISPOSITION OF VALVE F015B
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
105	8.55E-12	3.65E-05	%F3301_FDPS	
		4.84E-02	C12-BV_-RE-F013B	MISPOSITION OF VALVE F013B
		4.84E-02	C12-BV_-RE-F015A	MISPOSITION OF VALVE F015A
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
106	8.55E-12	3.65E-05	%F3301_FDPS	
		4.84E-02	C12-BV_-RE-F015A	MISPOSITION OF VALVE F015A
		4.84E-02	C12-BV_-RE-F015B	MISPOSITION OF VALVE F015B
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
107	8.55E-12	3.65E-05	%F3301_FDPS	
		4.84E-02	C12-BV_-RE-F064	MISPOSITION OF VALVE F064

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
108	8.02E-12	7.05E-03	%F7300	
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		1.14E-05	R13-INV-FC-CCFNSR_ALL	CCF of all components in group 'R13-INV-FC-CCFNSR'
109	7.98E-12	5.32E-03	%F3302	
		6.00E-03	B21-SRV-OO-ANYSRV1	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
110	7.98E-12	5.32E-03	%F3302	
		6.00E-03	B21-SRV-OO-ANYSRV10	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
111	7.98E-12	5.32E-03	%F3302	
		6.00E-03	B21-SRV-OO-ANYSRV11	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
112	7.98E-12	5.32E-03	%F3302	
		6.00E-03	B21-SRV-OO-ANYSRV12	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
113	7.98E-12	5.32E-03	%F3302	

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		6.00E-03	B21-SRV-OO-ANYSRV13	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
114	7.98E-12	5.32E-03	%F3302	
		6.00E-03	B21-SRV-OO-ANYSRV14	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
115	7.98E-12	5.32E-03	%F3302	
		6.00E-03	B21-SRV-OO-ANYSRV15	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
116	7.98E-12	5.32E-03	%F3302	
		6.00E-03	B21-SRV-OO-ANYSRV16	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
117	7.98E-12	5.32E-03	%F3302	
		6.00E-03	B21-SRV-OO-ANYSRV17	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
118	7.98E-12	5.32E-03	%F3302	
		6.00E-03	B21-SRV-OO-ANYSRV18	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
119	7.98E-12	5.32E-03	%F3302	
		6.00E-03	B21-SRV-OO-ANYSRV2	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
120	7.98E-12	5.32E-03	%F3302	
		6.00E-03	B21-SRV-OO-ANYSRV3	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
121	7.98E-12	5.32E-03	%F3302	
		6.00E-03	B21-SRV-OO-ANYSRV4	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
122	7.98E-12	5.32E-03	%F3302	
		6.00E-03	B21-SRV-OO-ANYSRV5	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
123	7.98E-12	5.32E-03	%F3302	
		6.00E-03	B21-SRV-OO-ANYSRV6	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
124	7.98E-12	5.32E-03	%F3302	
		6.00E-03	B21-SRV-OO-ANYSRV7	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
125	7.98E-12	5.32E-03	%F3302	
		6.00E-03	B21-SRV-OO-ANYSRV8	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
126	7.98E-12	5.32E-03	%F3302	
		6.00E-03	B21-SRV-OO-ANYSRV9	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
127	7.74E-12	5.32E-03	%F3302	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
128	7.44E-12	5.12E-03	%F7100	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
129	7.40E-12	5.10E-04	%FDPS	
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		3.00E-03	R10-LOSP-EPRI	CONSEQENTIAL LOSS OF PREFERRED OFFSITE POWER DUE TO A TRANSIENT
130	7.40E-12	4.93E-03	%F3301	
		6.00E-03	B21-SRV-OO-ANYSRV1	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
131	7.40E-12	4.93E-03	%F3301	
		6.00E-03	B21-SRV-OO-ANYSRV10	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
132	7.40E-12	4.93E-03	%F3301	
		6.00E-03	B21-SRV-OO-ANYSRV11	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
133	7.40E-12	4.93E-03	%F3301	
		6.00E-03	B21-SRV-OO-ANYSRV12	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
134	7.40E-12	4.93E-03	%F3301	
		6.00E-03	B21-SRV-OO-ANYSRV13	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
135	7.40E-12	4.93E-03	%F3301	
		6.00E-03	B21-SRV-OO-ANYSRV14	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
136	7.40E-12	4.93E-03	%F3301	
		6.00E-03	B21-SRV-OO-ANYSRV15	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
137	7.40E-12	4.93E-03	%F3301	

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		6.00E-03	B21-SRV-OO-ANYSRV16	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
138	7.40E-12	4.93E-03	%F3301	
		6.00E-03	B21-SRV-OO-ANYSRV17	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
139	7.40E-12	4.93E-03	%F3301	
		6.00E-03	B21-SRV-OO-ANYSRV18	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
140	7.40E-12	4.93E-03	%F3301	
		6.00E-03	B21-SRV-OO-ANYSRV2	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
141	7.40E-12	4.93E-03	%F3301	
		6.00E-03	B21-SRV-OO-ANYSRV3	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
142	7.40E-12	4.93E-03	%F3301	
		6.00E-03	B21-SRV-OO-ANYSRV4	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
143	7.40E-12	4.93E-03	%F3301	
		6.00E-03	B21-SRV-OO-ANYSRV5	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
144	7.40E-12	4.93E-03	%F3301	
		6.00E-03	B21-SRV-OO-ANYSRV6	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
145	7.40E-12	4.93E-03	%F3301	
		6.00E-03	B21-SRV-OO-ANYSRV7	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
146	7.40E-12	4.93E-03	%F3301	
		6.00E-03	B21-SRV-OO-ANYSRV8	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
147	7.40E-12	4.93E-03	%F3301	
		6.00E-03	B21-SRV-OO-ANYSRV9	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
148	7.30E-12	3.65E-05	%F3301_FDPS	
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		2.00E-03	P21-ACV-OO-F016B	AIR OPERATED VALVE F016B FAILS TO CLOSE
149	7.30E-12	3.65E-05	%F3301_FDPS	
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		2.00E-03	P41-MPW-FS-C002B	MOTOR-DRIVEN PUMP C002B FAILS TO START

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
150	7.17E-12	4.93E-03	%F3301	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
151	6.82E-12	2.73E-05	%F1311_F1331	
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
152	6.82E-12	2.73E-05	%F1311_F1341	
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
153	6.77E-12	2.89E-02	%F4100	
		1.00E+00	B32-NONCONDENSE	Non condensable gasses form in ICS sufficiently to require venting
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.61E-01	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
154	6.76E-12	2.70E-05	%F1321_F1203	
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
155	6.76E-12	2.70E-05	%F1321_F1341	
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
156	6.70E-12	2.68E-05	%F1331_F1311	
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
157	6.67E-12	2.67E-05	%F1341_F1311	
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
158	6.67E-12	2.67E-05	%F1341_F1321	
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
159	6.01E-12	1.24E-03	%F5350	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.61E-01	XXX-XHE-FO-DEPRESS	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
160	5.77E-12	2.89E-02	%F4100	
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
		7.99E-04	C41-UV_-CC-F004A	CHECK VALVE F004A FAILS TO OPEN
161	5.77E-12	2.89E-02	%F4100	
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
		7.99E-04	C41-UV_-CC-F004B	CHECK VALVE F004B FAILS TO OPEN
162	5.77E-12	2.89E-02	%F4100	
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		7.99E-04	C41-UV_-CC-F005A	CHECK VALVE F005A FAILS TO OPEN
163	5.77E-12	2.89E-02	%F4100	
		2.50E-07	C12-ROD-CF-SCRAM	CCF OF CONTROL RODS TO INSERT
		7.99E-04	C41-UV_-CC-F005B	CHECK VALVE F005B FAILS TO OPEN
164	5.57E-12	7.67E-03	%F5550	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
165	5.57E-12	7.67E-03	%F5550	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
166	5.47E-12	3.65E-05	%F3301_FDPS	
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		1.50E-03	P41-NSC-TM-C002B	PUMP C002B IN MAINTENANCE
167	5.17E-12	9.74E-06	%F1341_F1160	
		3.00E-05	C71-DTM-FC-R_ALL	CCF of all components in group 'C71-DTM-FC-R'
		1.77E-02	REC_MANSCRAM	
168	5.15E-12	1.06E-03	%F5100	

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.61E-01	XXX-XHE-FO-DEPRESS	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
169	5.12E-12	7.05E-03	%F7300	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'
		1.00E+00	B32-NONCONDENSE	Non condensable gasses form in ICS sufficiently to require venting
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
170	5.12E-12	7.05E-03	%F7300	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
171	5.12E-12	7.05E-03	%F7300	
		1.00E+00	B32-NONCONDENSE	Non condensable gasses form in ICS sufficiently to require venting
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
172	5.12E-12	7.05E-03	%F7300	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
173	5.10E-12	5.10E-04	%FDPS	
		1.00E-04	C62-CCFSOFTWARE	Common cause failure of software
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
174	4.70E-12	7.05E-03	%F7300	
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		6.67E-06	C72-LOG-FC-D_1_2_3	CCF of three components: C72-LOG-FC-D1DPS & C72-LOG-FC-D2DPS & C72-LOG-FC-D3DPS
175	4.56E-12	3.77E-06	%FDPS_F3301	
		1.21E-02	C12-BV_-RE-F021B	MISPOSITION OF VALVE F021B
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
176	4.56E-12	3.77E-06	%FDPS_F3301	
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		1.21E-02	P21-BV_-RE-F049B	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
177	4.56E-12	3.77E-06	%FDPS_F3301	
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.21E-02	P21-BV_-RE-F050B	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
178	4.37E-12	9.03E-04	%F9160	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.61E-01	XXX-XHE-FO-DEPRESS	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
179	4.32E-12	9.03E-04	%F9160	
		6.00E-03	B21-SRV-OO-ANYSRV1	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		4.50E-05	C71-SLU-FC-R_ALL	CCF of all components in group 'C71-SLU-FC-R'
		1.77E-02	REC_MANSCRAM	
180	4.32E-12	9.03E-04	%F9160	
		6.00E-03	B21-SRV-OO-ANYSRV10	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		4.50E-05	C71-SLU-FC-R_ALL	CCF of all components in group 'C71-SLU-FC-R'
		1.77E-02	REC_MANSCRAM	
181	4.32E-12	9.03E-04	%F9160	
		6.00E-03	B21-SRV-OO-ANYSRV11	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		4.50E-05	C71-SLU-FC-R_ALL	CCF of all components in group 'C71-SLU-FC-R'
		1.77E-02	REC_MANSCRAM	
182	4.32E-12	9.03E-04	%F9160	

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		6.00E-03	B21-SRV-OO-ANYSRV12	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		4.50E-05	C71-SLU-FC-R_ALL	CCF of all components in group 'C71-SLU-FC-R'
		1.77E-02	REC_MANSCRAM	
183	4.32E-12	9.03E-04	%F9160	
		6.00E-03	B21-SRV-OO-ANYSRV13	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		4.50E-05	C71-SLU-FC-R_ALL	CCF of all components in group 'C71-SLU-FC-R'
		1.77E-02	REC_MANSCRAM	
184	4.32E-12	9.03E-04	%F9160	
		6.00E-03	B21-SRV-OO-ANYSRV14	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		4.50E-05	C71-SLU-FC-R_ALL	CCF of all components in group 'C71-SLU-FC-R'
		1.77E-02	REC_MANSCRAM	
185	4.32E-12	9.03E-04	%F9160	
		6.00E-03	B21-SRV-OO-ANYSRV15	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		4.50E-05	C71-SLU-FC-R_ALL	CCF of all components in group 'C71-SLU-FC-R'
		1.77E-02	REC_MANSCRAM	
186	4.32E-12	9.03E-04	%F9160	
		6.00E-03	B21-SRV-OO-ANYSRV16	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		4.50E-05	C71-SLU-FC-R_ALL	CCF of all components in group 'C71-SLU-FC-R'
		1.77E-02	REC_MANSCRAM	

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
187	4.32E-12	9.03E-04	%F9160	
		6.00E-03	B21-SRV-OO-ANYSRV17	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		4.50E-05	C71-SLU-FC-R_ALL	CCF of all components in group 'C71-SLU-FC-R'
		1.77E-02	REC_MANSCRAM	
188	4.32E-12	9.03E-04	%F9160	
		6.00E-03	B21-SRV-OO-ANYSRV18	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		4.50E-05	C71-SLU-FC-R_ALL	CCF of all components in group 'C71-SLU-FC-R'
		1.77E-02	REC_MANSCRAM	
189	4.32E-12	9.03E-04	%F9160	
		6.00E-03	B21-SRV-OO-ANYSRV2	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		4.50E-05	C71-SLU-FC-R_ALL	CCF of all components in group 'C71-SLU-FC-R'
		1.77E-02	REC_MANSCRAM	
190	4.32E-12	9.03E-04	%F9160	
		6.00E-03	B21-SRV-OO-ANYSRV3	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		4.50E-05	C71-SLU-FC-R_ALL	CCF of all components in group 'C71-SLU-FC-R'
		1.77E-02	REC_MANSCRAM	
191	4.32E-12	9.03E-04	%F9160	
		6.00E-03	B21-SRV-OO-ANYSRV4	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		4.50E-05	C71-SLU-FC-R_ALL	CCF of all components in group 'C71-SLU-FC-R'

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.77E-02	REC_MANSCRAM	
192	4.32E-12	9.03E-04	%F9160	
		6.00E-03	B21-SRV-OO-ANYSRV5	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		4.50E-05	C71-SLU-FC-R_ALL	CCF of all components in group 'C71-SLU-FC-R'
		1.77E-02	REC_MANSCRAM	
193	4.32E-12	9.03E-04	%F9160	
		6.00E-03	B21-SRV-OO-ANYSRV6	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		4.50E-05	C71-SLU-FC-R_ALL	CCF of all components in group 'C71-SLU-FC-R'
		1.77E-02	REC_MANSCRAM	
194	4.32E-12	9.03E-04	%F9160	
		6.00E-03	B21-SRV-OO-ANYSRV7	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		4.50E-05	C71-SLU-FC-R_ALL	CCF of all components in group 'C71-SLU-FC-R'
		1.77E-02	REC_MANSCRAM	
195	4.32E-12	9.03E-04	%F9160	
		6.00E-03	B21-SRV-OO-ANYSRV8	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
		4.50E-05	C71-SLU-FC-R_ALL	CCF of all components in group 'C71-SLU-FC-R'
		1.77E-02	REC_MANSCRAM	
196	4.32E-12	9.03E-04	%F9160	
		6.00E-03	B21-SRV-OO-ANYSRV9	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE

Table 12.9-4

Cutset Report (Top 200) for Full-Power Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		4.50E-05	C71-SLU-FC-R_ALL	CCF of all components in group 'C71-SLU-FC-R'
		1.77E-02	REC_MANSCRAM	
197	4.28E-12	2.85E-04	%F1770	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'
		1.00E+00	B32-NONCONDENSE	Non condensable gasses form in ICS sufficiently to require venting
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
198	4.28E-12	2.85E-04	%F1770	
		1.50E-04	B21-SQV-CC_ALL	CCF of all components in group 'B21-SQV-CC'
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
199	4.28E-12	2.85E-04	%F1770	
		1.00E+00	B32-NONCONDENSE	Non condensable gasses form in ICS sufficiently to require venting
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
200	4.28E-12	2.85E-04	%F1770	
		1.00E-04	C63-CCFSOFTWARE_S	Common cause failure of software, for spurious
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
1	1.15E-09	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
2	7.72E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
3	6.60E-10	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
4	6.60E-10	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
5	6.47E-10	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
6	6.46E-10	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
7	5.12E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
8	4.42E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
9	4.42E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
10	4.34E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
11	4.33E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
12	3.83E-10	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
13	3.23E-10	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
14	2.93E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
15	2.93E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
16	2.88E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
17	2.87E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
18	2.57E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
19	2.19E-10	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
20	2.19E-10	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
21	2.16E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
22	2.15E-10	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
23	2.15E-10	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
24	1.93E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021A	MISPOSITION OF VALVE F021A
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
25	1.93E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021B	MISPOSITION OF VALVE F021B
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
26	1.93E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F049A	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
27	1.93E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F049B	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
28	1.93E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F050A	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
29	1.93E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F050B	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
30	1.70E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
31	1.47E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
32	1.47E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
33	1.44E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
34	1.44E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
35	1.44E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
36	1.13E-10	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		3.00E-03	E50-SQV-CC-F002A	SQUIB VALVE F002A FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
37	1.13E-10	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		3.00E-03	E50-SQV-CC-F002D	SQUIB VALVE F002D FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
38	1.13E-10	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		3.00E-03	E50-SQV-CC-F002E	SQUIB VALVE F002E FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
39	1.13E-10	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		3.00E-03	E50-SQV-CC-F002H	SQUIB VALVE F002H FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
40	1.10E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021A	MISPOSITION OF VALVE F021A
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
41	1.10E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021A	MISPOSITION OF VALVE F021A
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
42	1.10E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021B	MISPOSITION OF VALVE F021B
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
43	1.10E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021B	MISPOSITION OF VALVE F021B
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
44	1.10E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F049A	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
45	1.10E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F049B	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
46	1.10E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F050A	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
47	1.10E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F050B	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
48	1.10E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F049A	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
49	1.10E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.21E-02	P21-BV_-RE-F049B	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
50	1.10E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F050A	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
51	1.10E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F050B	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
52	1.08E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021A	MISPOSITION OF VALVE F021A
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
53	1.08E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021B	MISPOSITION OF VALVE F021B

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
54	1.08E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F049A	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
55	1.08E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F049B	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
56	1.08E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F050A	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
57	1.08E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.21E-02	P21-BV_-RE-F050B	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
58	1.08E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021A	MISPOSITION OF VALVE F021A
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
59	1.08E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021B	MISPOSITION OF VALVE F021B
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
60	1.08E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F049A	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
61	1.08E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F049B	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
62	1.08E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F050A	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
63	1.08E-10	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F050B	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
64	1.07E-10	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
65	9.75E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
66	9.75E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
67	9.57E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
68	9.55E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
69	7.58E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		3.00E-03	E50-SQV-CC-F002A	SQUIB VALVE F002A FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
70	7.58E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		3.00E-03	E50-SQV-CC-F002D	SQUIB VALVE F002D FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
71	7.58E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		3.00E-03	E50-SQV-CC-F002E	SQUIB VALVE F002E FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
72	7.58E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		3.00E-03	E50-SQV-CC-F002H	SQUIB VALVE F002H FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
73	7.20E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
74	6.47E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		3.00E-05	E50-UV_OC-EQU_ALL	CCF of all components in group 'E50-UV_OC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
75	6.42E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021A	MISPOSITION OF VALVE F021A
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
76	6.42E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021B	MISPOSITION OF VALVE F021B
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
77	6.42E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		1.21E-02	P21-BV_-RE-F049A	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
78	6.42E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		1.21E-02	P21-BV_-RE-F049B	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
79	6.42E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		1.21E-02	P21-BV_-RE-F050A	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
80	6.42E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		1.21E-02	P21-BV_-RE-F050B	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
81	6.38E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.00E-03	C12-MOV-CC-F020A	MOTOR OPER. VALVE F020A FAILS TO OPEN
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
82	6.38E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.00E-03	C12-MOV-CC-F020B	MOTOR OPER. VALVE F020B FAILS TO OPEN
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
83	5.89E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.69E-03	C12-MP_-FS-C001B	MOTOR-DRIVEN PUMP C001B FAILS TO START
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
84	5.44E-11	2.10E-06	%F1152_F1162_M6U	Loss of RWCU/SDC due to fire propagation between F1152 and F1162 - mode 6U
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
85	5.41E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.21E-02	C12-BV_-RE-F021A	MISPOSITION OF VALVE F021A
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
86	5.41E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021B	MISPOSITION OF VALVE F021B
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
87	5.41E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F049A	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
88	5.41E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F049B	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
89	5.41E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.21E-02	P21-BV_-RE-F050A	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
90	5.41E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
		1.21E-02	P21-BV_-RE-F050B	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
91	5.13E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		2.38E-05	E50-SQV-CC_1_5	CCF of two components: E50-SQV-CC-F002A & E50-SQV-CC-F002E
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
92	5.13E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		2.38E-05	E50-SQV-CC_4_8	CCF of two components: E50-SQV-CC-F002D & E50-SQV-CC-F002H
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
93	5.02E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		3.00E-03	E50-SQV-CC-F002A	SQUIB VALVE F002A FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
94	5.02E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		3.00E-03	E50-SQV-CC-F002D	SQUIB VALVE F002D FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
95	5.02E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		3.00E-03	E50-SQV-CC-F002E	SQUIB VALVE F002E FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
96	5.02E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		3.00E-03	E50-SQV-CC-F002H	SQUIB VALVE F002H FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
97	4.79E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-03	C12-SYS-TM-TRAINB	TRAIN B IN MAINTENANCE
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
98	4.78E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		1.50E-04	E50-SQV-CC_ALL	CCF of all components in group 'E50-SQV-CC'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
99	4.34E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		3.00E-05	E50-UV_OC-EQU_ALL	CCF of all components in group 'E50-UV_OC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
100	3.83E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		1.61E-03	U43-XHE-FO-LPCI	OPERATOR FAILS TO ACTUATE U43 IN LPCI MODE
101	3.83E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		2.40E-03	C12-MP_-FS-C001BOIL	MOTOR-DRIVEN AUX. OIL PUMP FOR C001B FAILS TO START
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
102	3.76E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		3.00E-03	E50-SQV-CC-F002A	SQUIB VALVE F002A FAILS TO OPERATE

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
103	3.76E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		3.00E-03	E50-SQV-CC-F002D	SQUIB VALVE F002D FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
104	3.76E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		3.00E-03	E50-SQV-CC-F002E	SQUIB VALVE F002E FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
105	3.76E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		3.00E-03	E50-SQV-CC-F002H	SQUIB VALVE F002H FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
106	3.74E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		4.84E-02	C12-BV_-RE-F013A	MISPOSITION OF VALVE F013A
		4.84E-02	C12-BV_-RE-F013B	MISPOSITION OF VALVE F013B
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
107	3.74E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F013A	MISPOSITION OF VALVE F013A
		4.84E-02	C12-BV_-RE-F015B	MISPOSITION OF VALVE F015B
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
108	3.74E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F013B	MISPOSITION OF VALVE F013B
		4.84E-02	C12-BV_-RE-F015A	MISPOSITION OF VALVE F015A
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
109	3.74E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F015A	MISPOSITION OF VALVE F015A
		4.84E-02	C12-BV_-RE-F015B	MISPOSITION OF VALVE F015B
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
110	3.68E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021A	MISPOSITION OF VALVE F021A
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
111	3.68E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021A	MISPOSITION OF VALVE F021A
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
112	3.68E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021B	MISPOSITION OF VALVE F021B
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
113	3.68E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021B	MISPOSITION OF VALVE F021B
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
114	3.68E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		1.21E-02	P21-BV_-RE-F049A	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
115	3.68E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		1.21E-02	P21-BV_-RE-F049B	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
116	3.68E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		1.21E-02	P21-BV_-RE-F050A	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
117	3.68E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		1.21E-02	P21-BV_-RE-F050B	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
118	3.68E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		1.21E-02	P21-BV_-RE-F049A	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
119	3.68E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		1.21E-02	P21-BV_-RE-F049B	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
120	3.68E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		1.21E-02	P21-BV_-RE-F050A	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
121	3.68E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		1.21E-02	P21-BV_-RE-F050B	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
122	3.65E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		4.00E-03	C12-MOV-CC-F020A	MOTOR OPER. VALVE F020A FAILS TO OPEN
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
123	3.65E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.00E-03	C12-MOV-CC-F020A	MOTOR OPER. VALVE F020A FAILS TO OPEN
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
124	3.65E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.00E-03	C12-MOV-CC-F020B	MOTOR OPER. VALVE F020B FAILS TO OPEN
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
125	3.65E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.00E-03	C12-MOV-CC-F020B	MOTOR OPER. VALVE F020B FAILS TO OPEN
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
126	3.61E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021A	MISPOSITION OF VALVE F021A
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
127	3.61E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021B	MISPOSITION OF VALVE F021B
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
128	3.61E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.21E-02	P21-BV_-RE-F049A	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
129	3.61E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.21E-02	P21-BV_-RE-F049B	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
130	3.61E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.21E-02	P21-BV_-RE-F050A	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
131	3.61E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		1.21E-02	P21-BV_-RE-F050B	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
132	3.60E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021A	MISPOSITION OF VALVE F021A
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
133	3.60E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.21E-02	C12-BV_-RE-F021B	MISPOSITION OF VALVE F021B
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
134	3.60E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		1.21E-02	P21-BV_-RE-F049A	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
135	3.60E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		1.21E-02	P21-BV_-RE-F049B	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
136	3.60E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		1.21E-02	P21-BV_-RE-F050A	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
137	3.60E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		1.21E-02	P21-BV_-RE-F050B	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
138	3.58E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.00E-03	C12-MOV-CC-F020A	MOTOR OPER. VALVE F020A FAILS TO OPEN
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
139	3.58E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.00E-03	C12-MOV-CC-F020B	MOTOR OPER. VALVE F020B FAILS TO OPEN
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
140	3.58E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.00E-03	C12-MOV-CC-F020A	MOTOR OPER. VALVE F020A FAILS TO OPEN
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
141	3.58E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		4.00E-03	C12-MOV-CC-F020B	MOTOR OPER. VALVE F020B FAILS TO OPEN
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
142	3.44E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		2.38E-05	E50-SQV-CC_1_5	CCF of two components: E50-SQV-CC-F002A & E50-SQV-CC-F002E
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
143	3.44E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		2.38E-05	E50-SQV-CC_4_8	CCF of two components: E50-SQV-CC-F002D & E50-SQV-CC-F002H
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
144	3.37E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.69E-03	C12-MP_-FS-C001B	MOTOR-DRIVEN PUMP C001B FAILS TO START
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
145	3.37E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.69E-03	C12-MP_-FS-C001B	MOTOR-DRIVEN PUMP C001B FAILS TO START

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
146	3.31E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.69E-03	C12-MP_-FS-C001B	MOTOR-DRIVEN PUMP C001B FAILS TO START
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
147	3.30E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.69E-03	C12-MP_-FS-C001B	MOTOR-DRIVEN PUMP C001B FAILS TO START
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
148	3.25E-11	6.72E-06	%F1152_F1162_M5	Loss of RWCU/SDC due to fire propagation between F1152 and F1162 - mode 5
		1.00E-04	C63-CCFSOFTWARE	Common cause failure of software
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
149	3.11E-11	2.10E-06	%F1152_F1162_M6U	Loss of RWCU/SDC due to fire propagation between F1152 and F1162 - mode 6U
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
150	3.11E-11	2.10E-06	%F1152_F1162_M6U	Loss of RWCU/SDC due to fire propagation between F1152 and F1162 - mode 6U
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
151	3.05E-11	2.10E-06	%F1152_F1162_M6U	Loss of RWCU/SDC due to fire propagation between F1152 and F1162 - mode 6U
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
152	3.05E-11	2.10E-06	%F1152_F1162_M6U	Loss of RWCU/SDC due to fire propagation between F1152 and F1162 - mode 6U
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
153	2.88E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		3.00E-05	E50-UV_OC-EQU_ALL	CCF of all components in group 'E50-UV_OC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
154	2.74E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		3.00E-03	C12-SYS-TM-TRAINB	TRAIN B IN MAINTENANCE
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
155	2.74E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-03	C12-SYS-TM-TRAINB	TRAIN B IN MAINTENANCE
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
156	2.69E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-03	C12-SYS-TM-TRAINB	TRAIN B IN MAINTENANCE
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
157	2.68E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.00E-03	C12-SYS-TM-TRAINB	TRAIN B IN MAINTENANCE
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
158	2.52E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		3.00E-03	E50-SQV-CC-F002A	SQUIB VALVE F002A FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
159	2.52E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		3.00E-03	E50-SQV-CC-F002D	SQUIB VALVE F002D FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
160	2.52E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065
		3.00E-03	E50-SQV-CC-F002E	SQUIB VALVE F002E FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
161	2.52E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F065	MISPOSITION OF LOCKED OPEN VALVE F065

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		3.00E-03	E50-SQV-CC-F002H	SQUIB VALVE F002H FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
162	2.28E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		2.38E-05	E50-SQV-CC_1_5	CCF of two components: E50-SQV-CC-F002A & E50-SQV-CC-F002E
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
163	2.28E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.21E-02	C12-XHE-FO-LEVEL2	Operator fails to back-up CRD actuation
		2.38E-05	E50-SQV-CC_4_8	CCF of two components: E50-SQV-CC-F002D & E50-SQV-CC-F002H
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
164	2.19E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		1.61E-03	U43-XHE-FO-LPCI	OPERATOR FAILS TO ACTUATE U43 IN LPCI MODE
165	2.19E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		1.61E-03	U43-XHE-FO-LPCI	OPERATOR FAILS TO ACTUATE U43 IN LPCI MODE
166	2.19E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		2.40E-03	C12-MP_-FS-C001BOIL	MOTOR-DRIVEN AUX. OIL PUMP FOR C001B FAILS TO START
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
167	2.19E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		2.40E-03	C12-MP_-FS-C001BOIL	MOTOR-DRIVEN AUX. OIL PUMP FOR C001B FAILS TO START
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
168	2.15E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		3.00E-05	E50-UV_OC-EQU_ALL	CCF of all components in group 'E50-UV_OC-EQU'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
169	2.15E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		1.61E-03	U43-XHE-FO-LPCI	OPERATOR FAILS TO ACTUATE U43 IN LPCI MODE
170	2.15E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		2.40E-03	C12-MP_-FS-C001BOIL	MOTOR-DRIVEN AUX. OIL PUMP FOR C001B FAILS TO START
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
171	2.15E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		1.61E-03	U43-XHE-FO-LPCI	OPERATOR FAILS TO ACTUATE U43 IN LPCI MODE
172	2.15E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		2.40E-03	C12-MP_-FS-C001BOIL	MOTOR-DRIVEN AUX. OIL PUMP FOR C001B FAILS TO START
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
173	2.14E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F013A	MISPOSITION OF VALVE F013A
		4.84E-02	C12-BV_-RE-F013B	MISPOSITION OF VALVE F013B
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
174	2.14E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F013A	MISPOSITION OF VALVE F013A
		4.84E-02	C12-BV_-RE-F013B	MISPOSITION OF VALVE F013B
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
175	2.14E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F013A	MISPOSITION OF VALVE F013A
		4.84E-02	C12-BV_-RE-F015B	MISPOSITION OF VALVE F015B
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
176	2.14E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F013A	MISPOSITION OF VALVE F013A
		4.84E-02	C12-BV_-RE-F015B	MISPOSITION OF VALVE F015B
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
177	2.14E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F013B	MISPOSITION OF VALVE F013B
		4.84E-02	C12-BV_-RE-F015A	MISPOSITION OF VALVE F015A
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
178	2.14E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F013B	MISPOSITION OF VALVE F013B
		4.84E-02	C12-BV_-RE-F015A	MISPOSITION OF VALVE F015A
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
179	2.14E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F015A	MISPOSITION OF VALVE F015A
		4.84E-02	C12-BV_-RE-F015B	MISPOSITION OF VALVE F015B
		1.75E-02	E50-UV_-OC-F003A	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
180	2.14E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F015A	MISPOSITION OF VALVE F015A
		4.84E-02	C12-BV_-RE-F015B	MISPOSITION OF VALVE F015B
		1.75E-02	E50-UV_-OC-F003D	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
		1.75E-02	E50-UV_-OC-F003H	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
181	2.12E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.00E-03	C12-MOV-CC-F020A	MOTOR OPER. VALVE F020A FAILS TO OPEN
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
182	2.12E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.00E-03	C12-MOV-CC-F020B	MOTOR OPER. VALVE F020B FAILS TO OPEN
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
183	2.10E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F013A	MISPOSITION OF VALVE F013A
		4.84E-02	C12-BV_-RE-F013B	MISPOSITION OF VALVE F013B

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
184	2.10E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F013A	MISPOSITION OF VALVE F013A
		4.84E-02	C12-BV_-RE-F015B	MISPOSITION OF VALVE F015B
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
185	2.10E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F013B	MISPOSITION OF VALVE F013B
		4.84E-02	C12-BV_-RE-F015A	MISPOSITION OF VALVE F015A
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
186	2.10E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F015A	MISPOSITION OF VALVE F015A
		4.84E-02	C12-BV_-RE-F015B	MISPOSITION OF VALVE F015B
		3.00E-04	E50-UV_OC_ALL	CCF of all components in group 'E50-UV_OC'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
187	2.10E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		4.84E-02	C12-BV_-RE-F013A	MISPOSITION OF VALVE F013A
		4.84E-02	C12-BV_-RE-F013B	MISPOSITION OF VALVE F013B
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
188	2.10E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F013A	MISPOSITION OF VALVE F013A
		4.84E-02	C12-BV_-RE-F015B	MISPOSITION OF VALVE F015B
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
189	2.10E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F013B	MISPOSITION OF VALVE F013B
		4.84E-02	C12-BV_-RE-F015A	MISPOSITION OF VALVE F015A
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
190	2.10E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		4.84E-02	C12-BV_-RE-F015A	MISPOSITION OF VALVE F015A
		4.84E-02	C12-BV_-RE-F015B	MISPOSITION OF VALVE F015B
		3.00E-04	E50-SQV-CC-EQU_ALL	CCF of all components in group 'E50-SQV-CC-EQU'

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
191	2.07E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		9.60E-06	E50-SQV-CO-F009A	SQUIB DELUGE VALVE F009A SPUR. OPENING [#7]
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
192	2.07E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		9.60E-06	E50-SQV-CO-F009D	SQUIB DELUGE VALVE F009D SPUR. OPENING [#7]
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
193	2.07E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		9.60E-06	E50-SQV-CO-F009E	SQUIB DELUGE VALVE F009E SPUR. OPENING [#7]
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
194	2.07E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		9.60E-06	E50-SQV-CO-F009H	SQUIB DELUGE VALVE F009H SPUR. OPENING [#7]
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
195	2.07E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		9.60E-06	E50-SQV-CO-F009J	SQUIB DELUGE VALVE F009J SPUR. OPENING [#7]
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
196	2.07E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		9.60E-06	E50-SQV-CO-F009M	SQUIB DELUGE VALVE F009M SPUR. OPENING [#7]

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
197	1.96E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		3.69E-03	C12-MP_-FS-C001B	MOTOR-DRIVEN PUMP C001B FAILS TO START
		5.35E-04	E50-STR-PG_ALL	CCF of all components in group 'E50-STR-PG'
		1.61E-02	XXX-XHE-FO-LPMAKEUP	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION
198	1.94E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		3.00E-03	E50-SQV-CC-F002A	SQUIB VALVE F002A FAILS TO OPERATE
		3.00E-03	E50-SQV-CC-F002E	SQUIB VALVE F002E FAILS TO OPERATE
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
199	1.94E-11	4.45E-05	%F7300_M6U	Loss of service water due to fire in fire area F7300 - mode 6U
		3.00E-03	E50-SQV-CC-F002D	SQUIB VALVE F002D FAILS TO OPERATE
		3.00E-03	E50-SQV-CC-F002H	SQUIB VALVE F002H FAILS TO OPERATE
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334
200	1.89E-11	6.16E-04	%F4100_M6U	Loss of RWCU/SDC due to fire in fire area F4100 - mode 6U
		1.21E-02	C12-BV_-RE-F021A	MISPOSITION OF VALVE F021A
		3.00E-03	E50-SQV-CC-F002A	SQUIB VALVE F002A FAILS TO OPERATE
		1.75E-02	E50-UV_-OC-F003E	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG

Table 12.9-5

Cutset Report (Top 200) for Shutdown Core Damage Frequencies Due to Internal Fires

#	Cutset Prob	Event Prob	Event	Description
		4.84E-02	G21-BV_-RE-F334	MISPOSITION OF VALVE F334

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
B21-SQV-CC_ALL	1.50E-04	7.85E-02	522.96	CCF of all components in group 'B21-SQV-CC'
B21-SRV-OO-ANYSRV1	6.00E-03	1.23E-02	3.03	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
B21-SRV-OO-ANYSRV10	6.00E-03	1.23E-02	3.03	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
B21-SRV-OO-ANYSRV11	6.00E-03	1.23E-02	3.03	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
B21-SRV-OO-ANYSRV12	6.00E-03	1.23E-02	3.03	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
B21-SRV-OO-ANYSRV13	6.00E-03	1.23E-02	3.03	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
B21-SRV-OO-ANYSRV14	6.00E-03	1.23E-02	3.03	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
B21-SRV-OO-ANYSRV15	6.00E-03	1.23E-02	3.03	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
B21-SRV-OO-ANYSRV16	6.00E-03	1.23E-02	3.03	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
B21-SRV-OO-ANYSRV17	6.00E-03	1.23E-02	3.03	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
B21-SRV-OO-ANYSRV18	6.00E-03	1.23E-02	3.03	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
B21-SRV-OO-ANYSRV2	6.00E-03	1.23E-02	3.03	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
B21-SRV-OO-ANYSRV3	6.00E-03	1.23E-02	3.03	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
B21-SRV-OO-ANYSRV4	6.00E-03	1.23E-02	3.03	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
B21-SRV-OO-ANYSRV5	6.00E-03	1.23E-02	3.03	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
B21-SRV-OO-ANYSRV6	6.00E-03	1.23E-02	3.03	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
B21-SRV-OO-ANYSRV7	6.00E-03	1.23E-02	3.03	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
B21-SRV-OO-ANYSRV8	6.00E-03	1.23E-02	3.03	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
B21-SRV-OO-ANYSRV9	6.00E-03	1.23E-02	3.03	SAFETY/RELIEF VALVE FAILS TO RE-CLOSE
B21-SRV-RO-F006_ALL	4.74E-07	1.54E-06	4.11	CCF of all components in group 'B21-SRV-RO-F006'
B21-UV_-CC-F102B	1.00E-04	1.12E-04	2.11	CHECK VALVE #1 IN FEEDWATER LINE B FAILS TO REOPEN
B21-UV_-CC-F103B	1.00E-04	1.12E-04	2.11	CHECK VALVE #2 IN FEEDWATER LINE B FAILS TO REOPEN
B32-HX_-PG_1_2	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX001A & B32-HX_-PG-HX001B
B32-HX_-PG_1_2_3	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX001B & B32-HX_-PG-HX00
B32-HX_-PG_1_2_4	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX001B & B32-HX_-PG-HX00
B32-HX_-PG_1_2_5	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX001B & B32-HX_-PG-HX00
B32-HX_-PG_1_2_6	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX001B & B32-HX_-PG-HX00
B32-HX_-PG_1_2_7	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX001B & B32-HX_-PG-HX00
B32-HX_-PG_1_2_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX001B & B32-HX_-PG-HX00
B32-HX_-PG_1_3	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX001A & B32-HX_-PG-HX001C

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
B32-HX_-PG_1_3_4	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX001C & B32-HX_-PG-HX00
B32-HX_-PG_1_3_5	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX001C & B32-HX_-PG-HX00
B32-HX_-PG_1_3_6	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX001C & B32-HX_-PG-HX00
B32-HX_-PG_1_3_7	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX001C & B32-HX_-PG-HX00
B32-HX_-PG_1_3_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX001C & B32-HX_-PG-HX00
B32-HX_-PG_1_4	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX001A & B32-HX_-PG-HX001D
B32-HX_-PG_1_4_5	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX001D & B32-HX_-PG-HX00
B32-HX_-PG_1_4_6	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX001D & B32-HX_-PG-HX00
B32-HX_-PG_1_4_7	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX001D & B32-HX_-PG-HX00
B32-HX_-PG_1_4_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX001D & B32-HX_-PG-HX00
B32-HX_-PG_1_5_6	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX002A & B32-HX_-PG-HX00

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
B32-HX_-PG_1_5_7	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX002A & B32-HX_-PG-HX00
B32-HX_-PG_1_5_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX002A & B32-HX_-PG-HX00
B32-HX_-PG_1_6	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX001A & B32-HX_-PG-HX002B
B32-HX_-PG_1_6_7	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX002B & B32-HX_-PG-HX00
B32-HX_-PG_1_6_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX002B & B32-HX_-PG-HX00
B32-HX_-PG_1_7	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX001A & B32-HX_-PG-HX002C
B32-HX_-PG_1_7_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001A & B32-HX_-PG-HX002C & B32-HX_-PG-HX00
B32-HX_-PG_1_8	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX001A & B32-HX_-PG-HX002D
B32-HX_-PG_2_3	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX001B & B32-HX_-PG-HX001C
B32-HX_-PG_2_3_4	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001B & B32-HX_-PG-HX001C & B32-HX_-PG-HX00
B32-HX_-PG_2_3_5	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001B & B32-HX_-PG-HX001C & B32-HX_-PG-HX00

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
B32-HX_-PG_2_3_6	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001B & B32-HX_-PG-HX001C & B32-HX_-PG-HX00
B32-HX_-PG_2_3_7	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001B & B32-HX_-PG-HX001C & B32-HX_-PG-HX00
B32-HX_-PG_2_3_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001B & B32-HX_-PG-HX001C & B32-HX_-PG-HX00
B32-HX_-PG_2_4	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX001B & B32-HX_-PG-HX001D
B32-HX_-PG_2_4_5	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001B & B32-HX_-PG-HX001D & B32-HX_-PG-HX00
B32-HX_-PG_2_4_6	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001B & B32-HX_-PG-HX001D & B32-HX_-PG-HX00
B32-HX_-PG_2_4_7	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001B & B32-HX_-PG-HX001D & B32-HX_-PG-HX00
B32-HX_-PG_2_4_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001B & B32-HX_-PG-HX001D & B32-HX_-PG-HX00
B32-HX_-PG_2_5	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX001B & B32-HX_-PG-HX002A
B32-HX_-PG_2_5_6	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001B & B32-HX_-PG-HX002A & B32-HX_-PG-HX00
B32-HX_-PG_2_5_7	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001B & B32-HX_-PG-HX002A & B32-HX_-PG-HX00

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
B32-HX_-PG_2_5_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001B & B32-HX_-PG-HX002A & B32-HX_-PG-HX00
B32-HX_-PG_2_6_7	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001B & B32-HX_-PG-HX002B & B32-HX_-PG-HX00
B32-HX_-PG_2_6_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001B & B32-HX_-PG-HX002B & B32-HX_-PG-HX00
B32-HX_-PG_2_7	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX001B & B32-HX_-PG-HX002C
B32-HX_-PG_2_7_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001B & B32-HX_-PG-HX002C & B32-HX_-PG-HX00
B32-HX_-PG_2_8	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX001B & B32-HX_-PG-HX002D
B32-HX_-PG_3_4	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX001C & B32-HX_-PG-HX001D
B32-HX_-PG_3_4_5	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001C & B32-HX_-PG-HX001D & B32-HX_-PG-HX00
B32-HX_-PG_3_4_6	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001C & B32-HX_-PG-HX001D & B32-HX_-PG-HX00
B32-HX_-PG_3_4_7	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001C & B32-HX_-PG-HX001D & B32-HX_-PG-HX00
B32-HX_-PG_3_4_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001C & B32-HX_-PG-HX001D & B32-HX_-PG-HX00

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
B32-HX_-PG_3_5	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX001C & B32-HX_-PG-HX002A
B32-HX_-PG_3_5_6	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001C & B32-HX_-PG-HX002A & B32-HX_-PG-HX00
B32-HX_-PG_3_5_7	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001C & B32-HX_-PG-HX002A & B32-HX_-PG-HX00
B32-HX_-PG_3_5_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001C & B32-HX_-PG-HX002A & B32-HX_-PG-HX00
B32-HX_-PG_3_6	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX001C & B32-HX_-PG-HX002B
B32-HX_-PG_3_6_7	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001C & B32-HX_-PG-HX002B & B32-HX_-PG-HX00
B32-HX_-PG_3_6_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001C & B32-HX_-PG-HX002B & B32-HX_-PG-HX00
B32-HX_-PG_3_7_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001C & B32-HX_-PG-HX002C & B32-HX_-PG-HX00
B32-HX_-PG_3_8	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX001C & B32-HX_-PG-HX002D
B32-HX_-PG_4_5	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX001D & B32-HX_-PG-HX002A
B32-HX_-PG_4_5_6	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001D & B32-HX_-PG-HX002A & B32-HX_-PG-HX00

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
B32-HX_-PG_4_5_7	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001D & B32-HX_-PG-HX002A & B32-HX_-PG-HX00
B32-HX_-PG_4_5_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001D & B32-HX_-PG-HX002A & B32-HX_-PG-HX00
B32-HX_-PG_4_6	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX001D & B32-HX_-PG-HX002B
B32-HX_-PG_4_6_7	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001D & B32-HX_-PG-HX002B & B32-HX_-PG-HX00
B32-HX_-PG_4_6_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001D & B32-HX_-PG-HX002B & B32-HX_-PG-HX00
B32-HX_-PG_4_7	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX001D & B32-HX_-PG-HX002C
B32-HX_-PG_4_7_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX001D & B32-HX_-PG-HX002C & B32-HX_-PG-HX00
B32-HX_-PG_5_6	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX002A & B32-HX_-PG-HX002B
B32-HX_-PG_5_6_7	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX002A & B32-HX_-PG-HX002B & B32-HX_-PG-HX00
B32-HX_-PG_5_6_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX002A & B32-HX_-PG-HX002B & B32-HX_-PG-HX00
B32-HX_-PG_5_7	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX002A & B32-HX_-PG-HX002C

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
B32-HX_-PG_5_7_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX002A & B32-HX_-PG-HX002C & B32-HX_-PG-HX00
B32-HX_-PG_5_8	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX002A & B32-HX_-PG-HX002D
B32-HX_-PG_6_7	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX002B & B32-HX_-PG-HX002C
B32-HX_-PG_6_7_8	1.14E-08	1.41E-06	121.54	CCF of three components: B32-HX_-PG-HX002B & B32-HX_-PG-HX002C & B32-HX_-PG-HX00
B32-HX_-PG_6_8	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX002B & B32-HX_-PG-HX002D
B32-HX_-PG_7_8	3.43E-07	7.22E-05	210.77	CCF of two components: B32-HX_-PG-HX002C & B32-HX_-PG-HX002D
B32-HX_-PG_ALL	2.67E-08	4.49E-06	166.82	CCF of all components in group 'B32-HX_-PG'
B32-HX_-PG-HX001A	2.40E-05	5.18E-05	3.09	Heat Exchanger HX001A Plugs
B32-HX_-PG-HX001B	2.40E-05	5.01E-05	3.02	Heat Exchanger HX001B Plugs
B32-HX_-PG-HX001C	2.40E-05	5.14E-05	3.07	Heat Exchanger HX001C Plugs
B32-HX_-PG-HX001D	2.40E-05	5.18E-05	3.09	Heat Exchanger HX001D Plugs
B32-HX_-PG-HX002A	2.40E-05	5.18E-05	3.09	Heat Exchanger HX002A Plugs
B32-HX_-PG-HX002B	2.40E-05	5.01E-05	3.02	Heat Exchanger HX002B Plugs
B32-HX_-PG-HX002C	2.40E-05	5.14E-05	3.07	Heat Exchanger HX002A Plugs
B32-HX_-PG-HX002D	2.40E-05	5.18E-05	3.09	Heat Exchanger HX002D Plugs

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
B32-NMO-CC_1_2	1.11E-05	2.54E-05	3.27	CCF of two components: B32-NMO-CC-F104A & B32-NMO-CC-F104B
B32-NMO-CC-F104A	1.00E-04	1.64E-04	2.63	F104A Fails to Open
B32-NMO-CC-F104B	1.00E-04	1.60E-04	2.58	F104B fails to open
B32-NONCONDENSE	1.00E+00	3.30E-02	1	Non condensable gasses form in ICS sufficiently to require venting
B32-NPO-CC_ALL	1.11E-07	2.15E-05	193.83	CCF of all components in group 'B32-NPO-CC'
BOPCWS-SYS-FAILS	1.00E-03	3.53E-03	4.51	BALANCE OF PLANT CHILLED WATER SYSTEM FAILS
C11-LOG-FC-CHNLA	1.20E-04	1.25E-04	2.04	LOGIC UNIT FAILS TO FUNCTION
C11-LOG-FC-CHNLB	1.20E-04	1.25E-04	2.04	LOGIC UNIT FAILS TO FUNCTION
C12-AOV-CF-SCRV126	6.90E-09	9.09E-06	1.28E+03	CCF TO OPEN OF AIR OPERATED SCRAM VALVE AOV-126
C12-BV_-RE-F013A	4.84E-02	7.42E-03	1.15	MISPOSITION OF VALVE F013A
C12-BV_-RE-F013B	4.84E-02	7.42E-03	1.15	MISPOSITION OF VALVE F013B
C12-BV_-RE-F015A	4.84E-02	7.42E-03	1.15	MISPOSITION OF VALVE F015A
C12-BV_-RE-F015B	4.84E-02	7.42E-03	1.15	MISPOSITION OF VALVE F015B
C12-BV_-RE-F021A	1.21E-02	5.35E-03	1.44	MISPOSITION OF VALVE F021A
C12-BV_-RE-F021B	1.21E-02	1.23E-02	2	MISPOSITION OF VALVE F021B
C12-BV_-RE-F065	4.84E-02	3.74E-02	1.73	MISPOSITION OF LOCKED OPEN VALVE F065

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
C12-INV-FC-X_1_2	1.00E-04	1.04E-04	2.04	CCF of two components: C12-INV-FC-G1X205 & C12-INV-FC-G2X205
C12-INV-FC-X_1_2_3	2.00E-04	2.18E-04	2.08	CCF of three components: C12-INV-FC-G1X205 & C12-INV-FC-G2X205 & C12-INV-FC-G3X2
C12-INV-FC-X_1_3	1.00E-04	1.04E-04	2.04	CCF of two components: C12-INV-FC-G1X205 & C12-INV-FC-G3X205
C12-INV-FC-X_2_3	1.00E-04	1.04E-04	2.04	CCF of two components: C12-INV-FC-G2X205 & C12-INV-FC-G3X205
C12-ROD-CF-SCRAM	2.50E-07	5.69E-01	2.26E+06	CCF OF CONTROL RODS TO INSERT
C12-UV_-CC-F022	1.00E-04	1.12E-04	2.11	CHECK VALVE F022 FAILS TO OPEN
C41-ACV-OC-F002A	2.40E-05	1.67E-04	7.95	AIR OPERATED VALVE F002A FAILS TO REMAIN OPEN
C41-ACV-OC-F002B	2.40E-05	1.67E-04	7.95	AIR OPERATED VALVE F002B FAILS TO REMAIN OPEN
C41-ACV-OC-F002C	2.40E-05	1.67E-04	7.95	AIR OPERATED VALVE F002C FAILS TO REMAIN OPEN
C41-ACV-OC-F002D	2.40E-05	1.67E-04	7.95	AIR OPERATED VALVE FAILS TO REMAIN OPEN
C41-SQV-CC_1_2_3	5.56E-06	3.76E-05	7.7	CCF of three components: C41-SQV-CC-F003A & C41-SQV-CC-F003B & C41-SQV-CC-F003C
C41-SQV-CC_1_2_4	5.56E-06	3.76E-05	7.7	CCF of three components: C41-SQV-CC-F003A & C41-SQV-CC-F003B & C41-SQV-CC-F003D

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
C41-SQV-CC_1_3	5.56E-05	3.89E-04	7.99	CCF of two components: C41-SQV-CC-F003A & C41-SQV-CC-F003C
C41-SQV-CC_1_3_4	5.56E-06	3.76E-05	7.7	CCF of three components: C41-SQV-CC-F003A & C41-SQV-CC-F003C & C41-SQV-CC-F003D
C41-SQV-CC_2_3_4	5.56E-06	3.76E-05	7.7	CCF of three components: C41-SQV-CC-F003B & C41-SQV-CC-F003C & C41-SQV-CC-F003D
C41-SQV-CC_2_4	5.56E-05	3.89E-04	7.99	CCF of two components: C41-SQV-CC-F003B & C41-SQV-CC-F003D
C41-SQV-CC_ALL	1.50E-04	1.05E-03	8	CCF of all components in group 'C41-SQV-CC'
C41-TNK-RP-A001A	2.40E-06	1.50E-05	7.13	ACCUMULATOR A001A FAILS CATASTROPHICALLY
C41-TNK-RP-A001B	2.40E-06	1.50E-05	7.13	ACCUMULATOR A001B FAILS CATASTROPHICALLY
C41-UV_-CC_1_2	2.85E-07	5.79E-07	2.94	CCF of two components: C41-UV_-CC-F004A & C41-UV_-CC-F004B
C41-UV_-CC_1_2_3	2.25E-06	1.40E-05	7.1	CCF of three components: C41-UV_-CC-F004A & C41-UV_-CC-F004B & C41-UV_-CC-F005A
C41-UV_-CC_1_2_4	2.25E-06	1.40E-05	7.1	CCF of three components: C41-UV_-CC-F004A & C41-UV_-CC-F004B & C41-UV_-CC-F005B
C41-UV_-CC_1_3	2.85E-07	5.79E-07	2.94	CCF of two components: C41-UV_-CC-F004A & C41-UV_-CC-F005A
C41-UV_-CC_1_3_4	2.25E-06	1.40E-05	7.1	CCF of three components: C41-UV_-CC-F004A & C41-UV_-CC-F005A & C41-UV_-CC-F005B

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
C41-UV_-CC_1_4	2.85E-07	5.79E-07	2.94	CCF of two components: C41-UV_-CC-F004A & C41-UV_-CC-F005B
C41-UV_-CC_2_3	2.85E-07	5.79E-07	2.94	CCF of two components: C41-UV_-CC-F004B & C41-UV_-CC-F005A
C41-UV_-CC_2_3_4	2.25E-06	1.40E-05	7.1	CCF of three components: C41-UV_-CC-F004B & C41-UV_-CC-F005A & C41-UV_-CC-F005B
C41-UV_-CC_2_4	2.85E-07	5.79E-07	2.94	CCF of two components: C41-UV_-CC-F004B & C41-UV_-CC-F005B
C41-UV_-CC_3_4	2.85E-07	5.79E-07	2.94	CCF of two components: C41-UV_-CC-F005A & C41-UV_-CC-F005B
C41-UV_-CC_ALL	1.37E-05	9.42E-05	7.83	CCF of all components in group 'C41-UV_-CC'
C41-UV_-CC-F004A	7.99E-04	5.60E-03	8.01	CHECK VALVE F004A FAILS TO OPEN
C41-UV_-CC-F004B	7.99E-04	5.60E-03	8.01	CHECK VALVE F004B FAILS TO OPEN
C41-UV_-CC-F005A	7.99E-04	5.60E-03	8.01	CHECK VALVE F005A FAILS TO OPEN
C41-UV_-CC-F005B	7.99E-04	5.60E-03	8.01	CHECK VALVE F005B FAILS TO OPEN
C62-CCFSOFTWARE	1.00E-04	2.11E-03	21.99	Common cause failure of software
C62-CCFSOFTWARE_S	1.00E-04	1.36E-04	2.35	Common cause failure of software, for spurious
C63-CCFSOFTWARE	1.00E-04	1.72E-01	1.72E+03	Common cause failure of software
C63-CCFSOFTWARE_S	1.00E-04	1.78E-01	1.78E+03	Common cause failure of software, for spurious
C63-UNDEVSPUR58	1.00E-03	3.32E-03	4.3	Undeveloped spurious hardware failure
C63-UNDEVSPUR59	1.00E-03	3.22E-03	4.19	Undeveloped spurious hardware failure

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
C63-UNDEVSPUR60	1.00E-03	3.30E-03	4.27	Undeveloped spurious hardware failure
C63-UNDEVSPUR61	1.00E-03	3.39E-03	4.36E+00	Undeveloped spurious hardware failure
C63-UNDEVSPUR62	1.00E-03	3.32E-03	4.30E+00	Undeveloped spurious hardware failure
C63-UNDEVSPUR63	1.00E-03	3.22E-03	4.19	Undeveloped spurious hardware failure
C63-UNDEVSPUR64	1.00E-03	3.30E-03	4.27	Undeveloped spurious hardware failure
C63-UNDEVSPUR65	1.00E-03	3.39E-03	4.36	Undeveloped spurious hardware failure
C63-UNDEVSPUR66	1.00E-03	3.32E-03	4.3	Undeveloped spurious hardware failure
C63-UNDEVSPUR67	1.00E-03	3.22E-03	4.19	Undeveloped spurious hardware failure
C63-UNDEVSPUR68	1.00E-03	3.30E-03	4.27	Undeveloped spurious hardware failure
C63-UNDEVSPUR69	1.00E-03	3.39E-03	4.36	Undeveloped spurious hardware failure
C63-UNDEVSPUR70	1.00E-03	3.32E-03	4.3	Undeveloped spurious hardware failure
C63-UNDEVSPUR71	1.00E-03	3.22E-03	4.19	Undeveloped spurious hardware failure
C63-UNDEVSPUR72	1.00E-03	3.30E-03	4.27	Undeveloped spurious hardware failure
C63-UNDEVSPUR73	1.00E-03	3.39E-03	4.36	Undeveloped spurious hardware failure
C71-ACT-FC-S_ALL	1.44E-06	4.55E-06	4.1	CCF of all components in group 'C71-ACT-FC-S'
C71-DTM-FC-R_1_2	1.11E-05	2.76E-04	25.79	CCF of two components: C71-DTM-FC-RPSDIV1 & C71-DTM-FC-RPSDIV2
C71-DTM-FC-R_1_2_3	1.11E-06	3.29E-05	30.46	CCF of three components: C71-DTM-FC-RPSDIV1 & C71-DTM-FC-RPSDIV2 & C71-DTM-FC-RP

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
C71-DTM-FC-R_1_2_4	1.11E-06	3.29E-05	30.46	CCF of three components: C71-DTM-FC-RPSDIV1 & C71-DTM-FC-RPSDIV2 & C71-DTM-FC-RP
C71-DTM-FC-R_1_3	1.11E-05	2.73E-04	25.61	CCF of two components: C71-DTM-FC-RPSDIV1 & C71-DTM-FC-RPSDIV3
C71-DTM-FC-R_1_3_4	1.11E-06	3.29E-05	30.46	CCF of three components: C71-DTM-FC-RPSDIV1 & C71-DTM-FC-RPSDIV3 & C71-DTM-FC-RP
C71-DTM-FC-R_2_3	1.11E-05	2.74E-04	25.63	CCF of two components: C71-DTM-FC-RPSDIV2 & C71-DTM-FC-RPSDIV3
C71-DTM-FC-R_2_3_4	1.11E-06	3.29E-05	30.46	CCF of three components: C71-DTM-FC-RPSDIV2 & C71-DTM-FC-RPSDIV3 & C71-DTM-FC-RP
C71-DTM-FC-R_ALL	3.00E-05	9.71E-04	33.32	CCF of all components in group 'C71-DTM-FC-R'
C71-OLU-FC-R_1_5_7	1.27E-07	4.96E-07	4.8	CCF of three components: C71-OLU-FC-MSIVDIV1 & C71-OLU-FC-RPSDIV1 & C71-OLU-FC-R
C71-OLU-FC-R_1_6_7	1.27E-07	4.96E-07	4.8	CCF of three components: C71-OLU-FC-MSIVDIV1 & C71-OLU-FC-RPSDIV2 & C71-OLU-FC-R
C71-OLU-FC-R_2_5_7	1.27E-07	4.96E-07	4.8	CCF of three components: C71-OLU-FC-MSIVDIV2 & C71-OLU-FC-RPSDIV1 & C71-OLU-FC-R
C71-OLU-FC-R_2_6_7	1.27E-07	4.96E-07	4.8	CCF of three components: C71-OLU-FC-MSIVDIV2 & C71-OLU-FC-RPSDIV2 & C71-OLU-FC-R
C71-OLU-FC-R_3_5_7	1.27E-07	4.96E-07	4.8	CCF of three components: C71-OLU-FC-MSIVDIV3 & C71-OLU-FC-RPSDIV1 & C71-OLU-FC-R
C71-OLU-FC-R_3_6_7	1.27E-07	4.96E-07	4.8	CCF of three components: C71-OLU-FC-MSIVDIV3 & C71-OLU-FC-RPSDIV2 & C71-OLU-FC-R

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
C71-OLU-FC-R_4_5_7	1.27E-07	4.96E-07	4.8	CCF of three components: C71-OLU-FC-MSIVDIV4 & C71-OLU-FC-RPSDIV1 & C71-OLU-FC-R
C71-OLU-FC-R_4_6_7	1.27E-07	4.96E-07	4.8	CCF of three components: C71-OLU-FC-MSIVDIV4 & C71-OLU-FC-RPSDIV2 & C71-OLU-FC-R
C71-OLU-FC-R_5_6_7	1.27E-07	3.70E-05	291.95	CCF of three components: C71-OLU-FC-RPSDIV1 & C71-OLU-FC-RPSDIV2 & C71-OLU-FC-RP
C71-OLU-FC-R_5_6_8	1.27E-07	3.70E-05	291.95	CCF of three components: C71-OLU-FC-RPSDIV1 & C71-OLU-FC-RPSDIV2 & C71-OLU-FC-RP
C71-OLU-FC-R_5_7	3.81E-06	1.48E-05	4.87	CCF of two components: C71-OLU-FC-RPSDIV1 & C71-OLU-FC-RPSDIV3
C71-OLU-FC-R_5_7_8	1.27E-07	3.70E-05	291.95	CCF of three components: C71-OLU-FC-RPSDIV1 & C71-OLU-FC-RPSDIV3 & C71-OLU-FC-RP
C71-OLU-FC-R_6_7	3.81E-06	1.48E-05	4.87	CCF of two components: C71-OLU-FC-RPSDIV2 & C71-OLU-FC-RPSDIV3
C71-OLU-FC-R_6_7_8	1.27E-07	3.70E-05	291.95	CCF of three components: C71-OLU-FC-RPSDIV2 & C71-OLU-FC-RPSDIV3 & C71-OLU-FC-RP
C71-OLU-FC-R_ALL	2.40E-05	7.39E-03	308.7	CCF of all components in group 'C71-OLU-FC-R'
C71-SLU-FC-N_1_2_3	1.67E-06	9.59E-06	6.64	CCF of three components: C71-SLU-FC-NMSDIV1 & C71-SLU-FC-NMSDIV2 & C71-SLU-FC-NM
C71-SLU-FC-N_1_2_4	1.67E-06	9.59E-06	6.64	CCF of three components: C71-SLU-FC-NMSDIV1 & C71-SLU-FC-NMSDIV2 & C71-SLU-FC-NM
C71-SLU-FC-N_1_3_4	1.67E-06	9.59E-06	6.64	CCF of three components: C71-SLU-FC-NMSDIV1 & C71-SLU-FC-NMSDIV3 & C71-SLU-FC-NM

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
C71-SLU-FC-N_2_3_4	1.67E-06	9.59E-06	6.64	CCF of three components: C71-SLU-FC-NMSDIV2 & C71-SLU-FC-NMSDIV3 & C71-SLU-FC-NM
C71-SLU-FC-N_ALL	4.50E-05	3.42E-04	8.58	CCF of all components in group 'C71-SLU-FC-N'
C71-SLU-FC-R_1_2_3	1.67E-06	5.01E-04	301.53	CCF of three components: C71-SLU-FC-RPSDIV1 & C71-SLU-FC-RPSDIV2 & C71-SLU-FC-RP
C71-SLU-FC-R_1_2_4	1.67E-06	5.01E-04	301.53	CCF of three components: C71-SLU-FC-RPSDIV1 & C71-SLU-FC-RPSDIV2 & C71-SLU-FC-RP
C71-SLU-FC-R_1_3	1.67E-05	7.45E-05	5.44	CCF of two components: C71-SLU-FC-RPSDIV1 & C71-SLU-FC-RPSDIV3
C71-SLU-FC-R_1_3_4	1.67E-06	5.01E-04	301.53	CCF of three components: C71-SLU-FC-RPSDIV1 & C71-SLU-FC-RPSDIV3 & C71-SLU-FC-RP
C71-SLU-FC-R_2_3	1.67E-05	7.49E-05	5.46	CCF of two components: C71-SLU-FC-RPSDIV2 & C71-SLU-FC-RPSDIV3
C71-SLU-FC-R_2_3_4	1.67E-06	5.01E-04	301.53	CCF of three components: C71-SLU-FC-RPSDIV2 & C71-SLU-FC-RPSDIV3 & C71-SLU-FC-RP
C71-SLU-FC-R_ALL	4.50E-05	1.39E-02	309.07	CCF of all components in group 'C71-SLU-FC-R'
C71-SLU-FC-S_1_2_3	1.67E-06	5.40E-06	4.16	CCF of three components: C71-SLU-FC-SRNDIV1 & C71-SLU-FC-SRNDIV2 & C71-SLU-FC-SR
C71-SLU-FC-S_1_2_4	1.67E-06	5.40E-06	4.16	CCF of three components: C71-SLU-FC-SRNDIV1 & C71-SLU-FC-SRNDIV2 & C71-SLU-FC-SR
C71-SLU-FC-S_1_3_4	1.67E-06	5.40E-06	4.16	CCF of three components: C71-SLU-FC-SRNDIV1 & C71-SLU-FC-SRNDIV3 & C71-SLU-FC-SR

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
C71-SLU-FC-S_2_3_4	1.67E-06	5.40E-06	4.16	CCF of three components: C71-SLU-FC-SRNDIV2 & C71-SLU-FC-SRNDIV3 & C71-SLU-FC-SR
C71-SLU-FC-S_ALL	4.50E-05	2.19E-04	5.85	CCF of all components in group 'C71-SLU-FC-S'
C72-ATM-FC-L1_1_2_3	2.65E-08	7.72E-07	29.12	CCF of three components: C72-ATM-FC-DPSL1LLA & C72-ATM-FC-DPSL1LLB & C72-ATM-FC-
C72-ATM-FC-L1_1_2_4	2.65E-08	7.72E-07	29.12	CCF of three components: C72-ATM-FC-DPSL1LLA & C72-ATM-FC-DPSL1LLB & C72-ATM-FC-
C72-ATM-FC-L1_1_3_4	2.65E-08	7.72E-07	29.12	CCF of three components: C72-ATM-FC-DPSL1LLA & C72-ATM-FC-DPSL1LLC & C72-ATM-FC-
C72-ATM-FC-L1_2_3_4	2.65E-08	7.72E-07	29.12	CCF of three components: C72-ATM-FC-DPSL1LLB & C72-ATM-FC-DPSL1LLC & C72-ATM-FC-
C72-ATM-FC-L1_ALL	5.00E-06	2.89E-04	58.26	CCF of all components in group 'C72-ATM-FC-L1'
C72-CCFSOFTWARE	1.00E-04	2.24E-02	224.27	COMMON CAUSE FAILURE OF DPS PROCESSORS
C72-LDD-CF-LOADS	1.86E-06	3.51E-04	188.99	COMMON CAUSE FAILURE OF DPS LOAD DRIVERS
C72-LDD-FC-FWRB1	1.80E-04	8.76E-04	5.86	LOAD DRIVER FAILS TO ENERGIZE FWRB CIRCUIT
C72-LDD-FC-FWRB2	1.80E-04	8.76E-04	5.86	LOAD DRIVER FAILS TO ENERGIZE FWRB CIRCUIT
C72-LOG-FC-D_1_2	3.33E-06	6.61E-04	198.54	CCF of two components: C72-LOG-FC-D1DPS & C72-LOG-FC-D2DPS

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
C72-LOG-FC-D_1_2_3	6.67E-06	1.37E-03	206.39	CCF of three components: C72-LOG-FC-D1DPS & C72-LOG-FC-D2DPS & C72-LOG-FC-D3DPS
C72-LOG-FC-D_1_3	3.33E-06	6.61E-04	198.54	CCF of two components: C72-LOG-FC-D1DPS & C72-LOG-FC-D3DPS
C72-LOG-FC-D_2_3	3.33E-06	6.61E-04	198.54	CCF of two components: C72-LOG-FC-D2DPS & C72-LOG-FC-D3DPS
C74-ATM-FC-PR_ALL	5.00E-06	2.35E-05	5.63	CCF of all components in group 'C74-ATM-FC-PR'
C74-CCFATSOFTWARE	1.00E-04	4.86E-04	5.85	COMMON CAUSE FAILURE OF ATWS/SLC LOGIC PROCESSORS
C74-LOG-FC-AT-_ALL	6.00E-06	2.81E-05	5.65	CCF of all components in group 'C74-LOG-FC-AT-'
E50-SQV-CC_ALL	1.50E-04	6.02E-02	401.52	CCF of all components in group 'E50-SQV-CC'
E50-SQV-CF-4OPEN	1.50E-05	9.29E-04	62.68	CCF OF 4 OR MORE SQUIB VALVES TO OPEN
E50-UV_OC_1_4_5	7.05E-06	8.07E-06	2.13	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003D & E50-UV_-OC-F003E
E50-UV_OC_1_5_8	7.05E-06	8.07E-06	2.13	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003E & E50-UV_-OC-F003H
E50-UV_OC_ALL	3.00E-04	1.22E-01	407.27	CCF of all components in group 'E50-UV_OC'
G21-BV_-RE-F308	4.84E-02	5.69E-03	1.11	MISPOSITION OF VALVE F308
G21-BV_-RE-F334	4.84E-02	5.57E-02	2.09	MISPOSITION OF VALVE F334
N21-ACV-CC-F0016	2.00E-03	5.55E-03	3.76	AIR OPERATED VALVE F0016 FAILS TO OPEN

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
N21-ACV-OC-F0016	2.40E-05	4.41E-05	2.82	AIR OPERATED VALVE N21-F0016 FAILS TO REMAIN OPEN
N21-ACV-OC-F0018	2.40E-05	5.28E-05	3.18	AIR OPERATED VALVE N21-F018 FAILS TO REMAIN OPEN
N21-AHU-FR-COND_1_2	1.26E-05	2.45E-05	2.93	CCF of two components: N21-AHU-FR-CONDA & N21-AHU-FR-CONDB
N21-AHU-FR-FW_1_2	1.26E-05	2.05E-05	2.61	CCF of two components: N21-AHU-FR-FWA & N21-AHU-FR-FWB
N21-MOV-OC-F0057	3.36E-06	3.55E-06	2.05	MOTOR OPERATED VALVE N21-F0057 FAILS TO REMAIN OPEN
N21-MP_-FR-COND_ALL	1.42E-05	2.79E-05	2.94	CCF of all components in group 'N21-MP_-FR-COND'
N21-MPF-FR_ALL	8.53E-05	1.80E-04	3.1	CCF of all components in group 'N21-MPF-FR'
N21-MPF-FR-BP_ALL	8.53E-05	1.80E-04	3.1	CCF of all components in group 'N21-MPF-FR-BP'
N21-STR-PG_ALL	5.68E-06	9.04E-06	2.57	CCF of all components in group 'N21-STR-PG'
N21-XHE-FO-FWRERUN	1.76E-01	2.89E-02	1.14	OPERATOR FAILS TO RESTART FDW AFTER RUNBACK - ATWS
P21-ACV-OO-F0016_1_2	1.93E-04	2.78E-04	2.43	CCF of two components: P21-ACV-OO-F016A & P21-ACV-OO-F016B
P21-BV_-RE-F049A	1.21E-02	5.35E-03	1.44	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
P21-BV_-RE-F049B	1.21E-02	1.23E-02	2	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
P21-BV_-RE-F050A	1.21E-02	5.35E-03	1.44	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
P21-BV_-RE-F050B	1.21E-02	1.23E-02	2	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
P22-ACV-OC-F0006	2.40E-05	5.28E-05	3.18	TCCW HX FLOW CONTROL VALVE FAILS TO REMAIN OPEN
P22-NSC-TM-HXS	7.50E-05	1.95E-04	3.57	MULTIPLE TCCW HXS OUT FOR TESTING/ MAINTENANCE
P22-NSC-TM-PUMPS	7.50E-05	1.95E-04	3.57	MULTIPLE TCCW PUMPS OUT FOR TESTING/ MAINTENANCE
P22-TNK-RP-A001	2.40E-06	2.81E-06	2.17	TCCW SURGE TANK LEAKS CATASTROPHICALLY
P30-ACV-CC_1_2	1.93E-04	3.60E-04	2.86	CCF of two components: P30-ACV-CC-F023 & P30-ACV-CC-F026
P41-FAN-FR_1_2	4.44E-06	5.53E-05	13.37	CCF of two components: P41-FAN-FR-0001A & P41-FAN-FR-0001B
P41-FAN-FR_1_2_3	4.44E-07	3.03E-06	7.79	CCF of three components: P41-FAN-FR-0001A & P41-FAN-FR-0001B & P41-FAN-FR-0002A
P41-FAN-FR_1_2_4	4.44E-07	3.03E-06	7.79	CCF of three components: P41-FAN-FR-0001A & P41-FAN-FR-0001B & P41-FAN-FR-0002B
P41-FAN-FR_1_3_4	4.44E-07	3.03E-06	7.79	CCF of three components: P41-FAN-FR-0001A & P41-FAN-FR-0002A & P41-FAN-FR-0002B

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
P41-FAN-FR_1_4	4.44E-06	5.53E-05	13.37	CCF of two components: P41-FAN-FR-0001A & P41-FAN-FR-0002B
P41-FAN-FR_2_3	4.44E-06	5.53E-05	13.37	CCF of two components: P41-FAN-FR-0001B & P41-FAN-FR-0002A
P41-FAN-FR_2_3_4	4.44E-07	3.03E-06	7.79	CCF of three components: P41-FAN-FR-0001B & P41-FAN-FR-0002A & P41-FAN-FR-0002B
P41-FAN-FR_3_4	4.44E-06	5.53E-05	13.37	CCF of two components: P41-FAN-FR-0002A & P41-FAN-FR-0002B
P41-FAN-FR_ALL	1.20E-05	2.04E-04	17.72	CCF of all components in group 'P41-FAN-FR'
P41-MPW-FR_ALL	3.20E-06	3.65E-05	12.2	CCF of all components in group 'P41-MPW-FR'
P41-STR-PG_1_2_3	2.11E-07	1.35E-06	7.35	CCF of three components: P41-STR-PG-D01A & P41-STR-PG-D01B & P41-STR-PG-D02A
P41-STR-PG_1_2_4	2.11E-07	1.35E-06	7.35	CCF of three components: P41-STR-PG-D01A & P41-STR-PG-D01B & P41-STR-PG-D02B
P41-STR-PG_1_3_4	2.11E-07	1.35E-06	7.35	CCF of three components: P41-STR-PG-D01A & P41-STR-PG-D02A & P41-STR-PG-D02B
P41-STR-PG_2_3_4	2.11E-07	1.35E-06	7.35	CCF of three components: P41-STR-PG-D01B & P41-STR-PG-D02A & P41-STR-PG-D02B
P41-STR-PG_ALL	5.68E-06	7.67E-05	14.36	CCF of all components in group 'P41-STR-PG'
P41-TRN-RE-PUMP2B	8.07E-03	5.61E-03	1.69	FAILURE TO RESTORE PSW PUMP 2B
P52-UV_-OC-F006	4.80E-06	5.48E-06	2.13	CHECK VALVE FAILS TO REMAIN OPEN

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
R10-LOSP-EPRI	3.00E-03	2.18E-02	8.19	CONSEQENTIAL LOSS OF PREFERRED OFFSITE POWER DUE TO A TRANSIENT
R11-BAC-LP-100A3	4.80E-06	1.53E-05	4.15	6.9 KV AC PIP-A LOADS BUS 1000A3 FAILS DURING OPERATION
R11-BAC-TM-100A3	4.80E-06	1.53E-05	4.15	6.9 KV AC PIP-A LOADS BUS 1000A3 IN MAINTENANCE
R13-BAC-LP-R13A1	4.80E-06	1.85E-04	39.48	NSR BUS R13-A1 FAILS DURING OPERATION
R13-BAC-LP-R13B1	4.80E-06	1.90E-04	40.44	BUS R13-B1 FAILS DURING OPERATION
R13-BAC-LP-R13RBA	4.80E-06	9.48E-06	2.92	NSR R13 REACTOR BLDG LOAD GROUP A FAILS DURING OPERATION
R13-BAC-LP-R13RBB	4.80E-06	1.87E-04	39.85	NSR R13 REACTOR BLDG LOAD GROUP B FAILS DURING OPERATION
R13-INV-FC-CCFNSR_1_2_5	2.11E-07	4.96E-07	3.23	CCF of three components: R13-INV-FC-R13A1 & R13-INV-FC-R13A2 & R13-INV-FC-R13C
R13-INV-FC-CCFNSR_1_3	3.16E-06	3.69E-06	2.16	CCF of two components: R13-INV-FC-R13A1 & R13-INV-FC-R13B1
R13-INV-FC-CCFNSR_1_3_5	2.11E-07	3.09E-05	146.69	CCF of three components: R13-INV-FC-R13A1 & R13-INV-FC-R13B1 & R13-INV-FC-R13C
R13-INV-FC-CCFNSR_1_4_5	2.11E-07	4.96E-07	3.23	CCF of three components: R13-INV-FC-R13A1 & R13-INV-FC-R13B2 & R13-INV-FC-R13C
R13-INV-FC-CCFNSR_1_5	3.16E-06	1.26E-05	4.97	CCF of two components: R13-INV-FC-R13A1 & R13-INV-FC-R13C

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
R13-INV-FC-CCFNSR_2_3_5	2.11E-07	1.87E-06	9.9	CCF of three components: R13-INV-FC-R13A2 & R13-INV-FC-R13B1 & R13-INV-FC-R13C
R13-INV-FC-CCFNSR_3_4_5	2.11E-07	1.87E-06	9.9	CCF of three components: R13-INV-FC-R13B1 & R13-INV-FC-R13B2 & R13-INV-FC-R13C
R13-INV-FC-CCFNSR_3_5	3.16E-06	4.84E-05	16.23	CCF of two components: R13-INV-FC-R13B1 & R13-INV-FC-R13C
R13-INV-FC-CCFNSR_ALL	1.14E-05	2.38E-03	209.99	CCF of all components in group 'R13-INV-FC-CCFNSR'
R13-INV-FC-CCFSR_ALL	1.14E-05	3.95E-03	347.35	CCF of all components in group 'R13-INV-FC-CCFSR'
R13-LCB-CO-FR13RBA	1.20E-05	2.57E-05	3.12	CIRCUIT BREAKER OPENS SPURIOUSLY
R13-LCB-CO-FR13RBB	1.20E-05	4.67E-04	39.89	CIRCUIT BREAKER OPENS SPURIOUSLY
R13-LCB-CO-R13RBA	1.20E-05	2.57E-05	3.12	CIRCUIT BREAKER OPENS SPURIOUSLY
R13-LCB-CO-R13RBB	1.20E-05	4.67E-04	39.89	CIRCUIT BREAKER OPENS SPURIOUSLY
R13-LCB-CO-TOR13A1	1.20E-05	4.62E-04	39.5	CIRCUIT BREAKER TO R13-A1 OPENS SPURIOUSLY
R13-LCB-CO-TOR13B1	1.20E-05	4.74E-04	40.49	CIRCUIT BREAKER TO R13-B1 OPENS SPURIOUSLY
R13-MTS-CO-R13A1	2.40E-05	9.33E-04	39.84	NSR R13-A1 MANUAL TRANSFER SWITCH SPURIOUSLY OPENS
R13-MTS-CO-R13B1	2.40E-05	9.56E-04	40.79	NSR R13-B1 MANUAL TRANSFER SWITCH SPURIOUSLY OPENS
R13-SXS-CO-R13A1	2.40E-05	9.33E-04	39.84	NSR R13-A1 STATIC SWITCH SPURIOUSLY OPENS

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
R13-SXS-CO-R13B1	2.40E-05	9.56E-04	40.79	NSR R13-B1 STATIC SWITCH SPURIOUSLY OPENS
R13-XFL-LP-R13RBA	1.92E-05	4.42E-05	3.28	TRANSFORMER FAILS DURING OPERATION
R13-XFL-LP-R13RBB	1.92E-05	7.51E-04	40.09	TRANSFORMER FAILS DURING OPERATION
R16-BDC-LP-R16A3	4.80E-06	6.97E-06	2.44	DC BUS R16-A3 FAILS DURING OPERATION
R16-BDC-TM-R16A3	5.00E-04	1.79E-03	4.55	DC BUS R16-A3 IN MAINTENANCE
R16-BT_-LP-CCFNSR_1_3_5	7.54E-09	7.99E-07	106.96	CCF of three components: R16-BT_-LP-R16BTA1 & R16-BT_-LP-R16BTB1 & R16-BT_-LP-R1
R16-BT_-LP-CCFNSR_3_5	1.50E-07	1.27E-06	9.18	CCF of two components: R16-BT_-LP-R16BTB1 & R16-BT_-LP-R16BTC
R16-BT_-LP-CCFNSR_ALL	4.07E-07	6.76E-05	165.91	CCF of all components in group 'R16-BT_-LP-CCFNSR'
R16-BT_-LP-CCFSR_ALL	4.07E-07	1.14E-04	279.42	CCF of all components in group 'R16-BT_-LP-CCFSR'
R16-BT_-LP-R16BTA3	4.80E-05	1.26E-04	3.6	BATTERY R16-BTA3 FAILS TO PROVIDE OUTPUT
R16-BT_-TM-R16BTA3	5.00E-04	1.79E-03	4.55	BATTERY R16-BTA3 IN TEST AND MAINTENANCE
R16-LCB-CO-FROMR16BTA3	1.20E-05	2.34E-05	2.93	CIRCUIT BREAKER FROM R16-BTA3 OPENS SPURIOUSLY
R16-LCB-CO-R16A3SWGR1	1.20E-05	2.34E-05	2.93	CIRCUIT BREAKER 1 FROM R16-A3 OPENS SPURIOUSLY
R16-LCB-CO-R16A3SWGR2	1.20E-05	2.34E-05	2.93	CIRCUIT BREAKER 2 FROM R16-A3 OPENS SPURIOUSLY

Table 12.9-6

Importance Measure Report for Full-Power Core Damage Frequencies Due to Internal Fires

Event Name	Probability	F-V	RAW	Description
R21-DG_-FR-DGA	5.76E-02	5.82E-03	1.09	DIESEL GENERATOR "A" FAILS TO RUN GIVEN START
R21-DG_-FR-DGB	5.76E-02	6.40E-03	1.1	DIESEL GENERATOR "B" FAILS TO RUN GIVEN START
REC_MANSCRAM	1.77E-02	2.61E-02	2.45	
T10-UV_-CC-VBISVS_1_2_3	5.23E-07	5.78E-04	1.10E+03	CCF of three components: T10-UV_-CC-ISV1 & T10-UV_-CC-ISV2 & T10-UV_-CC-ISV3
T10-VB_-CC_1_2_3	4.19E-07	4.62E-04	1.10E+03	CCF of three components: T10-VB_-CC-VB1 & T10-VB_-CC-VB2 & T10-VB_-CC-VB3
T15-FLT-PP_ALL	5.68E-07	1.01E-04	178.01	CCF of all components in group 'T15-FLT-PP'
T15-HX_-PP_ALL	5.68E-08	7.66E-06	134.8	CCF of all components in group 'T15-HX_-PP'
XXX-XHE-FO-DEPRESS	1.61E-01	1.11E-01	1.58	OPERATOR FAILS TO RECOGNIZE NEED OF DEPRESSURIZATION
XXX-XHE-FO-LPMAKEUP	1.61E-01	1.11E-01	1.58	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
B21-SQV-CC_ALL	1.50E-04	3.59E-03	24.9	CCF of all components in group 'B21-SQV-CC'
B21-UV_-CC-F102A	1.00E-04	1.46E-03	15.53	CHECK VALVE F102A IN FEEDWATER LINE A FAILS TO OPEN
B21-UV_-CC-F102B	1.00E-04	3.59E-04	4.58	CHECK VALVE #1 IN FEEDWATER LINE B FAILS TO REOPEN
B21-UV_-CC-F103A	1.00E-04	1.46E-03	15.53	CHECK VALVE F103A IN FEEDWATER LINE A FAILS TO OPEN
B21-UV_-CC-F103B	1.00E-04	3.59E-04	4.58	CHECK VALVE #2 IN FEEDWATER LINE B FAILS TO REOPEN
B32-HX_-PG-HX001A	2.40E-05	8.23E-05	4.39	Heat Exchanger HX001A Plugs
B32-HX_-PG-HX001B	2.40E-05	8.23E-05	4.39	Heat Exchanger HX001B Plugs
B32-HX_-PG-HX002A	2.40E-05	8.23E-05	4.39	Heat Exchanger HX002A Plugs
B32-HX_-PG-HX002B	2.40E-05	8.23E-05	4.39	Heat Exchanger HX002B Plugs
B32-NMO-OC-F001A	2.40E-06	4.22E-06	2.71	F001A Spuriously closes
B32-NMO-OC-F001B	2.40E-06	4.22E-06	2.71	Nitrogen Motor Operated Valve Transfers Closed
B32-NMO-OC-F004A	2.40E-06	4.22E-06	2.71	F004A Spuriously closes
B32-NMO-OC-F004B	2.40E-06	4.22E-06	2.71	Nitrogen Motor Operated Valve Transfers Closed
B32-NPO-CC_1_5	1.11E-06	1.30E-06	2.13	CCF of two components: B32-NPO-CC-F005A & B32-NPO-CC-F006A

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
B32-NPO-CC_2_6	1.11E-06	1.30E-06	2.13	CCF of two components: B32-NPO-CC-F005B & B32-NPO-CC-F006B
B32-NPO-OC-F002A	2.40E-06	4.22E-06	2.71	F002A Spuriously closes
B32-NPO-OC-F002B	2.40E-06	4.22E-06	2.71	F002B Spuriously closes
B32-NPO-OC-F003A	2.40E-06	4.22E-06	2.71	F003A Spuriously closes
B32-NPO-OC-F003B	2.40E-06	4.22E-06	2.71	F003B Spuriously closes
B32-SOV-FE_10_18	4.35E-06	1.03E-05	3.34	CCF of two components: B32-SOV-FE-F009B & B32-SOV-FE-F011B
B32-SOV-FE_10_22	4.35E-06	1.03E-05	3.34	CCF of two components: B32-SOV-FE-F009B & B32-SOV-FE-F012B
B32-SOV-FE_13_17	4.35E-06	1.03E-05	3.34	CCF of two components: B32-SOV-FE-F010A & B32-SOV-FE-F011A
B32-SOV-FE_13_21	4.35E-06	1.03E-05	3.34	CCF of two components: B32-SOV-FE-F010A & B32-SOV-FE-F012A
B32-SOV-FE_14_18	4.35E-06	1.03E-05	3.34	CCF of two components: B32-SOV-FE-F010B & B32-SOV-FE-F011B
B32-SOV-FE_14_22	4.35E-06	1.03E-05	3.34	CCF of two components: B32-SOV-FE-F010B & B32-SOV-FE-F012B
B32-SOV-FE_9_17	4.35E-06	1.03E-05	3.34	CCF of two components: B32-SOV-FE-F009A & B32-SOV-FE-F011A

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
B32-SOV-FE_9_21	4.35E-06	1.03E-05	3.34	CCF of two components: B32-SOV-FE-F009A & B32-SOV-FE-F012A
C12-BV_-RE-F013A	4.84E-02	2.01E-02	1.39	MISPOSITION OF VALVE F013A
C12-BV_-RE-F013B	4.84E-02	2.01E-02	1.39	MISPOSITION OF VALVE F013B
C12-BV_-RE-F015A	4.84E-02	2.01E-02	1.39	MISPOSITION OF VALVE F015A
C12-BV_-RE-F015B	4.84E-02	2.01E-02	1.39	MISPOSITION OF VALVE F015B
C12-BV_-RE-F021A	1.21E-02	4.46E-02	4.64	MISPOSITION OF VALVE F021A
C12-BV_-RE-F021B	1.21E-02	4.46E-02	4.64	MISPOSITION OF VALVE F021B
C12-BV_-RE-F065	4.84E-02	1.77E-01	4.48	MISPOSITION OF LOCKED OPEN VALVE F065
C12-HX_-LK-COO1AHX	2.40E-05	8.38E-05	4.48	CRD HX LEAKS OR RUPTURES
C12-HX_-LK-COO1BHX	2.40E-05	8.38E-05	4.48	HEAT EXCHANGER (LEAK OR RUPTURE)
C12-HX_-PG-C001AHX	2.40E-05	8.38E-05	4.48	CRD HEAT EXCHANGER (PLUGGED)
C12-HX_-PG-C001BHX	2.40E-05	8.38E-05	4.48	CRD HEAT EXCHANGER (PLUGGED)
C12-MOV-CC-F020A	4.00E-03	1.47E-02	4.67	MOTOR OPER. VALVE F020A FAILS TO OPEN
C12-MOV-CC-F020B	4.00E-03	1.47E-02	4.67	MOTOR OPER. VALVE F020B FAILS TO OPEN
C12-MP_-FR-C001A	2.88E-04	1.05E-03	4.64	MOTOR-DRIVEN PUMP C001A FAILS TO RUN, GIVEN START
C12-MP_-FR-C001B	2.88E-04	1.05E-03	4.64	MOTOR-DRIVEN PUMP C001B FAILS TO RUN, GIVEN START

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
C12-MP_-FS-C001B	3.69E-03	1.36E-02	4.67	MOTOR-DRIVEN PUMP C001B FAILS TO START
C12-MP_-FS-C001BOIL	2.40E-03	8.83E-03	4.67	MOTOR-DRIVEN AUX. OIL PUMP FOR C001B FAILS TO START
C12-OR_-PG-D007A	1.44E-05	4.99E-05	4.45	ORIFICE D007A FAILS TO REMAIN OPEN (PLUG)
C12-OR_-PG-D007B	1.44E-05	4.99E-05	4.45	ORIFICE D007B FAILS TO REMAIN OPEN (PLUG)
C12-SYS-TM-TRAINB	3.00E-03	1.10E-02	4.67	TRAIN B IN MAINTENANCE
C12-UV_-CC_1_2	2.50E-07	5.81E-07	3.3	CCF of two components: B21-UV_-CC-F102B & B21-UV_-CC-F103B
C12-UV_-CC_1_2_3	2.28E-06	7.28E-06	4.18	CCF of three components: B21-UV_-CC-F102B & B21-UV_-CC-F103B & C12-UV_-CC-F022
C12-UV_-CC_1_3	2.50E-07	5.81E-07	3.3	CCF of two components: B21-UV_-CC-F102B & C12-UV_-CC-F022
C12-UV_-CC_2_3	2.50E-07	5.81E-07	3.3	CCF of two components: B21-UV_-CC-F103B & C12-UV_-CC-F022
C12-UV_-CC-F022	1.00E-04	3.59E-04	4.58	CHECK VALVE F022 FAILS TO OPEN
C12-XHE-FO-LEVEL2	3.21E-02	1.18E-01	4.57	Operator fails to back-up CRD actuation
C62-CCFSOFTWARE	1.00E-04	5.17E-04	6.15	Common cause failure of software
C62-CCFSOFTWARE_S	1.00E-04	4.76E-04	5.75	Common cause failure of software, for spurious
C62-MOD-FDSIG114-LD1	1.00E-06	3.04E-06	4.01	Loss of load driver LD1

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
C62-MOD-FDSIG115-LD1	1.00E-06	3.04E-06	4.01	Loss of load driver LD1
C62-MOD-FDSIG1-LD1	1.00E-06	3.04E-06	4.01	Loss of load driver LD1
C62-MOD-FDSIG3-LD1	1.00E-06	3.04E-06	4.01	Loss of load driver LD1
C62-UNDEVSPUR5	1.00E-03	3.67E-03	4.66	Undeveloped spurious hardware failure
C62-UNDEVSPUR7	1.00E-03	3.67E-03	4.66	Undeveloped spurious hardware failure
C63-CCFSOFTWARE	1.00E-04	6.89E-03	69.8	Common cause failure of software
C63-CCFSOFTWARE_S	1.00E-04	2.02E-03	21.23	Common cause failure of software, for spurious
C63-UNDEVSPUR126	1.00E-03	3.67E-03	4.66	Undeveloped spurious hardware failure
C63-UNDEVSPUR127	1.00E-03	3.67E-03	4.66	Undeveloped spurious hardware failure
C63-UNDEVSPUR58	1.00E-03	4.10E-03	5.09	Undeveloped spurious hardware failure
C63-UNDEVSPUR59	1.00E-03	4.10E-03	5.09	Undeveloped spurious hardware failure
C63-UNDEVSPUR62	1.00E-03	4.10E-03	5.09	Undeveloped spurious hardware failure
C63-UNDEVSPUR63	1.00E-03	4.10E-03	5.09	Undeveloped spurious hardware failure
C63-UNDEVSPUR66	1.00E-03	4.10E-03	5.09	Undeveloped spurious hardware failure
C63-UNDEVSPUR67	1.00E-03	4.10E-03	5.09	Undeveloped spurious hardware failure
C63-UNDEVSPUR70	1.00E-03	4.10E-03	5.09	Undeveloped spurious hardware failure
C63-UNDEVSPUR71	1.00E-03	4.10E-03	5.09	Undeveloped spurious hardware failure
E50-POL-RP-POOLA	3.00E-07	1.19E-04	397.61	GDCS POOL A LEAKS CATASTROPHICALLY
E50-POL-RP-POOLD	3.00E-07	1.19E-04	397.61	GDCS POOL D LEAKS CATASTROPHICALLY

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
E50-SQV-CC_1_2	2.38E-05	1.94E-04	9.15	CCF of two components: E50-SQV-CC-F002A & E50-SQV-CC-F002B
E50-SQV-CC_1_2_3	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002B & E50-SQV-CC-F002C
E50-SQV-CC_1_2_4	7.94E-07	1.09E-05	14.52	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002B & E50-SQV-CC-F002D
E50-SQV-CC_1_2_5	7.94E-07	3.20E-04	403.85	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002B & E50-SQV-CC-F002E
E50-SQV-CC_1_2_6	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002B & E50-SQV-CC-F002F
E50-SQV-CC_1_2_7	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002B & E50-SQV-CC-F002G
E50-SQV-CC_1_2_8	7.94E-07	1.09E-05	14.52	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002B & E50-SQV-CC-F002H
E50-SQV-CC_1_3	2.38E-05	1.94E-04	9.15	CCF of two components: E50-SQV-CC-F002A & E50-SQV-CC-F002C
E50-SQV-CC_1_3_4	7.94E-07	1.09E-05	14.52	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002C & E50-SQV-CC-F002D
E50-SQV-CC_1_3_5	7.94E-07	3.20E-04	403.85	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002C & E50-SQV-CC-F002E
E50-SQV-CC_1_3_6	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002C & E50-SQV-CC-F002F

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
E50-SQV-CC_1_3_7	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002C & E50-SQV-CC-F002G
E50-SQV-CC_1_3_8	7.94E-07	1.09E-05	14.52	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002C & E50-SQV-CC-F002H
E50-SQV-CC_1_4	2.38E-05	3.89E-04	17.3	CCF of two components: E50-SQV-CC-F002A & E50-SQV-CC-F002D
E50-SQV-CC_1_4_5	7.94E-07	3.20E-04	403.85	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002D & E50-SQV-CC-F002E
E50-SQV-CC_1_4_6	7.94E-07	1.09E-05	14.52	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002D & E50-SQV-CC-F002F
E50-SQV-CC_1_4_7	7.94E-07	1.09E-05	14.52	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002D & E50-SQV-CC-F002G
E50-SQV-CC_1_4_8	7.94E-07	3.20E-04	403.85	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002D & E50-SQV-CC-F002H
E50-SQV-CC_1_5	2.38E-05	9.86E-03	415.16	CCF of two components: E50-SQV-CC-F002A & E50-SQV-CC-F002E
E50-SQV-CC_1_5_6	7.94E-07	3.20E-04	403.85	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002E & E50-SQV-CC-F002F
E50-SQV-CC_1_5_7	7.94E-07	3.20E-04	403.85	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002E & E50-SQV-CC-F002G
E50-SQV-CC_1_5_8	7.94E-07	3.20E-04	403.85	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002E & E50-SQV-CC-F002H

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
E50-SQV-CC_1_6	2.38E-05	1.94E-04	9.15	CCF of two components: E50-SQV-CC-F002A & E50-SQV-CC-F002F
E50-SQV-CC_1_6_7	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002F & E50-SQV-CC-F002G
E50-SQV-CC_1_6_8	7.94E-07	1.09E-05	14.52	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002F & E50-SQV-CC-F002H
E50-SQV-CC_1_7	2.38E-05	1.94E-04	9.15	CCF of two components: E50-SQV-CC-F002A & E50-SQV-CC-F002G
E50-SQV-CC_1_7_8	7.94E-07	1.09E-05	14.52	CCF of three components: E50-SQV-CC-F002A & E50-SQV-CC-F002G & E50-SQV-CC-F002H
E50-SQV-CC_1_8	2.38E-05	3.89E-04	17.3	CCF of two components: E50-SQV-CC-F002A & E50-SQV-CC-F002H
E50-SQV-CC_2_3_4	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002B & E50-SQV-CC-F002C & E50-SQV-CC-F002D
E50-SQV-CC_2_3_5	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002B & E50-SQV-CC-F002C & E50-SQV-CC-F002E
E50-SQV-CC_2_3_8	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002B & E50-SQV-CC-F002C & E50-SQV-CC-F002H
E50-SQV-CC_2_4	2.38E-05	1.94E-04	9.15	CCF of two components: E50-SQV-CC-F002B & E50-SQV-CC-F002D
E50-SQV-CC_2_4_5	7.94E-07	1.09E-05	14.52	CCF of three components: E50-SQV-CC-F002B & E50-SQV-CC-F002D & E50-SQV-CC-F002E

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
E50-SQV-CC_2_4_6	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002B & E50-SQV-CC-F002D & E50-SQV-CC-F002F
E50-SQV-CC_2_4_7	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002B & E50-SQV-CC-F002D & E50-SQV-CC-F002G
E50-SQV-CC_2_4_8	7.94E-07	3.20E-04	403.85	CCF of three components: E50-SQV-CC-F002B & E50-SQV-CC-F002D & E50-SQV-CC-F002H
E50-SQV-CC_2_5	2.38E-05	1.94E-04	9.15	CCF of two components: E50-SQV-CC-F002B & E50-SQV-CC-F002E
E50-SQV-CC_2_5_6	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002B & E50-SQV-CC-F002E & E50-SQV-CC-F002F
E50-SQV-CC_2_5_7	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002B & E50-SQV-CC-F002E & E50-SQV-CC-F002G
E50-SQV-CC_2_5_8	7.94E-07	1.09E-05	14.52	CCF of three components: E50-SQV-CC-F002B & E50-SQV-CC-F002E & E50-SQV-CC-F002H
E50-SQV-CC_2_6_8	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002B & E50-SQV-CC-F002F & E50-SQV-CC-F002H
E50-SQV-CC_2_7_8	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002B & E50-SQV-CC-F002G & E50-SQV-CC-F002H
E50-SQV-CC_2_8	2.38E-05	1.94E-04	9.15	CCF of two components: E50-SQV-CC-F002B & E50-SQV-CC-F002H
E50-SQV-CC_3_4	2.38E-05	1.94E-04	9.15	CCF of two components: E50-SQV-CC-F002C & E50-SQV-CC-F002D

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
E50-SQV-CC_3_4_5	7.94E-07	1.09E-05	14.52	CCF of three components: E50-SQV-CC-F002C & E50-SQV-CC-F002D & E50-SQV-CC-F002E
E50-SQV-CC_3_4_6	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002C & E50-SQV-CC-F002D & E50-SQV-CC-F002F
E50-SQV-CC_3_4_7	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002C & E50-SQV-CC-F002D & E50-SQV-CC-F002G
E50-SQV-CC_3_4_8	7.94E-07	3.20E-04	403.85	CCF of three components: E50-SQV-CC-F002C & E50-SQV-CC-F002D & E50-SQV-CC-F002H
E50-SQV-CC_3_5	2.38E-05	1.94E-04	9.15	CCF of two components: E50-SQV-CC-F002C & E50-SQV-CC-F002E
E50-SQV-CC_3_5_6	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002C & E50-SQV-CC-F002E & E50-SQV-CC-F002F
E50-SQV-CC_3_5_7	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002C & E50-SQV-CC-F002E & E50-SQV-CC-F002G
E50-SQV-CC_3_5_8	7.94E-07	1.09E-05	14.52	CCF of three components: E50-SQV-CC-F002C & E50-SQV-CC-F002E & E50-SQV-CC-F002H
E50-SQV-CC_3_6_8	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002C & E50-SQV-CC-F002F & E50-SQV-CC-F002H
E50-SQV-CC_3_7_8	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002C & E50-SQV-CC-F002G & E50-SQV-CC-F002H
E50-SQV-CC_3_8	2.38E-05	1.94E-04	9.15	CCF of two components: E50-SQV-CC-F002C & E50-SQV-CC-F002H

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
E50-SQV-CC_4_5	2.38E-05	3.89E-04	17.3	CCF of two components: E50-SQV-CC-F002D & E50-SQV-CC-F002E
E50-SQV-CC_4_5_6	7.94E-07	1.09E-05	14.52	CCF of three components: E50-SQV-CC-F002D & E50-SQV-CC-F002E & E50-SQV-CC-F002F
E50-SQV-CC_4_5_7	7.94E-07	1.09E-05	14.52	CCF of three components: E50-SQV-CC-F002D & E50-SQV-CC-F002E & E50-SQV-CC-F002G
E50-SQV-CC_4_5_8	7.94E-07	3.20E-04	403.85	CCF of three components: E50-SQV-CC-F002D & E50-SQV-CC-F002E & E50-SQV-CC-F002H
E50-SQV-CC_4_6	2.38E-05	1.94E-04	9.15	CCF of two components: E50-SQV-CC-F002D & E50-SQV-CC-F002F
E50-SQV-CC_4_6_7	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002D & E50-SQV-CC-F002F & E50-SQV-CC-F002G
E50-SQV-CC_4_6_8	7.94E-07	3.20E-04	403.85	CCF of three components: E50-SQV-CC-F002D & E50-SQV-CC-F002F & E50-SQV-CC-F002H
E50-SQV-CC_4_7	2.38E-05	1.94E-04	9.15	CCF of two components: E50-SQV-CC-F002D & E50-SQV-CC-F002G
E50-SQV-CC_4_7_8	7.94E-07	3.20E-04	403.85	CCF of three components: E50-SQV-CC-F002D & E50-SQV-CC-F002G & E50-SQV-CC-F002H
E50-SQV-CC_4_8	2.38E-05	9.86E-03	415.16	CCF of two components: E50-SQV-CC-F002D & E50-SQV-CC-F002H
E50-SQV-CC_5_6	2.38E-05	1.94E-04	9.15	CCF of two components: E50-SQV-CC-F002E & E50-SQV-CC-F002F

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
E50-SQV-CC_5_6_7	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002E & E50-SQV-CC-F002F & E50-SQV-CC-F002G
E50-SQV-CC_5_6_8	7.94E-07	1.09E-05	14.52	CCF of three components: E50-SQV-CC-F002E & E50-SQV-CC-F002F & E50-SQV-CC-F002H
E50-SQV-CC_5_7	2.38E-05	1.94E-04	9.15	CCF of two components: E50-SQV-CC-F002E & E50-SQV-CC-F002G
E50-SQV-CC_5_7_8	7.94E-07	1.09E-05	14.52	CCF of three components: E50-SQV-CC-F002E & E50-SQV-CC-F002G & E50-SQV-CC-F002H
E50-SQV-CC_5_8	2.38E-05	3.89E-04	17.3	CCF of two components: E50-SQV-CC-F002E & E50-SQV-CC-F002H
E50-SQV-CC_6_7_8	7.94E-07	5.45E-06	7.76	CCF of three components: E50-SQV-CC-F002F & E50-SQV-CC-F002G & E50-SQV-CC-F002H
E50-SQV-CC_6_8	2.38E-05	1.94E-04	9.15	CCF of two components: E50-SQV-CC-F002F & E50-SQV-CC-F002H
E50-SQV-CC_7_8	2.38E-05	1.94E-04	9.15	CCF of two components: E50-SQV-CC-F002G & E50-SQV-CC-F002H
E50-SQV-CC_ALL	1.50E-04	6.23E-02	416.09	CCF of all components in group 'E50-SQV-CC'
E50-SQV-CC-EQU_1_2_3	1.11E-05	8.29E-05	8.43	CCF of three components: E50-SQV-CC-F006A & E50-SQV-CC-F006B & E50-SQV-CC-F006C
E50-SQV-CC-EQU_1_2_4	1.11E-05	8.29E-05	8.43	CCF of three components: E50-SQV-CC-F006A & E50-SQV-CC-F006B & E50-SQV-CC-F006D

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
E50-SQV-CC-EQU_1_3_4	1.11E-05	8.15E-05	8.31	CCF of three components: E50-SQV-CC-F006A & E50-SQV-CC-F006C & E50-SQV-CC-F006D
E50-SQV-CC-EQU_2_3_4	1.11E-05	8.29E-05	8.43	CCF of three components: E50-SQV-CC-F006B & E50-SQV-CC-F006C & E50-SQV-CC-F006D
E50-SQV-CC-EQU_ALL	3.00E-04	1.25E-01	416.21	CCF of all components in group 'E50-SQV-CC-EQU'
E50-SQV-CC-F002A	3.00E-03	2.58E-02	9.57	SQUIB VALVE F002A FAILS TO OPERATE
E50-SQV-CC-F002D	3.00E-03	2.58E-02	9.57	SQUIB VALVE F002D FAILS TO OPERATE
E50-SQV-CC-F002E	3.00E-03	2.58E-02	9.57	SQUIB VALVE F002E FAILS TO OPERATE
E50-SQV-CC-F002H	3.00E-03	2.58E-02	9.57	SQUIB VALVE F002H FAILS TO OPERATE
E50-SQV-CO-F009A	9.60E-06	3.96E-03	413.78	SQUIB DELUGE VALVE F009A SPUR. OPENING [#7]
E50-SQV-CO-F009D	9.60E-06	3.96E-03	413.78	SQUIB DELUGE VALVE F009D SPUR. OPENING [#7]
E50-SQV-CO-F009E	9.60E-06	3.96E-03	413.78	SQUIB DELUGE VALVE F009E SPUR. OPENING [#7]
E50-SQV-CO-F009H	9.60E-06	3.96E-03	413.78	SQUIB DELUGE VALVE F009H SPUR. OPENING [#7]
E50-SQV-CO-F009J	9.60E-06	3.96E-03	413.78	SQUIB DELUGE VALVE F009J SPUR. OPENING [#7]
E50-SQV-CO-F009M	9.60E-06	3.96E-03	413.78	SQUIB DELUGE VALVE F009M SPUR. OPENING [#7]

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
E50-STR-PG_1_2_3	1.98E-05	1.51E-04	8.6	CCF of three components: E50-STR-PG-D002A & E50-STR-PG-D002B & E50-STR-PG-D002C
E50-STR-PG_1_2_4	1.98E-05	1.51E-04	8.6	CCF of three components: E50-STR-PG-D002A & E50-STR-PG-D002B & E50-STR-PG-D002D
E50-STR-PG_1_3_4	1.98E-05	1.48E-04	8.46	CCF of three components: E50-STR-PG-D002A & E50-STR-PG-D002C & E50-STR-PG-D002D
E50-STR-PG_2_3_4	1.98E-05	1.51E-04	8.6	CCF of three components: E50-STR-PG-D002B & E50-STR-PG-D002C & E50-STR-PG-D002D
E50-STR-PG_ALL	5.35E-04	2.22E-01	416.25	CCF of all components in group 'E50-STR-PG'
E50-UV_OC_1_2	2.67E-06	2.03E-05	8.58	CCF of two components: E50-UV_-OC-F003A & E50-UV_-OC-F003B
E50-UV_OC_1_2_3	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003B & E50-UV_-OC-F003C
E50-UV_OC_1_2_4	7.05E-06	1.12E-04	16.83	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003B & E50-UV_-OC-F003D
E50-UV_OC_1_2_5	7.05E-06	2.91E-03	413.18	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003B & E50-UV_-OC-F003E
E50-UV_OC_1_2_6	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003B & E50-UV_-OC-F003F
E50-UV_OC_1_2_7	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003B & E50-UV_-OC-F003G

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
E50-UV_OC_1_2_8	7.05E-06	1.12E-04	16.83	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003B & E50-UV_-OC-F003H
E50-UV_OC_1_3	2.67E-06	2.03E-05	8.58	CCF of two components: E50-UV_-OC-F003A & E50-UV_-OC-F003C
E50-UV_OC_1_3_4	7.05E-06	1.12E-04	16.83	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003C & E50-UV_-OC-F003D
E50-UV_OC_1_3_5	7.05E-06	2.91E-03	413.18	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003C & E50-UV_-OC-F003E
E50-UV_OC_1_3_6	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003C & E50-UV_-OC-F003F
E50-UV_OC_1_3_7	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003C & E50-UV_-OC-F003G
E50-UV_OC_1_3_8	7.05E-06	1.12E-04	16.83	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003C & E50-UV_-OC-F003H
E50-UV_OC_1_4	2.67E-06	4.06E-05	16.15	CCF of two components: E50-UV_-OC-F003A & E50-UV_-OC-F003D
E50-UV_OC_1_4_5	7.05E-06	2.91E-03	413.18	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003D & E50-UV_-OC-F003E
E50-UV_OC_1_4_6	7.05E-06	1.12E-04	16.83	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003D & E50-UV_-OC-F003F
E50-UV_OC_1_4_7	7.05E-06	1.12E-04	16.83	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003D & E50-UV_-OC-F003G

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
E50-UV_OC_1_4_8	7.05E-06	2.91E-03	413.18	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003D & E50-UV_-OC-F003H
E50-UV_OC_1_5	2.67E-06	1.09E-03	410.48	CCF of two components: E50-UV_-OC-F003A & E50-UV_-OC-F003E
E50-UV_OC_1_5_6	7.05E-06	2.91E-03	413.18	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003E & E50-UV_-OC-F003F
E50-UV_OC_1_5_7	7.05E-06	2.91E-03	413.18	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003E & E50-UV_-OC-F003G
E50-UV_OC_1_5_8	7.05E-06	2.91E-03	413.18	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003E & E50-UV_-OC-F003H
E50-UV_OC_1_6	2.67E-06	2.03E-05	8.58	CCF of two components: E50-UV_-OC-F003A & E50-UV_-OC-F003F
E50-UV_OC_1_6_7	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003F & E50-UV_-OC-F003G
E50-UV_OC_1_6_8	7.05E-06	1.12E-04	16.83	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003F & E50-UV_-OC-F003H
E50-UV_OC_1_7	2.67E-06	2.03E-05	8.58	CCF of two components: E50-UV_-OC-F003A & E50-UV_-OC-F003G
E50-UV_OC_1_7_8	7.05E-06	1.12E-04	16.83	CCF of three components: E50-UV_-OC-F003A & E50-UV_-OC-F003G & E50-UV_-OC-F003H
E50-UV_OC_1_8	2.67E-06	4.06E-05	16.15	CCF of two components: E50-UV_-OC-F003A & E50-UV_-OC-F003H

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
E50-UV_OC_2_3_4	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003B & E50-UV_-OC-F003C & E50-UV_-OC-F003D
E50-UV_OC_2_3_5	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003B & E50-UV_-OC-F003C & E50-UV_-OC-F003E
E50-UV_OC_2_3_8	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003B & E50-UV_-OC-F003C & E50-UV_-OC-F003H
E50-UV_OC_2_4	2.67E-06	2.03E-05	8.58	CCF of two components: E50-UV_-OC-F003B & E50-UV_-OC-F003D
E50-UV_OC_2_4_5	7.05E-06	1.12E-04	16.83	CCF of three components: E50-UV_-OC-F003B & E50-UV_-OC-F003D & E50-UV_-OC-F003E
E50-UV_OC_2_4_6	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003B & E50-UV_-OC-F003D & E50-UV_-OC-F003F
E50-UV_OC_2_4_7	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003B & E50-UV_-OC-F003D & E50-UV_-OC-F003G
E50-UV_OC_2_4_8	7.05E-06	2.91E-03	413.18	CCF of three components: E50-UV_-OC-F003B & E50-UV_-OC-F003D & E50-UV_-OC-F003H
E50-UV_OC_2_5	2.67E-06	2.03E-05	8.58	CCF of two components: E50-UV_-OC-F003B & E50-UV_-OC-F003E
E50-UV_OC_2_5_6	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003B & E50-UV_-OC-F003E & E50-UV_-OC-F003F
E50-UV_OC_2_5_7	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003B & E50-UV_-OC-F003E & E50-UV_-OC-F003G

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
E50-UV_OC_2_5_8	7.05E-06	1.12E-04	16.83	CCF of three components: E50-UV_-OC-F003B & E50-UV_-OC-F003E & E50-UV_-OC-F003H
E50-UV_OC_2_6_8	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003B & E50-UV_-OC-F003F & E50-UV_-OC-F003H
E50-UV_OC_2_7_8	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003B & E50-UV_-OC-F003G & E50-UV_-OC-F003H
E50-UV_OC_2_8	2.67E-06	2.03E-05	8.58	CCF of two components: E50-UV_-OC-F003B & E50-UV_-OC-F003H
E50-UV_OC_3_4	2.67E-06	2.03E-05	8.58	CCF of two components: E50-UV_-OC-F003C & E50-UV_-OC-F003D
E50-UV_OC_3_4_5	7.05E-06	1.12E-04	16.83	CCF of three components: E50-UV_-OC-F003C & E50-UV_-OC-F003D & E50-UV_-OC-F003E
E50-UV_OC_3_4_6	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003C & E50-UV_-OC-F003D & E50-UV_-OC-F003F
E50-UV_OC_3_4_7	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003C & E50-UV_-OC-F003D & E50-UV_-OC-F003G
E50-UV_OC_3_4_8	7.05E-06	2.91E-03	413.18	CCF of three components: E50-UV_-OC-F003C & E50-UV_-OC-F003D & E50-UV_-OC-F003H
E50-UV_OC_3_5	2.67E-06	2.03E-05	8.58	CCF of two components: E50-UV_-OC-F003C & E50-UV_-OC-F003E
E50-UV_OC_3_5_6	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003C & E50-UV_-OC-F003E & E50-UV_-OC-F003F

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
E50-UV_OC_3_5_7	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003C & E50-UV_-OC-F003E & E50-UV_-OC-F003G
E50-UV_OC_3_5_8	7.05E-06	1.12E-04	16.83	CCF of three components: E50-UV_-OC-F003C & E50-UV_-OC-F003E & E50-UV_-OC-F003H
E50-UV_OC_3_6_8	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003C & E50-UV_-OC-F003F & E50-UV_-OC-F003H
E50-UV_OC_3_7_8	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003C & E50-UV_-OC-F003G & E50-UV_-OC-F003H
E50-UV_OC_3_8	2.67E-06	2.03E-05	8.58	CCF of two components: E50-UV_-OC-F003C & E50-UV_-OC-F003H
E50-UV_OC_4_5	2.67E-06	4.06E-05	16.15	CCF of two components: E50-UV_-OC-F003D & E50-UV_-OC-F003E
E50-UV_OC_4_5_6	7.05E-06	1.12E-04	16.83	CCF of three components: E50-UV_-OC-F003D & E50-UV_-OC-F003E & E50-UV_-OC-F003F
E50-UV_OC_4_5_7	7.05E-06	1.12E-04	16.83	CCF of three components: E50-UV_-OC-F003D & E50-UV_-OC-F003E & E50-UV_-OC-F003G
E50-UV_OC_4_5_8	7.05E-06	2.91E-03	413.18	CCF of three components: E50-UV_-OC-F003D & E50-UV_-OC-F003E & E50-UV_-OC-F003H
E50-UV_OC_4_6	2.67E-06	2.03E-05	8.58	CCF of two components: E50-UV_-OC-F003D & E50-UV_-OC-F003F
E50-UV_OC_4_6_7	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003D & E50-UV_-OC-F003F & E50-UV_-OC-F003G

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
E50-UV_OC_4_6_8	7.05E-06	2.91E-03	413.18	CCF of three components: E50-UV_-OC-F003D & E50-UV_-OC-F003F & E50-UV_-OC-F003H
E50-UV_OC_4_7	2.67E-06	2.03E-05	8.58	CCF of two components: E50-UV_-OC-F003D & E50-UV_-OC-F003G
E50-UV_OC_4_7_8	7.05E-06	2.91E-03	413.18	CCF of three components: E50-UV_-OC-F003D & E50-UV_-OC-F003G & E50-UV_-OC-F003H
E50-UV_OC_4_8	2.67E-06	1.09E-03	410.48	CCF of two components: E50-UV_-OC-F003D & E50-UV_-OC-F003H
E50-UV_OC_5_6	2.67E-06	2.03E-05	8.58	CCF of two components: E50-UV_-OC-F003E & E50-UV_-OC-F003F
E50-UV_OC_5_6_7	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003E & E50-UV_-OC-F003F & E50-UV_-OC-F003G
E50-UV_OC_5_6_8	7.05E-06	1.12E-04	16.83	CCF of three components: E50-UV_-OC-F003E & E50-UV_-OC-F003F & E50-UV_-OC-F003H
E50-UV_OC_5_7	2.67E-06	2.03E-05	8.58	CCF of two components: E50-UV_-OC-F003E & E50-UV_-OC-F003G
E50-UV_OC_5_7_8	7.05E-06	1.12E-04	16.83	CCF of three components: E50-UV_-OC-F003E & E50-UV_-OC-F003G & E50-UV_-OC-F003H
E50-UV_OC_5_8	2.67E-06	4.06E-05	16.15	CCF of two components: E50-UV_-OC-F003E & E50-UV_-OC-F003H
E50-UV_OC_6_7_8	7.05E-06	5.60E-05	8.91	CCF of three components: E50-UV_-OC-F003F & E50-UV_-OC-F003G & E50-UV_-OC-F003H

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
E50-UV_OC_6_8	2.67E-06	2.03E-05	8.58	CCF of two components: E50-UV_-OC-F003F & E50-UV_-OC-F003H
E50-UV_OC_7_8	2.67E-06	2.03E-05	8.58	CCF of two components: E50-UV_-OC-F003G & E50-UV_-OC-F003H
E50-UV_OC_ALL	3.00E-04	1.25E-01	416.21	CCF of all components in group 'E50-UV_OC'
E50-UV_OC-EQU_1_2_3	4.93E-06	3.51E-05	8.07	CCF of three components: E50-UV_-OC-F007A & E50-UV_-OC-F007B & E50-UV_-OC-F007C
E50-UV_OC-EQU_1_2_4	4.93E-06	3.51E-05	8.07	CCF of three components: E50-UV_-OC-F007A & E50-UV_-OC-F007B & E50-UV_-OC-F007D
E50-UV_OC-EQU_1_3_4	4.93E-06	3.48E-05	8	CCF of three components: E50-UV_-OC-F007A & E50-UV_-OC-F007C & E50-UV_-OC-F007D
E50-UV_OC-EQU_2_3_4	4.93E-06	3.51E-05	8.07	CCF of three components: E50-UV_-OC-F007B & E50-UV_-OC-F007C & E50-UV_-OC-F007D
E50-UV_OC-EQU_ALL	3.00E-05	1.25E-02	415.24	CCF of all components in group 'E50-UV_OC-EQU'
E50-UV_-OC-F003A	1.75E-02	1.51E-01	9.47	CHECK VALVE F003A FAILS TO REMAIN OPEN OR PLUG
E50-UV_-OC-F003D	1.75E-02	1.51E-01	9.47	CHECK VALVE F003D FAILS TO REMAIN OPEN OR PLUG
E50-UV_-OC-F003E	1.75E-02	1.51E-01	9.47	CHECK VALVE F003E FAILS TO REMAIN OPEN OR PLUG
E50-UV_-OC-F003H	1.75E-02	1.51E-01	9.47	CHECK VALVE F003H FAILS TO REMAIN OPEN OR PLUG

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
G21-BV_-RE-F334	4.84E-02	7.36E-01	15.47	MISPOSITION OF VALVE F334
G21-NMO_1_3_4	1.11E-06	1.21E-05	11.77	CCF of three components: G21-NMO-CC-F306A & G21-NMO-CC-F332A & G21-NMO-CC-F332B
G21-NMO_2_3_4	1.11E-06	1.21E-05	11.77	CCF of three components: G21-NMO-CC-F306B & G21-NMO-CC-F332A & G21-NMO-CC-F332B
G21-NMO_3_4	1.11E-05	1.50E-04	14.47	CCF of two components: G21-NMO-CC-F332A & G21-NMO-CC-F332B
G21-NMO_ALL	3.00E-05	4.23E-04	15.08	CCF of all components in group 'G21-NMO'
G21-UV_-333_1_2	1.79E-05	2.47E-04	14.74	CCF of two components: G21-UV_-CC-F333A & G21-UV_-CC-F333B
G21-UV_-OC-F331A	8.00E-07	2.82E-06	4.51	CHECK VALVE F331A FAILS TO CLOSE
G21-UV_-OC-F331B	8.00E-07	2.82E-06	4.51	CHECK VALVE F331B FAILS TO CLOSE
G31-UV_-OO_1_2	3.01E-05	1.05E-04	4.48	CCF of two components: G31-UV_-OO-F023A & G31-UV_-OO-F024A
P21-ACV-OO-F0016_1_2	1.93E-04	9.27E-04	5.8	CCF of two components: P21-ACV-OO-F016A & P21-ACV-OO-F016B
P21-AHU-FR_1_2	1.26E-05	5.66E-05	5.46	CCF of two components: P21-AHU-FR-RCCWA & P21-AHU-FR-RCCWB
P21-BV_-RE-F049A	1.21E-02	4.46E-02	4.64	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
P21-BV_-RE-F049B	1.21E-02	4.46E-02	4.64	MISPOSITION OF RCCW INLET TO CRD HEAT EXCHANGER
P21-BV_-RE-F050A	1.21E-02	4.46E-02	4.64	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
P21-BV_-RE-F050B	1.21E-02	4.46E-02	4.64	MISPOSITION OF RCCW OUTLET FROM CRD HEAT EXCHANGER
P21-MP_-FR_ALL	1.28E-06	4.94E-06	4.83	CCF of all components in group 'P21-MP_-FR'
P21-NSC-TM-TRAINAHX	7.50E-05	2.69E-04	4.58	RCCW HXS IN TEST OR MAINTENANCE TRAIN A
P21-NSC-TM-TRAINAPUMP	7.50E-05	2.69E-04	4.58	RCCW PUMPS IN TEST OR MAINTENANCE TRAIN A
P21-NSC-TM-TRAINBHX	7.50E-05	2.68E-04	4.57	RCCW HXS IN TEST OR MAINTENANCE TRAIN B
P21-NSC-TM-TRAINBPUMP	7.50E-05	2.68E-04	4.57	RCCW PUMPS IN TEST OR MAINTENANCE TRAIN B
P21-TNK-RP-0001A	2.40E-06	7.66E-06	4.17	RCCW SURGE TANK 0001A LEAKS CATASTROPHICALLY
P21-TNK-RP-0001B	2.40E-06	7.66E-06	4.17	RCCW SURGE TANK 0001B LEAKS CATASTROPHICALLY
P30-TNK-RP-A001	2.40E-06	7.66E-06	4.17	CONDENSATE STORAGE TANK LEAKS CATASTROPHICALLY

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
P41-FAN-FR_1_2	4.44E-06	1.89E-05	5.22	CCF of two components: P41-FAN-FR-0001A & P41-FAN-FR-0001B
P41-FAN-FR_1_2_3	4.44E-07	1.48E-06	4.29	CCF of three components: P41-FAN-FR-0001A & P41-FAN-FR-0001B & P41-FAN-FR-0002A
P41-FAN-FR_1_2_4	4.44E-07	1.48E-06	4.29	CCF of three components: P41-FAN-FR-0001A & P41-FAN-FR-0001B & P41-FAN-FR-0002B
P41-FAN-FR_1_3_4	4.44E-07	1.48E-06	4.29	CCF of three components: P41-FAN-FR-0001A & P41-FAN-FR-0002A & P41-FAN-FR-0002B
P41-FAN-FR_1_4	4.44E-06	1.89E-05	5.22	CCF of two components: P41-FAN-FR-0001A & P41-FAN-FR-0002B
P41-FAN-FR_2_3	4.44E-06	1.89E-05	5.22	CCF of two components: P41-FAN-FR-0001B & P41-FAN-FR-0002A
P41-FAN-FR_2_3_4	4.44E-07	1.48E-06	4.29	CCF of three components: P41-FAN-FR-0001B & P41-FAN-FR-0002A & P41-FAN-FR-0002B
P41-FAN-FR_3_4	4.44E-06	1.89E-05	5.22	CCF of two components: P41-FAN-FR-0002A & P41-FAN-FR-0002B
P41-FAN-FR_ALL	1.20E-05	5.35E-05	5.44	CCF of all components in group 'P41-FAN-FR'
P41-MPW-FR_ALL	3.20E-06	1.31E-05	5.06	CCF of all components in group 'P41-MPW-FR'
P41-STR-PG_1_2_3	2.11E-07	4.58E-07	3.1	CCF of three components: P41-STR-PG-D01A & P41-STR-PG-D01B & P41-STR-PG-D02A
P41-STR-PG_1_2_4	2.11E-07	4.58E-07	3.1	CCF of three components: P41-STR-PG-D01A & P41-STR-PG-D01B & P41-STR-PG-D02B

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
P41-STR-PG_1_3_4	2.11E-07	4.58E-07	3.1	CCF of three components: P41-STR-PG-D01A & P41-STR-PG-D02A & P41-STR-PG-D02B
P41-STR-PG_2_3_4	2.11E-07	4.58E-07	3.1	CCF of three components: P41-STR-PG-D01B & P41-STR-PG-D02A & P41-STR-PG-D02B
P41-STR-PG_ALL	5.68E-06	2.49E-05	5.34	CCF of all components in group 'P41-STR-PG'
R10-LOSP-EPRI	3.00E-03	7.78E-03	3.58	CONSEQENTIAL LOSS OF PREFERRED OFFSITE POWER DUE TO A TRANSIENT
R11-BAC-LP-100A3	4.80E-06	1.63E-05	4.38	6.9 KV AC PIP-A LOADS BUS 1000A3 FAILS DURING OPERATION
R11-BAC-LP-100B3	4.80E-06	2.09E-05	5.32	6.9 KV AC PIP-A LOADS BUS 1000B3 FAILS DURING OPERATION
R11-BAC-TM-100A3	4.80E-06	1.63E-05	4.38	6.9 KV AC PIP-A LOADS BUS 1000A3 IN MAINTENANCE
R11-BAC-TM-100B3	4.80E-06	2.09E-05	5.32	6.9 KV AC PIP-A LOADS BUS 1000B3 IN MAINTENANCE
R12-BAC-LP-R12A31	4.80E-06	1.63E-05	4.38	480 VAC ISOLATION POWER CENTER R12-A31 FAILS DURING OPERATION
R12-BAC-LP-R12B31	4.80E-06	1.63E-05	4.38	480 VAC ISOLATION POWER CENTER R12-B31 FAILS DURING OPERATION
R12-BAC-TM-R12A31	4.80E-06	1.63E-05	4.38	480 VAC ISOLATION POWER CENTER R12-A31 IN MAINTENANCE

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
R12-BAC-TM-R12B31	4.80E-06	1.63E-05	4.38	480 VAC ISOLATION POWER CENTER R12-B31 IN MAINTENANCE
R13-BAC-LP-R13A1	4.80E-06	1.63E-05	4.38	NSR BUS R13-A1 FAILS DURING OPERATION
R13-BAC-LP-R13B1	4.80E-06	1.63E-05	4.38	BUS R13-B1 FAILS DURING OPERATION
R13-BAC-LP-R13RBA	4.80E-06	1.63E-05	4.38	NSR R13 REACTOR BLDG LOAD GROUP A FAILS DURING OPERATION
R13-BAC-LP-R13RBB	4.80E-06	1.63E-05	4.38	NSR R13 REACTOR BLDG LOAD GROUP B FAILS DURING OPERATION
R13-INV-FC-CCFSR_ALL	1.14E-05	3.11E-05	3.72	CCF of all components in group 'R13-INV-FC-CCFSR'
R13-LCB-CO-FR13RBA	1.20E-05	4.11E-05	4.41	CIRCUIT BREAKER OPENS SPURIOUSLY
R13-LCB-CO-FR13RBB	1.20E-05	4.11E-05	4.41	CIRCUIT BREAKER OPENS SPURIOUSLY
R13-LCB-CO-R13RBA	1.20E-05	4.11E-05	4.41	CIRCUIT BREAKER OPENS SPURIOUSLY
R13-LCB-CO-R13RBB	1.20E-05	4.11E-05	4.41	CIRCUIT BREAKER OPENS SPURIOUSLY
R13-LCB-CO-TOR13A1	1.20E-05	4.11E-05	4.41	CIRCUIT BREAKER TO R13-A1 OPENS SPURIOUSLY
R13-LCB-CO-TOR13B1	1.20E-05	4.11E-05	4.41	CIRCUIT BREAKER TO R13-B1 OPENS SPURIOUSLY
R13-MTS-CO-R13A1	2.40E-05	8.38E-05	4.48	NSR R13-A1 MANUAL TRANSFER SWITCH SPURIOUSLY OPENS

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
R13-MTS-CO-R13B1	2.40E-05	8.38E-05	4.48	NSR R13-B1 MANUAL TRANSFER SWITCH SPURIOUSLY OPENS
R13-SXS-CO-R13A1	2.40E-05	8.38E-05	4.48	NSR R13-A1 STATIC SWITCH SPURIOUSLY OPENS
R13-SXS-CO-R13B1	2.40E-05	8.38E-05	4.48	NSR R13-B1 STATIC SWITCH SPURIOUSLY OPENS
R13-XFL-LP-R13RBA	1.92E-05	6.64E-05	4.45	TRANSFORMER FAILS DURING OPERATION
R13-XFL-LP-R13RBB	1.92E-05	6.64E-05	4.45	TRANSFORMER FAILS DURING OPERATION
R16-BT_-LP-CCFSR_ALL	4.07E-07	5.98E-07	2.45	CCF of all components in group 'R16-BT_-LP-CCFSR'
U43-BV_-CC-F346	4.00E-04	1.74E-03	5.35	MANUAL VALVE FAILS TO OPEN
U43-BV_-CC-FU439	4.00E-04	1.74E-03	5.35	MANUAL VALVE FAILS TO OPEN
U43-UV_-CC_1_2_7	3.67E-07	1.15E-06	4.11	CCF of three components: U43-UV_-CC-FU431A & U43-UV_-CC-FU431B & U43-UV_-CC-FU43
U43-UV_-CC_1_4_7	3.67E-07	1.15E-06	4.11	CCF of three components: U43-UV_-CC-FU431A & U43-UV_-CC-FU432B & U43-UV_-CC-FU43
U43-UV_-CC_2_3_7	3.67E-07	1.15E-06	4.11	CCF of three components: U43-UV_-CC-FU431B & U43-UV_-CC-FU432A & U43-UV_-CC-FU43
U43-UV_-CC_3_4_7	3.67E-07	1.15E-06	4.11	CCF of three components: U43-UV_-CC-FU432A & U43-UV_-CC-FU432B & U43-UV_-CC-FU43
U43-UV_-CC_ALL	3.38E-05	1.42E-04	5.19	CCF of all components in group 'U43-UV_-CC'

Table 12.9-7

Importance Measure Report for Shutdown Core Damage Frequencies Due to Internal Fire

Event Name	Probability	F-V	RAW	Description
U43-UV_-CC-F347	4.00E-04	1.74E-03	5.35	CHECK VALVE F347 FAILS TO OPEN
U43-UV_-CC-FU438	4.00E-04	1.74E-03	5.35	CHECK VALVE FAILS TO OPEN
U43-XHE-FO-LPCI	1.61E-03	6.84E-03	5.24	OPERATOR FAILS TO ACTUATE U43 IN LPCI MODE
XXX-XHE-FO-LPMAKEUP	1.61E-02	2.44E-01	15.94	OP. FAILS TO RECOG. NEED FOR LOW PRESS. MAKEUP AFTER DEPRESSURIZATION

12.10 INSIGHTS

12.10.1 Key Insights from Full-Power Fire CDF and LRF Models

The ESBWR probabilistic internal fire analysis highlights the following key insights regarding the fire mitigation capability of the ESBWR:

(1) The ESBWR, due to its basic layout and safety design features, is inherently capable of mitigating potential internal fires. Safety system redundancy and physical separation by fire barriers ensure that in all cases a single fire limits damage to a single safety system division or defense-in-depth (DID) system redundancy. Fire propagation to neighboring areas presents a relatively minor risk contribution.

(2) The ESBWR internal events PRA model assumes that both trains of standby liquid control (SLC) system are required to mitigate the accident consequences from the ATWS sequences, which is conservative. This is indicated by the top cutsets for full-power fire core damage frequency in Table 12.9-4, which show that core damage occurs with the common cause failure of control rod binding and the equipment failures (mainly the failure of one SLC train) induced-by a fire in a single fire area. It also uses conservative values for the common cause failure of the software and control rod mechanical binding failure. This leads to significant contributions from the ATWS sequences to the total fire CDF. On the other hand, this also indicates that ESBWR plant design is safer than the traditional plants, which typically do not include ATWS sequences in their fire PRA models.

(3) Fires in the control room are assumed to affect the execution of human actions from there. One feature relevant to the design is that a fire in the control room does not affect the automatic actuations of the safety systems. Additionally, the existence of remote shutdown panels allows the opportunity to perform manual actuations for failed automatic actuations that may occur.

12.10.2 Key Insights from Shutdown Fire CDF Model

The following insights are obtained from the ESBWR shutdown fire CDF model:

(1) The ESBWR plant has excellent capability to mitigate the consequences due to postulated internal fires. The separation criteria incorporated in the ESBWR design, especially for the safety-related systems and RTNSS systems, greatly enhances the redundancy and ensures that a single fire cannot defeat a whole system.

(2) The dominant risk contributors with respect to fire scenarios are the postulated fires in turbine building general area and the plant service water area. As stated in Section 12.8.4, conservatism is embedded in the shutdown modeling by assuming a fire in these two fire areas can induce a shutdown initiating event and fail all the components in the subject fire area. With the exception of large turbine building fires, both fire areas are well accessible for fire suppression. Therefore, the

shutdown fire risk analysis proves that the robustness of ESBWR plant against the postulated fires.

(3) The dominant risk contributor with respect to shutdown modes is “Mode 6 Unflooded.” This is consistent with the baseline shutdown CDF results since the isolation condenser system is not functional in the Mode 6 Unflooded event trees. Therefore, it is necessary to ensure the operability of the systems critical to decay heat removal function during this mode.

(4) Several GDCS system (E50) CCF basic events, pre-initiator and post-initiator operation actions contribute significantly to the fire shutdown CDF.

   a. While the GDCS system CCF events have some embedded conservatism in the data analysis, their risk contribution is considered as reasonable since the CCF events defeat the GDCS system functions.

   b. The risk contributions due to the misposition of valves are high (especially valve G21-F334 whose failure defeats both FAPCS and FPS injection path), which is mainly due to the screening value from the HRA analysis. The failure probability for valve misposition can be significant reduced if these valve positions are monitored and alarmed in the main control room.

   c. The contribution from post-initiator operator actions is conservative in that operators have plenty of response time during shutdown. Multiple shifts could be expected for some operator actions, which is highly unlikely for the operators not to realize the need to perform certain obvious operator actions (e.g., operators fail to recognize the need for low pressure makeup after depressurization).

12.10.3 Insights from Sensitivity Studies

Insights from sensitivity studies related to fire analysis are summarized in NEDO-33201 Section 11.

12.11 CONCLUSIONS

The main conclusion that can be drawn from the ESBWR probabilistic internal fire analysis is that the risk from internal fires is acceptably low. The estimated core damage frequency and large release frequency for all analyzed scenarios even when using a conservative analysis are typically lower than the internal events results. The shutdown fire CDF is higher than the internal events shutdown CDF. However, the shutdown fire PRA model is developed with significant conservatism, which can be refined following the detailed designs.

The ESBWR is inherently safe with respect to internal fire events. All potential fires have been analyzed and it has been shown that the plant can be safely shut down at low risk to plant personnel and the general public.

12.12 REFERENCES

12-1 NUREG/CR-6850, EPRI 1011989, September 2005, Fire PRA Methodology for Nuclear Power Facilities, Vol. 2: Detailed Methodology.

12-2 RES/OERAB/S02-01, January 2002, Fire Events – Update of U.S. Operating Experience, 1986 – 1999.

12-3 AEOD/S97-03, "Special Study, Fire Events – Feedback of U.S. Operating Experience", June 1997.

12-4 ESBWR Design Control Document, 26A6642 Rev. 04.

12-5 NEDE/NEDO-33386 Revision 0, ESBWR Plant Flood Zone Definition Drawings and Other PRA Supporting Information.