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Vice President
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June 7, 1999

U.S. Nuclear Regulatory Commission
Document Control Desk
Attn: Guy Vissing
Project Directorate I-1
Washington, D.C. 20555-0001

Subject: Response to RAI Regarding Verification of Seismic Adequacy of Mechanical and Electrical Equipment (TAC No. M69449)
R.E. Ginna Nuclear Power Plant
Docket No. 50/244

References:

A. Letter from Guy S. Vissing (NRC) to Dr. Robert C. Mecredy (RG&E), "Request for Additional Information (RAI) Regarding the RE Ginna Nuclear Power Plant, Summary Report on the Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, dated January 31, 1997" (TAC No. M69449), dated 3/10/99

B. Letter from Robert C. Mecredy (RG&E) to Document Control Desk (NRC), dated January 31, 1997: "Resolution of Generic Letter 87-02, Supplement 1 and Generic Letter 88-20, Supplements 4 & 5".

Dear Mr. Vissing:

Enclosed are Rochester Gas & Electric's responses to NRC Request for Additional Information (RAI), reference A.

Very truly yours,

Robert C. Mecredy

Enclosures

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xc: Mr. Guy S. Vissing (mail stop 8C2)
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RG&E Responses to NRC RAI, 3/10/99

NRC RAI a:

> Describe what reviews were performed to determine if any local operator actions required to safely shutdown the reactor(i.e., implement the SSEL) could be affected by potentially adverse environmental conditions (such as loss of lighting, excessive heat or humidity, or in-plant barriers resulting from the seismic event. Describe how the staffing was evaluated and describe the reviews which were conducted to ensure operators had adequate time and resources to respond to such events.

RG&E Response a:

During the SSEL development engineering personnel performed thorough plant walkdowns. Those walkdowns identified several areas where seismic interactions could cause collateral damage which could complicate achieving safe shutdown. In the development of the SSEL the equipment outliers were characterized as Group A and Group B Outliers. Group A outliers consisted of equipment that could sustain a potential loss of function which normal proceduralized operator actions do not compensate for; Group B outliers consisted of equipment which could lose its preferred mode of operation or had the potential to mal-operate and require compersatory manual operator action. The resolution process of the Group B outliers directly addressed the issues identified in this request for additional information.

RG&E developed a Group B outlier resolution plan which was chartered to examine:

"The cumulative affect of the losses of preferred modes of operation, and the subsequent manual operation of SSEL equipment,should be studied to examine the possibility of physical or procedural enhancements. These studies may also include margin studies to aid in defining the priorities in which manual actions should be taken".

An operations shift crew was detailed to work on the issue. The SSEL development engineer and the seismic engineer provided training delineating the SSEL development and the expected plant damage states.

The operations crew was then commissioned to perform plant walkdowns and table top discussions to validate the ability to achieve the desired equipment operations. The engineering staff provided "analytical obstacles" that had to be defeated. These obstacles included:

Debris fields
Expected harsh environments
Blocked/jammed doors
Communication system failures
Lighting failures

Specifically the operators were tasked to:

1) Verify the procedural set analyzed in the SSEL was correct.

2) Review the order in which equipment is operated and the time it takes to cascade to the SSEL equipment through procedural compliance.

3) Identify procedural weaknesses, i.e., identifying where doing things in the wrong sequence (from a priority standpoint) might lead to difficulties in achieving safe shutdown.

4) Walkdown selected procedure steps. The walkdowns included time penalties incurred from working around earthquake induced damage. (i.e., block wall rubble, minor leaks, the need to use ladders, etc.)

The outcome of the operator reviews revealed that the primary obstacle to achieving safe shutdown was due to both direct and secondary damage incurred from intermediate building block wall failures. When the operators were confronted with the plant damage state, (including potential hazardous environments) incurred from postulated failures in the building level which contains the steam header they expected to experience delays which could hinder the achievement of safe shutdown.

Accordingly, the impediments were resolved by performing an engineering modification to the affected wall panels which would preclude seismically-induced failure. Additionally the operators identified the need to provide additional procedural clarifications detailing expected seismically induced equipment losses and guidance as to how to mitigate those losses. The effects of the plant modifications along with the procedural enhancements were then reviewed to ensure that a normal operating shift compliment had sufficient resources and adequate time to achieve all actions necessary to safe shut down.

The plant SSEL, revision 1, addresses the resolution of the Group A and Group B outliers and includes a description of how resolution was achieved. The table summarizing resolution of all USI A-46 outliers is provided in Enclosure 2.

NRC RAI b:

As part of the licensee's review, were any control room structures which could impact the operator's ability to respond to the seismic event identified? Such items might include but are not limited to: MCR ceiling tiles, non bolted cabinets, and non-restrained pieces of equipment (i.e., computer keyboards, monitors, stands, printers, etc.). Describe how each of these potential sources of interactions has been evaluated and describe the schedule for implementation of the final resolution.

NRC Response b:

During the development of the Safe Shutdown Equipment List (SSEL) and subsequent SQUG walkdown of this equipment various seismic interactions were identified and resolved. The R.E. Ginna Nuclear Power Plant Control Room was determined to house ten major SSEL components. Each component walkdown was documented in a Screening Evaluation Work Sheet (SEWS). A review of these SEWS revealed 7 out of the 10 components had at least one seismic interaction concern. These interactions included an unsecured cabinet, copier, step ladder, and air sampler. An unanchored mail box, miscellaneous storage cabinets, control room ceiling tiles, and adjacent masonry walls were also identified. The seismic review team directed removal of identified seismic hazards, researched the control room ceiling evaluation, and documented the block wall qualifications. The SRT confirmed hazard removal in July 1996 and documented equipment seismic acceptance on component SEWS.

NRC RAI c:

Describe what reviews were performed to determine if any local operator actions were required to reposition "bad actor relays". For any such activities describe who adverse environmental conditions (such as loss of lighting, excessive heat or humidity, or in-plant barriers) resulting from the seismic event were analyzed and dispositioned. Describe how staffing was evaluated and describe the reviews which were conducted to ensure operators had adequate time and resources to respond to such events.

RG&E Response c:

RG&E performed a comprehensive evaluation of all relays associated with the SSEL (App. G of the January 31, 1997 submittal). All relays which were defined as 'low ruggedness' relays were modified or replaced, in accordance with the schedule provided in Enclosure 2. There are currently no 'low ruggedness' relays associated with the Ginna Station safe shutdown methodology equipment, and therefore no local operator actions are credited for resetting such relays.

NRC RAI d:

Describe which of the operator actions associated with resetting SSEL equipment affected by postulated relay chatter are considered to be routine and consistent with the skill of the craft. If not considered skill of the craft, what training and operational aids were developed to ensure the operators will perform the actions required to reset affected equipment?

RG&E Response d:

As stated in response to RAI d, no local operator actions are credited for resetting relays in the Ginna Station safe shutdown methodology.

NRC RAI e:

Assume the alarms associated with the "bad actor relays" are expected to annunciate during the seismic event. Do the operators have to respond to those annunciators and review the annunciator response procedures associated with them for potential action? How would those additional actions impact the operators ability to implement the Normal, Abnormal, and Emergency Operating Procedures required to place the reactor in a safe shutdown condition?

RG&E Response e:

This issue has previously been the subject of discussion between SQUG and the NRC, and has already been resolved. For completeness, we will summarize this resolution:

As described in EPRI Report NP-7148, Section 3.5.3, following an earthquake which causes a turbine and reactor trip, 50 to 100 or more alarms are expected to annunciate. The operators will clearly be aware that the plant has tripped.

Plant procedures and operator training require that operators response to the turbine trip and reactor scram by confirming the scram and trip and checking important levels, temperatures, pressures, flows, and electrical switching resulting from associated power transfers. These confirmatory checks will take more than a minute to go through during which time the operators will be busy making these checks and not responding to specific alarms. The earthquake motion is assumed to last less than a minute and the causes of the spurious alarms will have gone away during this period while the operators are responding to the plant trip.

As concluded in EPRI NP-7148, Section 3.5.3, p 3-12,

> "Accordingly, there appear to be no reasonable bases or evidence which would suggest that spurious alarms resulting from an earthquake may lead to abnormal operator responses. Therefore, special operating procedures or relay evaluation actions to address potential spurious alarms are not considered warranted and relays affecting alarms need not be seismically adequate."

The NRC staff accepted the relay functionality review procedure summarized in GIP-2 and described in detail in EPRI NP-7148 (including the above conclusion) in Supplemental Safety Evaluation Report No. 2 on GIP-2. Therefore, RG&E does not consider it necessary to perform any additional reviews of the effect spurious alarms caused by "low ruggedness" relays or other causes as a result of a seismic event.

NRC RAI f:

To the extent that Normal, Abnormal, and Emergency Operating Procedures were modified to provide plant staff with additional guidance on mitigating the A-46 Seismic Event, describe what training was required and provided to the licensed operators, non-licensed operators, and other plant staff required to respond to such events.

RG&E Response f:

Only minimal changes were required for plant procedures to account for the effects of the A-46 Seismic Event. Because Ginna uses Alternative Shutdown post fire methodologies the RG&E staff was already familiar with ex-control room manipulations to achieve and maintain safe shutdown. The normal and abnormal operating procedures provided for all functional requirements necessary for post seismic safe shutdown. The SQUG driven procedure changes consisted of guidance steps added to procedure ER-SC.4, Earthquake Emergency Plan. For the most part, the additional guidance took the form of reminders - prompting the operators as to the expected worse case equipment losses and to the correct procedure and step which mitigates that loss.

The procedure changes were reviewed by the Emergency Procedure Committee prior to submittal. A training request (TWR 1998-0700) was included with the procedure change submittal. The training department reviewed the change and determined tht read and acknowledge was the appropriate training method. To that end, the changes were reviewed by all operators, shift technical advisors and licensed instructors.

Mark B Fitzsimmons 4/20/99

Rev. 4, 4/15/99

OUTLIER TABLE – INCLUDES A-46, GROUP B

EIN	DESCRIPTION	REQUIRED FUNCTION	OUTLIER ISSUE	INTERIM ACCEPTABILITY	RESOLUTION PLAN/SCHEDULE	RESOLUTION DOCUMENTS	STATUS
MCC MCCD MCCH MCCJ	Motor Control centers C, D, H and J	Distribute power and circuit breakers provide isolation	These MCC's are floor mounted and are 15" deep. Per the GIP an MCC must be 18" deep or be top braced.	This caveat resulted from an SSRAP concern that there were no single section MCC's at data base sites less than 15" deep that saw ground motion on the order of the SQUG Reference Spectrum (0.5 g ZPA). Since then, the database has been expanded. Sufficient evidence is available to demonstrate capacity above 0 2 g. Ground spectra for MCC's low in buildings such as these.	Finalize documentation of capacity in 1997. CATS R05824	S&A Analysis 93C2780-C022 Revised SEWS 9/30/98	S&A Cal. Reviewed and accepted. **Outlier closed.**
MCCL MCCM	Motor Control Centers L and M	Distribute power and circuit breakers provide isolation.	A number of the anchors have significant exposed length, so the anchorage embedment may not meet GIP requirements	Anchorage calculations were performed using knockdown factors for low concrete strength, essential relays and unknown anchor type. The reductions were 0.75 x 0.75 x 0 6 = 0.3 (base allowable) and the result was a margin of 1.19 which is considerable considering the reduction taken to meet the GIP criteria, the embedment depth should be verified and a bolt tightness check made. The final report for EWR 2813 stats that the anchorage for MCCM has a factor of safety > 10.	Verify embedment and bolt tightness during 1997 refueling outage. If necessary install modification during 1999 RFO. CATS R05825	WO #'s 19701247 and 19701248 verified embedments and torque.	Embedments and torques acceptable. Updated SEWS 3/17/98. **Outlier closed.**
52/BYA 52/BYB 52/RTA 52/RTB	Reactor Trip Breakers and Reactor Trip Bypass Breakers	Trip Reactor	Block Wall Interaction	The Reactor Trip breakers fail open (Reactor Trip).They open on loss of DC power and loss of MG sets. No credible failure mode exists for this scenario.	Resolved	Need letter justifying acceptance (Dave Wilson/MBF)	Documentation provided by 12/7/98 ltr Wilson to Fitzsimmons **Outlier closed**
BUS 16	Bus 16 Switchgear	Distribute power and circuit breakers provide isolation	Bus 16 is adjacent to cabinet ARB1RC16. The clearance varies from 3/8" to almost nil at exposed bolt heads. Bus 16 contains essential relays so this configuration is an interaction outlier because of the possible impact of the cabinet.	Bus 16 contains essential, chatter sensitive relays. The concern is that rack to rack impacts can cause relay chatter. It is not likely that potential impacts between these cabinets. The relay cabinet is mounted at the end of BUS 16. BUS 16 is 160" long, 58" deep, 78" high and weighs about 15000#. The relay cabinet is 70" tall, 24" deep and long and weighs about 1000#. The switchgear cabinet will not displace much at all along its long dimension and the relay cabinet may impact it but with little effect. This is purely a SQUG concern and outside of the original design basis.	Bolt cabinets together during 1997 refueling outage. CATS R05826	PCR #97-035 DA-CE-97-023	**Cabinets connected with welded clip angles. Install. Complete 11/97. Updated SEWS 3/17/98. Outlier closed**

OUTLIER TABLE – INCLUDES A-46, GROUP B

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EIN	DESCRIPTION	REQUIRED FUNCTION	OUTLIER ISSUE	INTERIM ACCEPTABILITY	RESOLUTION PLAN/SCHEDULE	RESOLUTION DOCUMENTS	STATUS
90/MCCC 90/MCCD	Current Limiting Reactors	Must conduct current and provide fault current limiting.	Two issues, the SRT judged the cabinets to be fairly flexible (<8 Hz), therefore 1.5 x BS vs. Floor spectra was used. The FRS exceeds 1.5 x BS. Also, the cabinet structure is questionable due to the "latticed" panels on the front and back.	The "latticed" (similar to expanded metal) panels on the front and back of the cabinets require additional analysis to determine the true capacity of the cabinets, or the addition of stiffeners. The capacity may not quite meet the current Reg. Guide floor spectra, but would easily meet original design spectra.	Perform additional analysis to determine capacity by end of 1997. If modification is necessary install during 1999 RFO CATS R05827	S&A calculation No. 93C2769-C-021	Submitted CCVF 7/28/98. S&A Analysis complete. SEWS updated. No modifications. Outlier closed
TE-409A-1	RCS Loop A Hot Leg Temperature Element	RCS Hot Leg Temperature Indication	Cables in BW trays	Temperature indication is desired to monitor cool down rates and reactor core delta T's for natural circulation. Should loop A indication be lost, loop temperatures can be obtained by manually reading the resistance of other RTD's in the RCS loop. The process involves obtaining the proper measuring device, lifting leads in cabinets in the relay room, taking resistance readings and converting those to temperatures. Although this is a fairly simple procedure and has been performed in the past, it is not a normally performed procedure.	Perform additional analysis to determine capacity of block walls. IPEEE analysis showed additional capacity well above that reported during IE 80-11 resolution. Procedure will be finalized in 1997. If modifications are necessary, they will be performed during 1999 RFO. CATS R05828	Resolution to include taking manual reading NR Th/TC provides CR indication hold at no load tave until ready to use RTD readings. change SSEL - Add NR to SSEL ER-SC.4 Rev. 4 SSEL Rev. 1	Dave Wilson PCN . ER-SC.4 Rev. 4 signed 2/19/99 SSEL Rev. 1 4/23/99 No SEWS updates required. CCVF 4/23/99 Outlier closed
TE-409B-1	RCS Loop B Cold Leg Temperature Element	RCS Cold Leg Temperature Indication	Cables in BW Trays	See TE-409A-1	See TE-409A-1 CATS R05828	change SSEL - Add NR to SSEL, ER-SC.4 Rev. 4	Dave Wilson PCN. SSEL Rev.1, ER-SC.4 Outlier closed
LT-504	S/G A Wide Range Level Transmitter	Required for S/G A Level	Cables in BW Trays	Other wide range level indication devices are available, but they have power interdependencies that may make them susceptible to other single failures. Should it be necessary, S/G A wide range level can be obtained by manually reading the current loop associated with loop LT-505. This involves obtaining the proper measuring equipment, lifting leads in a cabinet in the relay room, taking a current measurement and converting that to a level reading. Although the process is simple, it is not a normally performed procedure.	Same as TE-409A-1 CATS R05829	Can use SAFW flow and pressurizer press have already changed FR's to allow use SAFW flow is GIPed. Add SAFW Flow to SSEL SSEL Rev. 1 4/23/99	Dave Wilson SSEL Rev. 1 4/23/99 Outlier closed

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BTRYA BTRYB	Battery Racks A and B	DC Power	Cells lack close fitting spacers between cells and the anchorage of the racks for north-south loads does not meet the GIP requirements	The battery racks meet the current design basis for seismic loading in both horizontal directions.	A modification to meet GIP criteria is in the design process and will be completed no later than the next refueling outage (1997). CATS R05830	PCR #97-038 installed mods. 1997. Need new mod. for larger batteries. Buying qualified racks; install in 99 RFO. w.o.'s 19702770, 19702771	PCR 98-066 installed new seismically qualified racks in 1999. Sews updated 4/99. Outlier closed
PT-468	S/G A Pressure Transmitter	S/G Pressure	BW outlier	Investigation of block walls for the IPEEE showed additional margin above that evaluated during IE Bulletin 80-11. This analysis shows that the walls are acceptable for the original design spectra and possibly for the current Reg. Guide spectra.	Same as TE-409A-1 CATS R05831 Qualify wall 971-141	DA-CE-99-041 qualified the wall therefore removing the interaction concerns	Wall seismically qualified by analysis. SEWS updated 4/99. Outlier closed
32/DGA	Westinghouse CRN-1 Relay	In DGAEC	Demand > GERS for all states	The relays meet the demand based on the original ground spectra including in cabinet amplification for all operating states of the relays. Therefore they meet out current design basis.	Analyze cabinet to determine actual demand. If mod. required, install in 1997 RFO. CATS R05832	PCR #97-031	Door stiffener mods. Installed 11/97. Updated SEWS 11/98. Outlier closed
32/DGB	Westinghouse CRN-1Relay	In DGBEC	Demand > GERS for all states	The relays meet the demand based on the original ground spectra, including in cabinet amplification for all operating states of the relays. Therefore they meet out current design basis.	Analyze cabinet to determine actual demand. If mod. req'd. Install in 1997 RFO. CATS R05832	PCR 97-031	Door stiffener mods. Installed 11/97. Updated SEWS 11/98. Outlier closed
42/3504A 42/3505A	Westinghouse Size 2 DC Motor Starter	In M @ V3504A and MS @ V3505A	Cabinet amplification unknown, outlier if > 1.6	Require further analysis to determine cabinet amplification. Valves are Group B outliers (block wall) – see discussion for Group B below and in the SSEL Report	See Group B below wall is seismic. CATS R05836 W.O. 19801843	DA-CE-98-095 PCR 98-022 Hot short issue still	Walls seismic by analysis Outlier closed
KIX/DGA K1X/DGB	Allen Bradley 200E00Z1A Relay	In DGACP & DGBCP	No Data	Need to investigate – either get data, test relays or replace with relays of known ruggedness.	Determine capacity and either accept or replace by the end of the 1997 RFO	PCR 97-032	Relays replaced 11/97. Updated relay eval. Shts 3/17/98. Outlier closed
K4-A K4-B	Potter Brumfield 6739-B3-A2 Relays	In DGACP & DGBCP	No Data	Need to investigate – either get data, test relays or replace with relays of known ruggedness.	Determine capacity and either accept or replace by the end of the 1997 RFO	PCR 97-032	Relays replaced 11/97. Updated relay eval Shts 3/17/98 Outlier closed

OUTLIER TABLE – INCLUDES A-46, GROUP B

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OSR-A OSR-B	Allen Bradley 200E400Z1A Relays	In DGACP & DGBCP	No Data	Need to investigate – either get data, test relays or replace with relays of known ruggedness.	Determine capacity and either accept or replace by the end of the 1997 RFO	PCR 97-032	Relays replaced 11/97. Updated relay eval. Shts 3/17/98. Outlier closed
VFX-1-A VFX-1-B	Allen Bradley 200E300Z1A Relays	In DGACP & DGBCP	No Data	Need to investigate – either get data, test relays or replace with relays of known ruggedness.	Determine capacity and either accept or replace by the end of the 1997 RFO	PCR 97-032	Relays replaced 11/97. Updated relay eval. Shts 3/17/98. Outlier closed
VFX-2-A VFX-2-B	Allen Bradley 200E300Z1A Relays	In DGACP & DGBCP	No Data	Need to investigate – either get data, test relays or replace with relays of known ruggedness.	Determine capacity and either accept or replace by the end of the 1997 RFO	PCR 97-032	Relays replaced 11/97. Updated relay eval. Shts 3/17/98. Outlier closed
AB53	Cable Trays in Aux. Bldg. El.253	Cable Trays	Hanger AB34 does not meet the Limited Analytical Review requirements due to the bending moment developed in the horizontal member at the top of the hanger that spans between the anchors.	Upon further investigation and inspection by D. Zebroski and S. Anagnostis it was judged that even if this hanger was to be removed (fail), there was sufficient support provided by adjacent hangers to maintain the current configuration. This is an extremely congested area, with cable trays branching and dropping into BUS 16.	Finalize analysis and either accept or modify by the end of the 1997 RFO. CATS R05834	PCR 97-035 DWG 33013-2746 DA-CE-97-068	Support enhancements installed 11/97. Revised OSVS 4/3/98. Outlier closed
AB2710	Cable Trays in Aux. Bldg. El. 271	Cable trays.	12' cable tray is supported on a block wall next to the fuel pool.	Cables were investigated as part of the block wall effort	See block wall discussion in SSEL Report and Group B resolution. CATS R05837	ER-SC.4 Rev. 4 SSEL Rev. 1	Procedures installed Outlier closed
INT253 CLEAN	Cable Trays in Int. bldg. Clean Side El.253	Cable trays	Block Wall Problems	Cables were investigated as part of the block wall effort	See block wall discussion in SSEL Report and Group B resolution. CATS R05837	ER-SC.4 Rev. 4 SSEL Rev. 1	Procedures installed Outlier closed
INT253 HOT	Cable Trays in Int. Bldg. Controlled Side El.271	Cable trays	Block Wall Problems	Cables were investigated as part of the block wall effort	See block wall discussion in SSEL Report and Group B resolution. CATS R05837	ER-SC.4 Rev. 4 SSEL Rev. 1	Procedures installed Outlier closed
INT271 HOT	Cable Trays in Int. Bldg. Controlled Side El 271	Cable trays	Block Wall Problems and tray span > 10' due to missing horizontal support member	Cables were investigated as part of the block wall effort	See block wall discussion in SSEL Report and Group B resolution. CATS R05837	ER-SC.4 Rev. 4 SSEL Rev. 1	Procedures installed Outlier closed

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MS@ V3505A	Motor starter cubicle for MOV 3505A	Valve must remain closed, Opens on LOOP.	Group B	See above.	See above. W.O. 19801843	Fix wall at F line PCR 98-022 DA-CE-98-095 ER-SC.4 Rev.4 SSEL REv. 1	Procedures and mods. installed **Outlier closed**
3410 3411	S/G A & B Atmospheric relief valves	Must not FO, NC and FC on loss of DC or IA	Group B	See above. IB 278'-4" South of walls 21,31, 41, 51	See above W.O. 19801843	Fix wall at F line PCR 98-022 DA-CE-98-095 ER-SC.4 Rev.4 SSEL REv. 1	Procedures and mods. installed **Outlier closed**
PHBG	Pressurizer Heater Backup Group	Pressurizer Heater	See above.	See above.	See above. CATS ID R06968	Procedure change: Pull fuse ER-SC.4 Rev. 4 SSEL Rev.1	Procedures installed **Outlier closed**

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INT278 CLEAN INT298 CLEAN INT293HOT	Cable Trays in Int. bldg. Clean Side Els. 278 & 298 and Controlled Side El. 293	Cable trays	Block Wall Problems	Cables were investigated as part of the block wall effort	See block wall discussion in SSEL Report and Group B resolution. CATS R05837 W.O. 19801843	F-Line fix/278'-4" PCR98-022 ER-SC.4 Rev. 4 SSEL Rev. 1	Procedures installed Outlier closed
Group B	See individual items below.	See individual items below.	Loss of preferred mode of operation. See SSEL Report for discussion and details.	No loss of safe shutdown function. See SSEL Report for discussion and details.	Perform time and motion studies and cost/benefit analysis to evaluate possible enhancements. Complete studies by end of 1997. CATS ID R05837		Complete 12/98
4613 4614 4663 4664 4773	Turbine Bldg. SW Isolation Valve Turbine Bldg. SW Isolation Valve Air Conditioning SW Isolation Valve Turbine Bldg. SW Isolation Valve Air Conditioning SW Isolation Valve	Service Water Isolation	Group B	See above.	See above. CATS ID R05837	SW Flow cal. DA-ME-96-097 ER-SC.4 Rev. 4 SSEL Rev. 1 AP-SW.1	Procedures installed Outlier closed
5735 5736	S/G A & B Blowdown Sample Isolation Valves	NO, Must Close, (fail closed on loss of DC or IA)	AOV on 3/4" line. Valves too flexible.	SQUG inclusion rules for AOV's specify 1" or larger line. The line is fairly well supported vertically, but the valve can put a torsional load on the pipe that should be evaluated to meet the intent of the caveat. This is a new SQUG criteria - the current license basis does not include any such limit on pipe line size. Pipe stress.	See above. CATS ID R06966 W.O. 19804454 99 RFO	PCR 98-052 Rev.1 DA-CE-99-108 Rev 1 DUF 99-0071	PCR 98-052 Rev. 1 installed valve operator restraints. SEWS updated 4/99. Outlier closed.
5737 5738	S/G A & B Blowdown Isolation Valves	NO, Must Close, (fail closed on loss of DC or IA)	Group B	See above.	See above. CATS ID R06966	ER-SC.4 Rev. 4 SSEL Rev. 1	Procedures installed Outlier closed
3504A 3505A	S/G A & B Steam Supply Valves to TDAFW Pump	NC, Must Remain Closed, Open on LOOP.	Group B	See above. IB 278'-4" South of walls 21,31, 41, 51	See above. W.O. 19801843	Fix wall at F line PCR 98-022 DA-CE-98-095 ER-SC.4 Rev.4 SSEL REv. 1	Procedures and mods. installed Outlier closed

B. Fire

1. **It is unclear how room-to-room fire scenarios were treated in the Ginna IPEEE analysis. Section 3.1 of the submittal indicates that fire areas were screened individually according to the FIVE [1] criteria (i.e, the area contains no Appendix R equipment, and a fire in the area would not cause a demand for safe shutdown). This section also indicates that fire compartments were further screened if they had no credible potential for fire spreading to other fire compartments. While the submittal indicates that the qualitative screening conformed with Phase I of the FIVE methodology, fire propagation potential between fire compartments is reviewed in the FIVE methodology during the Fire Compartment Interaction Analysis (FCIA). The submittal does not indicate that the FIVE FCIA criteria were used to determine if fire propagation between fire zones was possible.**

   The submittal does provide qualitative criteria for grouping plant locations, but it is unclear that this approach has adequately treated room-to-room fire scenarios. One of the cited criteria indicates that plant locations were grouped together when a physical barrier (not necessarily fire-rated) separates the subject locations from the rest of the plant and there is a significant time delay for fire propagation from the subject locations to other adjacent locations. In addition, the submittal indicates that one consideration for determining the importance of a location was whether it contains a sufficient amount of combustible material that, if ignited, could potentially propagate to adjacent zones. The basis for making these judgements is not provided. Further, it is not clear that the analysis has adequately considered the potential that active fire barrier elements (e.g., normally open fire doors, ventilation dampers, etc) might fail to activate, or that passive fire barriers (e.g., various fire barriers both rated and unrated and barrier penetration seals) might be challenged by local concentrations of flammable materials. Finally, it is not clear that the analysis has considered the potential for the spread of smoke and heat from one compartment to another in addition to the consideration of actual fire spread.

   Please clarify the bases used to assess the potential for cross-zone spreading of fire, heat, and smoke. Please provide an analysis for all fire areas of the effect on fire-induced core damage frequency (CDF) that includes consideration of the failure potential of active barrier components such as doors and dampers. Please provide an analysis of the potential for cross-zone fire propagation for high hazard areas such as the turbine building, diesel generator room, switchgear rooms, and lube oil storage areas that includes consideration of the potential to challenge passive fire barrier elements.

   The requested information is contained in Appendices B ("Location Characteristics Table") and E ("Propagation Pathway Credibility Assessment") to the 1998 submittal. While these appendices were never submitted to the NRC, selections from these Appendices have been extracted and included as Attachment B.1 to accompany the discussion provided below. The appendices in their entirety can be provided if required by the NRC.

Appendix B develops a fire zone adjacency matrix for each fire zone to identify possible propagation pathways (Item 4 in the Location Characteristics Table [LCT], e.g., as shown on page B-3 of Attachment B.1). Appendix E develops criteria to qualitatively screen the credibility of these propagation pathways (see Table E-2 beginning on page E-9 and its Supplement in Attachment B.1 which lists the propagation scenarios developed for the initial fire zones). As an example, referring to Item 1 on page B-3 of Appendix B, there are two fire zones, ABB and ABM, within fire area ABBM. Six fire zones are listed as horizontally adjacent to these two zones in Item 4, along with the corresponding propagation pathways and barrier ratings. These are repeated in Table E-2 (see page E-9 of Appendix E), where they were evaluated with respect to fire propagation as discussed below.

In the spatial interactions analysis, a propagation pathway was assumed to be credible if there is no automatic suppression system in the initial fire zone or in the adjacent fire zone AND at least one of the following criteria were satisfied:

1. There is a permanent opening between the fire zones;

2. The fire duration of the combustible contents in the initial fire zone is greater than 75% of the rating of the fire barrier (e.g., door, wall, etc.) separating the initial fire zone and its adjacent fire zones.[1]

The first criterion is conservative because it does not consider the actual amount of combustible inventory, the location of the fire source, and the separation distance between the fire source and combustibles in the adjacent location(s). The second criterion takes into consideration the potential failure of fire barriers (e.g., a fire door being left open), but requires a minimal amount of combustibles to provide a propagation path. The fire duration and barrier ratings for each fire zone are included under Items 2 and 4 in the LCT (see page B-3). Table E-2 and Supplement indicate whether or not inter-zonal propagation satisfies Criterion 1 or 2, from above.[2]

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1 The FIVE FCIA permits screening out propagation between compartments, one of which may contain safe shutdown equipment, for <u>any</u> of the following:

1. Boundary fire rating of at least two hours
2. Boundary fire rating of one hour with combustible loading in the exposing compartment < 8E+4 BTU/ft^2 (the Ginna IPEEE, by screening for 75% of this combustible loading, employs a more stringent criterion of < 6E+4 BTU/ft^2)
3. Very low combustible loading (< 2E+4 BTU/ft^2) in the exposing compartment, with automatic fire detection present
4. Very low combustible loading (< 2E+4 BTU/ft^2) in both the exposing and exposed compartment (regardless of presence of automatic detection)
5. Presence of automatic fire suppression above combustibles in exposing compartment.

2 The combustible inventory, listed under Item 2 in the LCT, denotes the maximum combustible loading within a fire zone allowed by procedure. In reality, the actual inventory may be less than the maximum allowable amount. The second criterion suggests that if the combustible inventory fire severity is less than 75% of the barrier rating, then there will not be a propagation pathway between fire zones. In order to have a fire propagation pathway if the fire duration is less than 75% of the barrier, the barrier must fail due to random failure (fail before the rated time on demand). Table E-2 and Supplement indicate whether or not the potential fire duration exceeds 75% of the barrier rating.

For the fire areas which met one of the two propagation criteria, the analysis considered multi-level fire propagation between locations. Level-1 propagation involves one initial fire zone and fire zone(s) directly adjacent to it through a credible propagation pathway. Level-2 fire propagation involves one initial fire zone, the fire zone(s) directly adjacent to it, and the fire zone(s) that are adjacent to the Level-1 fire zone(s). At Level-2, the fire would have to propagate through two fire barriers, with the time required to burn through being at least 2 hours (assuming each barrier is at least one-hour rated). The mean generic fire suppression time for most fires is 40 minutes (estimated by Sandia in Ref. 5). A survey of past fire drills at Ginna indicates that the longest total duration of a drill was less than 50 minutes (see Table 3-12 of the 1998 submittal). It is reasonable, then, to assume that the longest response time at Ginna (regardless of the location) is less than 50 minutes. Therefore, it is expected that the fire brigade will start fire-fighting efforts at the initial fire zone and the Level-1 locations, and respond to the Level-2 locations to start cooling the pathways between Level-1 and Level-2 locations. Thus, the probability of a fire being allowed to propagate to Level-2 fire zones is negligible. As a result, all propagation scenarios involving Level-2 propagation or higher were also screened from the analysis.

Table E-2 and Supplement of Appendix E (see Attachment B.1) summarize the analyses of the potential for inter-zonal fire propagation for all Ginna fire zones. Included among these are high hazard areas such as the turbine building (TB), diesel generator rooms (EDG1A/B), switchgear rooms (distributed among the auxiliary building [ABM and ABO], turbine building, and screen house [SH]), turbine lube oil storage area (TO), and hydrogen storage area (H2). Review of Table E-2 and Supplement indicates that fire propagation to/from these zones was not considered credible since: (1) they did not meet either of the two screening criteria; or (2) they met at least one of the criteria, but fire propagation was still considered not credible for other reasons (see Notes in Table E-2 and Supplement).

The LCT from Appendix B (also in Attachment B.1 [see, e.g., pp. B-3 through B-5 and B-48]) includes the following information in greater detail for these zones:

1. Fire and smoke hazards, as obtained from review of the Ginna Station Appendix R program information (Item 2);
2. Fire protection features, i.e., the fire detection and suppression capabilities (Item 3);
3. Adjacent fire zones (Item 4);
4. Potential key equipment and their associated basic event impacted by fire or smoke hazards (Item 5);
5. Potential raceways (conduit and cable tray) and their associated equipment/basic events impacted by fire or smoke hazards, where the cable trays associated with the safety equipment were identified from a database relating cables and conduit to the equipment served (Item 6);
6. Notes taken during the two spatial interactions walkdowns (Item 7).

As reported in Section 3.9.2 of the 1998 submittal, active fire barrier components at Ginna consist of fire doors and dampers. There are also penetration seals, considered to be passive barriers. Fire doors are inspected and maintained through station procedure FPS-15, "Fire Door Identification, Inspection and Maintenance," on a quarterly basis. The

procedure also lists all the fire doors and their locations. To date, there have been no failures of fire doors that have not been promptly detected during these plant tours. Compensatory and corrective actions have been initiated as required. The accessible fire zones are also visited by plant personnel frequently (e.g., auxiliary operator and security rounds), and the plant personnel are trained to maintain fire doors closed. Therefore, it is unlikely that a fire door would be left open and uncorrected for an extended period of time.

Engineering Work Request (EWR) 4882 completed verification in 1991 that all plant fire dampers were installed and configured as designed (or provided for analyses where differences from qualified configurations existed). Fire damper operability is verified through station procedure PT-13.26, "Testing of Fire Dampers." Ten percent of the dampers are drop-tested yearly on a rotating basis so that all dampers are tested at least once every ten years. If any damper fails the drop test, an additional 10% are tested for every failure. Fire dampers are inspected and maintained through station procedure M-103, "Inspection and Maintenance of Fire Dampers." Both procedures list all the fire dampers, their ratings, and their locations. Adherence to these procedures assures that all fire dampers are present as configured and reduces the likelihood of a failure upon demand.

EWR 4941 completed verification in 1991 that all plant fire penetration seals were installed and configured as designed (or provided for analyses where differences from qualified configurations existed). A database was developed and each seal was associated with an industry fire test. This database is updated annually in accordance with station procedures FPS-2.1, "Control and Verification of UFSAR and/or 10CFR50 Appendix R Fire Barriers," and FPS-2.2, "Control and Verification of Non-UFSAR and Non-10CFR50 Appendix R Fire Barriers." Visual inspections are performed every 18 months for the UFSAR/10CFR50 penetration seals under FPS-2.1 and every 36 months for the non-UFSAR/non-10CFR50 penetration seals under FPS-2.2. Adherence to these procedures assures that all fire penetration seals are present as configured and reduces the likelihood of a failure upon demand.

In summary, the potential for inter-zonal spreading of fire, heat and smoke was assessed using criteria derived from the FIVE FCIA, but considered more conservative. For example, the "critical" combustible loading in the originating fire zone was reduced to 75% of the FIVE FCIA criterion. The potential for inter-zonal propagation was examined for the high hazard areas, individually the turbine building (TB), diesel generator rooms (EDG1A/B), switchgear rooms (distributed among the auxiliary building [ABM and ABO], turbine building, and screen house [SH]), turbine lube oil storage area (TO), and hydrogen storage area (H2). Fire propagation to/from these zones was not considered credible. This is further supported by the fire protection testing program described earlier.

2. **The Ginna fire IPEEE submittal indicates that cable wrap was credited in the quantitative assessments, but the treatment that was given is not clear and may have led to "double counting" of suppression effectiveness. It is also not clear if this approach was used in the screening analyses as well. Section 3.3.4 (Assumption 2) indicates that "a probability of 0.15 was assigned to the failure of cable wrap to account for the probability that a fire is not suppressed within the one hour time frame associated with the fire rating of the cable wrap." This description implies that the modeling of the cable wrap failure implicitly credits fire suppression in the quantitative screening of fire zones that contain the wrap. In the detailed fire PRA evaluations, an additional independent credit for fire suppression efforts would result in double counting suppression efforts.**

Please indicate if fire suppression was credited in fire scenarios where cable wrap was independently credited as protecting critical cables. If there are any such scenarios, reevaluate the core damage frequency either (1) assuming that the 0.15 barrier failure probability fully credits suppression, or (2) assuming an independent suppression credit and that the cable wrap fails with a probability of 1.0 for all fires lasting greater than one hour.

Double-counting of cable wrap protection and fire suppression efforts did not occur in the IPEEE analysis. The factor of 0.15 is related to the failure to manually suppress the fire within the time that the cable wrap provides protection. The 0.15 cable wrap failure probability represents the conditional probability that longer term manual suppression efforts, using fire hoses or extinguishers, fail to extinguish the fire prior to the damage of wrapped cables. If this occurs, the cable wrap is assumed failed with a probability = 1.0. In addition, if a fire area for which fire wrap was credited has insufficient combustible loading to support a fire duration of at least one hour, a 0.1 probability was assigned that such a loading might exist. If the fire area already had the sufficient loading, no adjustment was made. It is explicitly assumed that the installed fire sprinklers have failed to extinguish the fire (either automatic or manually actuated). The analysis, therefore, did not apply double credit for fire sprinkler protection and cable wrap protection. No significant dependencies were identified between the performance of manual suppression, using fire hoses or extinguishers, and the functioning of the installed fire sprinklers (including manual actuation of the sprinklers) as discussed in the response to RAI Question #9, below. Therefore, no significant dependencies were identified to exist between the 0.15 cable wrap failure probability and the failure probability of installed fire sprinklers. Finally, as described in the response to RAI Question #8 below, the Fire IPEEE was resolved with the fire suppression system specifically modeled. As shown in Section 9.6.3.4 of Attachment B.3 (and Table 9-18), cable wrap failures were not risk significant.

3. The 19 fire zones remaining after the qualitative and quantitative screening phases of the Ginna fire assessment were subjected to further detailed evaluation including the analysis of fire propagation and suppression. Actual fire modeling using the FIVE methodology or other techniques was not performed. Instead, probabilities for fire propagation were assigned based primarily upon physical separation of equipment. However, it is not clear upon what basis these judgements were made.

For example, in the analysis of the Auxiliary Building Operating Level (ABO, Page 3-14) "a 0.01 probability was assigned that a fire occurring in the vicinity would disable both CCW pumps, and a 0.99 probability was assigned that one CCW pump, in addition to one AC power electrical division, would be disabled." It is not clear that this assumption is well founded. The submittal states the two CCW pumps are located within nine feet of each other, and that there are cables in conduits in the area. Presumably, loss of the cables may lead to loss of the second pump. Further, the fact that the fire source appears to be the CCW pumps themselves, there would be a significant potential for large fires to occur. Given a large fire, nine feet of spatial separation would likely not prevent thermal damage to the second pump, its power cables, or its control cables. This is one specific example where the assumed damage probabilities may be optimistic.

For other fire areas, from the description of fire scenarios presented in the submittal, it appears that fires that are not suppressed were assumed to damage all the equipment in a fire zone. If the fire was suppressed, some level of damage was assumed to occur, and it appears that in many cases suppressed fires were assumed to damage just one electrical division. The submittal states that this is conservative since for many fire scenarios only a portion of components relying on the electrical division would be disabled. In general, this approach is acceptable if the critical set of components and cables are relatively far apart, and therefore, it will take a long time for a fire to damage them. On the other hand, if the key cables and components are close together, critical damage may occur before successful suppression.

Please provide a general description of how the fire damage assumed for each of the fire scenarios considered in the detailed analyses was determined. Include a description of the criteria used to determine the radius of the damage caused by suppressed fires and the timing of component damage. Also indicate to what extent the actual location of critical cables and components was verified and considered in the damage assessment. For suppressed fires, indicate if any time was assumed for the suppression of the fire and if this time impacted the assumed damage.

For each fire scenario, the potential fire sources and critical cables and equipment were carefully examined. Fires were assumed to fail all equipment and cables in a fire zone unless the fire was suppressed or physical separation or barriers existed (i.e., a detailed analysis was performed). The grounds upon which physical separation, barriers and fire suppression were credited in these detailed analyses as well as the justification for the extent of damage assumed, including considerations of timing and damage radii, are provided in the following discussion. The discussion is presented in two parts: (1) postulation of damage to one electrical division for scenarios in which fire suppression succeeds, and (2) use of physical separation or barriers as justification for limiting damage of a zone's contents.

1. Postulation of Damage to One Electrical Division for Scenarios in which Fire Suppression Succeeds. Justification for postulating damage to one AC electrical train for scenarios in which fire suppression succeeds is provided as follows.

   a. Cables -- Fire suppression credited for the protection of plant cables consisted of the automatic actuation of sprinklers as well as manual actuation of the sprinklers in the event that automatic actuation fails. For instances in which automatic actuation succeeds, sprinkler protection is postulated to commence prior to significant cable damage since the sprinkler head fuses melt at a temperature well below the damage and ignition temperatures of the cable insulation. Similarly, the successful manual actuation of sprinklers was postulated to commence prior to significant cable damage. A failure probability of 0.01 was assigned for the manual actuation when automatic actuation failed to reflect the potential delay of actuation prior to significant cable damage. This value takes into consideration the close proximity of the sprinkler actuators to the control room (within a two-minute response from the time a smoke alarm is received).

      On this basis, fires were postulated to fail only the contents of one cable tray for scenarios in which sprinkler protection is successful. By examining the inventories of cables routed in each cable tray in the applicable zones, the conditional core damage probabilities (CCDPs) associated with such damage were found to be bounded by the CCDP for the loss of one AC electrical train.

   b. Equipment -- Fire zones containing multiple equipment trains were also evaluated.

      i. Fire zone ABB (auxiliary building basement) -- Sprinkler protection is provided for cables installed in the safety injection (SI) pump area. Although fire scenarios in this area could disable both SI pump trains, the loss of SI in conjunction with the loss of cables for any cable tray in ABB results in CCDPs which are bounded by the CCDP for the loss of an entire AC power train. The assumption, therefore, for the loss of one AC power train is conservative.

      ii. Fire zone ABM (auxiliary building mezzanine) -- The only PSA-related components consist of two electrical buses that belong to a single AC power train, which was then assumed to fail. Fires igniting within the electrical bus cabinets were assumed not to damage cables in surrounding cable trays since flames would be contained within the sealed cabinets for a time sufficient for suppression to commence (that is, for the sprinkler head fuses to melt). Likewise, fires occurring outside of the buses were judged not to be capable of damaging the electrical buses prior to initiation of suppression. Therefore, no credible fire scenario was identified which could damage the electrical buses and cables belonging to the opposite AC power train. The assumption for the loss of one AC power train is therefore valid.

iii. Fire zone AHR (air handling room) -- The loss of all PSA-related components would cause only a reactor trip. In conjunction with the postulated loss of one cable tray, the CCDP for reactor trip is bounded by that for the loss of one AC power train.

iv. Fire zone BR1A or BR1B (battery room A or B) -- The loss of all PSA-related components would cause the loss of only one AC power train, which was then assumed to fail.

v. Fire zone IBN-1 (intermediate building north) -- The loss of AFW Pumps A and B is credible. However, due to the multiple sources of feedwater not impacted by the fire (i.e., turbine-driven auxiliary feedwater pump, standby auxiliary feedwater pumps C and D, and main feedwater pumps A and B), the loss of one AC power train assumed for the scenario is bounding.

2. Use of Physical Separation or Barriers as Justification for Partial Damage of a Zone's Contents. As discussed in the 1998 IPEEE submittal and expanded upon where pertinent here, physical separation rationales were used in the detailed fire modeling for five fire zones.

a. Auxiliary Building Operating Level (ABO) -- Due to the nine-foot separation between the component cooling pumps installed in zone ABO, and a lack of intervening fixed combustibles (all cables in the area are routed in conduit), a 0.01 probability was assigned that a fire occurring in the vicinity would disable both CCW pumps. This probability was based on the following considerations:

i. Since no intervening fixed combustibles exist between the two CCW pumps (control and power cables associated with each pump penetrate the floor from below directly adjacent to the pump they serve, and therefore do not travel near the other pump) and no fixed combustibles are installed in the broad vicinity of the pumps, two sources of combustion must be considered: (1) the potential for the ignition of one CCW pump to damage the second CCW pump and (2) the potential for a transient combustible fire to damage both pumps.

ii. The ignition of one CCW pump was judged not to have the potential to cause damage to the second CCW pump based on the following grounds:

- No combustible material is installed on the outer surface of the pumps (all cables are installed in conduits) and therefore ignition of the second pump is not likely.
- The pumps are installed in a large, open area and therefore the heat from the ignited pump would be dissipated.

- The pump motors are relatively small, and therefore the heat generated by the ignition of one pump would be limited.
- The only lubricant utilized for the pumps is grease located within sealed gear boxes. This significantly reduces the likelihood for leakage of combustible material to the exterior of the pump, which eliminates the potential for a large pump lubricant spill, and also reduces the likelihood for combustion of lubricant of the second pump.

iii. A significant transient combustible fire was judged to be the only credible fire source that could disable both pumps. A very conservative apportionment of 0.01 of the total fire initiation frequency for the zone was assigned for the occurrence of a transient fire failing both CCW pumps on the basis that:

- Transient combustibles comprise only one category of ignition sources present in the zone. The 0.01 factor addresses, in part, the probability that a transient combustible fire initiates the fire scenario (rather than some other ignition source), and that the fire occurs in the vicinity of the pumps (the pump area occupies less than three percent of the total floor area).
- Transient combustibles would normally be in this area only during pump maintenance. The 0.01 factor also addresses, in part, the likelihood that the presence of significant transient combustibles within the vicinity of the pumps (such as a solvent spill) would not be detected within a relatively short period of time by the maintenance personnel, security personnel during hourly rounds, or plant operators during shift rounds.

iv The Fire IPEEE was re-solved assuming that the CCW pumps always failed during a fire on the Auxiliary Building Operating Level (see response to RAI Question #8). For this case, the fire CDF only increased by 8.8E-07/yr. This limited increase is due to the small potential for the need for CCW in the short term. While CCW would be required to support RHR cooling, the plant can remain on AFW for a long period of time. Also, there is no real scenario by which a fire at this location could create a PORV LOCA requiring RHR in the short term.

b. Turbine Building Basement (TB-1) -- Cables that supply offsite power to the 480V safeguards Buses 17 and 18 are routed in the turbine building basement near, and parallel to, the eastern wall. A review was performed of the location of potential fire sources. Most fire sources are not located near the cable runs. The primary fire source, the turbine lube oil reservoir and associated equipment, is located at the opposite end of the turbine building and is protected by a fire suppression system. Major lube oil piping

is also encased inside a guard pipe to collect leakage. The major portions of the hydrogen seal oil system are located toward the center of the turbine building, inside an enclosure with automatic fire doors and a fire suppression system. The most significant fire sources near the 480V safeguards bus cable runs are two of the condensate booster pumps and the four air compressors. Based on this arrangement of significant fire sources in the zone, a seven percent likelihood was assigned that fires occurring in TB-1 will be in the proximity of the offsite power cables supplying Buses 17 and 18, or will be of sufficient magnitude to propagate to that portion of the zone.

The cables supplying Buses 14 and 16 are also located near, and parallel to, the east wall of fire zone TB-1 and travel a total distance of only ten feet within the zone. One of the condensate booster pumps is located near these cables. The cables supplying Buses 17 and 18 are located more than 20 feet from those supplying Buses 14 and 16. Based on this arrangement, a three percent likelihood was assigned that fires occurring in TB-1 will damage the offsite power cables supplying Buses 14 and 16 in addition to those supplying Buses 17 and 18. All other fires occurring in the zone were postulated not to damage the offsite power cables.

The justification for the use of the three percent and seven percent values is as follows. An area extending 10 feet on either side of the cable runs would comprise a little less than eight percent of the turbine building basement area. Based roughly on these physical dimensions, a ten percent likelihood was assigned that fires occurring in TB-1 would be in the proximity of these cables, and cause damage to them. The most critical length for failing all four safeguards buses, below the 4kV Buses 12A and 12B, comprises about 20 percent of this cable run length. Therefore, the ten percent was further divided into seven percent for the cables to the safeguards Buses 17 and 18, and three percent to cables for all four safeguards buses, including Buses 14 and 16.

c. Reactor Containment Mezzanine (RC-2) -- Fires with sufficient intensity to damage equipment located in RC-2, other than those involving ignition of combustibles related to a reactor coolant pump (RCP), were postulated to damage all equipment in the zone, with the exception that RCS circulation was assumed to remain functional. This exception was made on the basis that no credible fire scenario was identified that could disable RCS forced circulation (i.e., both RCPs) and natural circulation (i.e., the pressurizer heaters and both shroud fans). Significant separation was identified between cables associated with these systems. In particular, the power and control cables for RCP A travel through the northwest quadrant of containment and those for RCP B travel through the southeast quadrant and are located over sixty feet apart. The pressurizer heater cables are located 24 feet from RCP B cables at the nearest point and over sixty feet from RCP A cables. The shroud fan control and power cables are located in close vicinity of RCP A cables but not those of RCP B cables. Therefore, for calculational purposes, RCP A and the shroud fans were arbitrarily selected as surviving this fire scenario.

d. Auxiliary Building Basement Level (ABB) -- The auxiliary building basement was divided into three sections for the purpose of defining fire scenarios (the charging room is its own separate zone). The division was based on walkdown observations, cable routing, and examinations of plant layout drawings.

i. The safety injection pump area contains most of the electrical cables present in ABB; unsuppressed fires occurring in this area were conservatively assumed to damage all equipment and cables in this area.

ii. Propagation of fire from rooms in the northern part to the adjacent safety injection and charging pump rooms was judged not to be credible based on the presence of relatively few combustibles and the enclosure of these northern rooms by concrete walls.

iii. In the RHR pump area, the vital equipment and cables installed in this area are separated from the adjacent safety injection pump area by approximately 40 feet, and the RWST occupies most of the space at the interface of the two areas. Propagation of fire from this area to the adjacent SI pump area was judged not to be credible.

e. Screen House Operating Level (SH-2) -- The PSA-related equipment installed in the screen house operating level consists of two 480-VAC safeguards Buses 17 and 18, and the four service water (SW) pumps. No electrical cables are installed on the operating floor; therefore, consideration of cable-related fires was not necessary.

Buses 17 and 18 are installed end-to-end (note: the cabinets are not installed back-to-back -- the short ends of the cabinets are adjacent). Cabinet fires that are significant enough to damage more than two bus compartments were assumed to disable both buses, which results in a loss of all SW. Cabinet fires that do not disable more than two bus compartments result in the loss of no more than two SW pumps; therefore, two SW pumps were conservatively assumed to be unavailable for such fires.

For fire scenarios which involve the SW pumps (installed on the operating level), no credible fire scenario was identified that would disable more than two SW pumps. No intervening combustibles are installed between the SW pumps (only the pump motors are present on this floor; no cables are present) and only one fixed combustible (a diesel-driven fire pump) is installed within 20 feet of the pumps. Therefore, three sources of combustion were considered to be credible: (1) the potential for the ignition of one SW pump to damage other SW pumps, (2) the potential for the diesel-driven fire pump to damage the SW pumps, and (3) the potential for a transient combustible fire to damage the pumps.

1. SW pump fire -- The ignition of one SW pump was judged not to have the potential to cause damage to other SW pumps because:

   i. No combustible material is installed on the outer surface of the pumps; therefore, ignition of the other pumps is not likely. Damage of other SW pumps would require radiative or convective heat transfer.

   ii. The SW pumps are installed in a large, open area and therefore the heat from the ignited pump would be dissipated.

   iii. Only the SW pump motors are present on the operating level. Lubricant utilized for the pump motors is a small quantity of grease located within sealed bearings. This significantly reduces the likelihood for leakage of combustible material to the exterior of the pump, which eliminates the potential for a large pump lubricant spill, and reduces the likelihood for combustion of lubricant for neighboring SW pumps.

2. Diesel fire pump fire -- Two of the SW pumps are installed at distances of 8 and 16 feet from the diesel-driven fire pump (with the other two at 24 and 32 feet). A berm is installed to collect diesel fuel if spillage occurs and direct the spill to an outside sump. Therefore, a fire involving the diesel fuel (if no spraying of the fuel occurs) would be relatively confined. Conservatively, two SW pumps were postulated to be disabled because of the distance involved.

3. Transient combustible fire -- For the analysis, transient combustible fires were judged to be capable of damaging no more than two SW pumps. The bases for this are the same reasons described for the CCW pump in Section 2.a of this same response above (e.g., the pump area occupies less than 5% of the total floor area; transient combustibles would only be in the area during pump maintenance).

A sensitivity analysis was performed for the assumption that only two of the four SW pumps were impacted by a fire on the Screenhouse operating floor. A 0.001 probability was assigned that a fire would impact all four pumps on the following basis:

- Each SW pump occupies less than 5% of the total floor area
- The SW pumps are installed with a centerline separation of eight feet
- The only fixed combustible is diesel fuel oil which would have to spray 32 feet to reach all four SW pumps

- Transient combustibles would normally only be in the area during maintenance activities with personnel located nearby. There are also routine walk-throughs by security and plant operators.

The results of the sensitivity analysis indicate that the CDF only increases by 1.50E-7/yr. This is due to the fact that Ginna Station can shutdown without SW and has procedures in place to do so. Basically, the plant can utilize the city water supply to plant hydrants to cool the DGs and provide a suction source to SAFW. This city water source has already been shown to be risk significant as described in Section 9.6.3.2 of Attachment B.3 (see response to RAI Question #8). Since there is sufficient basis to justify not assuming the loss of all 4 SW pumps, and the risk consequences are minimal using a conservative scenario probability of 0.001, this analysis is considered acceptable.

4. **Transient combustible fires were not analyzed separately in the Ginna fire assessment. The submittal states that during the development of the fire frequencies, transient combustibles were grouped with the type of component that was primarily damaged by or exposed to the fire. Thus, the submittal states that the impact and consequences of transient combustible fires are accounted for in the modeled component fires, and no separate evaluation of transient fires was necessary.**

Based on the limited description in the submittal, it is unclear if the methodology accounts for transient fires at all critical locations in the plant. Specifically, it is unclear if a portion of the frequency of transient fires was accounted for in the evaluation of cable fires. Please provide a more detailed description of how the transient fire frequency was included in the analysis including a description of how the frequency was partitioned and the types of components assumed damaged or exposed to the transient fires. If cables were not in the list of components damaged or exposed to the transient fires, provide a separate assessment of transient-induced fire scenarios involving cables in the unscreened fire zones containing cables.

Appendices C ("Component/Location-Based Fire Ignition Frequency") and D ("Fire Frequency Apportionment") to the 1998 submittal detail the development of the fire ignition frequencies for the Ginna fire zones. Included in this process are fires due to transient combustibles, as extracted from the PLG generic fire database (proprietary). While these appendices were never submitted to the NRC, selected portions of Appendices C and D have been extracted and included as Attachment B.2 to supplement the response to this question. The appendices in their entirety can be provided to the NRC if required.

There were 230 fire incidents retained from the PLG generic fire database for applicability as generic fires for Ginna. Of these 230, six (2.6%) could definitively be attributed to the presence of transient combustibles: #s 66, 73, 75, 77, 113, and 114 listed in Table C-2 of Appendix C (see Attachment B.2). Three of these occurred in the auxiliary building, and one each in the control room, diesel generator room, and turbine building, of other plants. These six fires were included among those assigned to their respective locations when generic fire frequencies were estimated for the Bayesian prior distribution. These priors were subsequently combined with the Ginna-specific likelihood to yield the posterior fire ignition frequencies. The extracted portions of Appendix C in Attachment B.2 discuss the treatment of the generic data prior to frequency analysis (e.g., grouping, assignment of unidentified plant events).

Of the 14 fire events identified at Ginna Station as being applicable to the analysis (see Table C-3 in Attachment B.2), two (#2 -- relay room and #13 -- turbine building basement), could be attributed to transient combustibles. As shown in Table C-4 (#s 48 and 72), both of these were included among the plant-specific fires used in the Bayesian likelihood to generate the posterior fire frequency for these zones.

Appendix D (see Attachment B.2) describes the frequency apportionment technique based on combustibles within each fire zone, including the table with the final assigned frequencies by zone and combustible. Tables D-1 and D-2 in Attachment B.2 indicate that cable fires were apportioned for nearly every fire zone, including the five (auxiliary building, control room, diesel generator room, turbine building, and relay room, and their respective

sub-zones) mentioned above as specific sites of previous transient combustible fires at Ginna and other plants. Section 3.5 of the 1998 submittal discusses the types of components assumed to be damaged by or exposed to fire effects. These consist of power, control, and instrumentation cables (including hot shorting); and all equipment modeled in the internal events PSA except for the following: piping, tanks, check valves, and manual valves. The areas in which transient fires have historically occurred, either at Ginna or other plants, and in which transient fires were included among the Ginna ignition frequencies, possess all the types of equipment susceptible to fire effects as listed above. Therefore, these same types of components were assumed to be damaged by or exposed to the effects of transient combustible fires. Consequently, the frequency of transient fires from other plants and from Ginna is included in the fire frequencies for the various Ginna areas. Furthermore, the potential for transient fires was specifically evaluated in the fire scenarios where detailed analyses of critical locations were performed. Examples are discussed in the response to RAI Question #3. For all other areas, it was assumed that a fire affected all equipment within the area. Thus, there would be no additional effect on CDF from a transient fire in these areas.

Finally, Section 9.6.3.1 of Attachment B.3 indicates that only four fire initiators had high Risk Achievement Worth values (i.e., RAW ≥ 10) with a Fussell-Vesely value < 0.05 (i.e., these initiators do not contribute significantly to the CDF now, but would do so if they were assumed to occur more frequently).

a. FIDG1B10 (Fire in the DG Room B Cable Vault) -- This room is normally closed off and requires a "confined space entry" permit to enter. Consequently, this area would not be expected to normally contain any transient combustibles.

b. FI0CR3-3 (Fire in the Control Room Which Only Fails One Electrical Train) -- This area is always manned. Transient combustibles would normally be present during maintenance activities when even more personnel are in the Control Room. Since a generic transient combustible fire in this room was already assigned as discussed above, no further consideration is required.

c. FI00ABO1 (Fire in the Auxiliary Building Operating Level) -- A generic transient combustible fire was already assigned to this area as discussed above. The issue of a transient combustible failing both trains of CCW is described in the response to RAI Question #3.

d. FI00AHR1 (Fire in the Air Handling Room) -- This secured area only contains an air handling unit and MCC. Traffic in this area is limited to personnel working in or touring the room. Therefore, transient combustibles would only be present during maintenance activities for which personnel would be in the room.

Consequently, further consideration of transient combustibles would not be expected to offer any more risk insights.

5. **Two fire zones (IBN-1 and IBS-1) are identified in the submittal which are not listed as being either qualitatively or quantitatively screened. Since the results of a detailed fire PRA evaluation for these fire zones are also not given in the submittal, the importance of these two fire zones is unknown.**

Please indicate if these two fire zones were screened or subjected to a detailed fire scenario evaluation. Provide descriptions for any fire scenarios modeled for these fire zones and list the estimated core damage frequencies.

Table 3-2 in the 1998 submittal, "Fire Areas and Fire Zones of Ginna Nuclear Power Plant," lists the 64 fire zones subjected to the Phase 1 qualitative screening. Both IBN-1 and IBS-1 are included, as parts of the Intermediate Building (IB) and ABI fire area. Table 3-4, "Frequency Allocation for Ginna," indicates the 48 fire zones which survived qualitative screening in Phase 1. Both IBN-1 and IBS-1 are indicated as survivors, for which a fire ignition frequency was estimated. Table 3-6, "Quantitative Screening Results," indicates the 29 fire zones for which conservative estimates of their contribution to CDF fell below the Phase 2 quantitative screening cut-off threshold of 1E-6/yr. IBS-1 is included, with its CDF of 9.9E-8/yr. IBN-1 is not, since it survived for detailed evaluation in Phase 3. Table 3-9, "Quantification Summary for Phase 3 Fire Scenarios," lists all scenarios subjected to detailed CDF evaluation, with their final CDF results. Zone IBN-1 is included, with three scenarios IBN-1-1, IBN-1-2, and IBN-1-3, and CDF estimates of 1.3E-8/yr, 6.2E-8/yr, and 2.1E-6/yr, respectively. The Comments column in Table 3-9 summarizes each of these scenarios. Table 3-10, "Phase 3 Fire Analysis Results Sorted by Contribution," indicates that fire zone IBN-1 contributes 3% to the overall fire CDF.

Also, evaluations of both of these fire zones are described in the new fire results provided in Attachment B.3 (see response to RAI Question #8). These results indicate slightly smaller contributions to CDF based on more detailed evaluation of required operator actions.

6. NUREG-1407 [2], Section 4.2 and Appendix C, and GL 88-20, Supplement 4 [3], request that documentation be submitted with the IPEEE submittal with regard to the FRSS [4] issues, including the basis and assumptions used to address these issues, and a discussion of the findings and conclusions. NUREG-1407 also requests that evaluation results and potential improvements be specifically highlighted. Control system interactions involving a combination of fire-induced failures and high probability random equipment failures were identified in the FRSS as potential contributors to fire risk.

The issue of control systems interactions is associated primarily with the potential that a fire in the plant (e.g., the MCR) might lead to potential control systems vulnerabilities. Given a fire in the plant, the likely sources of control systems interactions are between the control room, the remote shutdown panel, and shutdown systems. Specific areas that have been identified as requiring attention in the resolution of this issue include:

(a) Electrical independence of the remote shutdown control systems: The primary concern of control systems interactions occurs at plants that do not provide independent remote shutdown control systems. The electrical independence of the remote shutdown panel and the evaluation of the level of indication and control of remote shutdown control and monitoring circuits need to be assessed.

(b) Loss of control equipment or power before transfer: The potential for loss of control power for certain control circuits as a result of hot shorts and/or blown fuses before transferring control from the MCR to remote shutdown locations needs to be assessed.

(c) Spurious actuation of components leading to component damage, loss-of-coolant accident (LOCA), or interfacing systems LOCA: The spurious actuation of one or more safety-related to safe-shutdown-related components as a result of fire-induced cable faults, hot shorts, or component failures leading to component damage, LOCA, or interfacing systems LOCA, prior to taking control from the remote shutdown panel, needs to be assessed. This assessment also needs to include the spurious starting and running of pumps as well as the spurious repositioning of valves. It does appear that the assessment has included this aspect of the concern.

(d) Total loss of system function: The potential for total loss of system function as a result of fire-induced redundant component failures or electrical distribution system (power source) failure needs to be addressed.

Please describe your remote shutdown capability, including the nature and location of the shutdown station(s), as well as the types of control actions which can be taken from the remote panel(s). Describe how your procedures provide for transfer of control to the remote shutdown station(s). Provide an evaluation of whether loss of control power could occur prior to transferring control to the remote shutdown location and identify the risk contribution of these types of failures (if these failures are screened, please provide the basis for the screening).

Safe shutdown is normally accomplished from the Control Room by utilizing the safe shutdown equipment along with other available equipment. The plant EOPs are used in these instances. Some operator actions are typically required to be taken outside the Control Room for shutdown and would also be expected as a result of fires in specific fire areas. This is the preferred shutdown method and is defined as "normal safe shutdown." If there is a fire in any fire area which has the potential to interfere with performing shutdown activities from the Control Room, the operators will proceed to the alternative shutdown stations as directed by Procedure AP-CR.1 (which is a "direct" entry procedure) and the ER.FIRE series of procedures.

For five Ginna Station fire areas, compliance with the provisions of Section III.G.2 of Appendix R cannot be effectively or economically achieved due to the existing plant configuration (i.e., shutdown in these areas cannot be effectively performed from the control room). These areas are:

1. Control Complex (CC)
   a. Control Room (CR)
   b. Relay Room (RR)
   c. Air Handling Room (AHR)
2. Cable Tunnel (CT)
3. Auxiliary Building Basement/Mezzanine (ABBM)
4. Battery Room A (BR1A)
5. Battery Room B (BR1B)

For these areas, RG&E has determined that the appropriate technical approach necessary to comply with Section III.G of Appendix R is to provide an alternative shutdown capability per the provisions of Section III.G.3.

The alternative shutdown method establishes a coordinated series of operational and procedural manipulations of existing redundant safe shutdown systems. This method provides independent control stations for the equipment and systems normally controlled from the Control Room. The alternative shutdown method provides an additional means to ensure safe shutdown of the Ginna plant in the event of an unmitigated fire in any of these five fire areas of concern.

Two types of alternative shutdown stations have been designated:

1. Primary Shutdown Stations - stations that would be manned continuously and provided with the necessary instrumentation and support functions to meet safe shutdown performance goals; and

2. Support Stations - stations with staffing requirements of a transient nature.

These are discussed below.

Staffing requirements impose a constraint on the location and features of the remote shutdown stations. The Code of Federal Regulations and Ginna Station procedures and Technical Specifications require that at least seven operators and a Shift Technical Advisor

(STA) be assigned to each operating crew when in Modes 1 through 4. Since two operators are assigned to the fire brigade and would not be available for the first hour, only five operators and the STA remain for plant shutdown. For fires requiring ex-control room activities, these five operators and the STA are typically dedicated as follows:

1. Head Control Operator (HCO) -- responsible for establishing auxiliary feedwater flow to at least one steam generator and monitoring associated process variables.

2. Control Operator (CO) -- responsible for assuring makeup and pressure control of the reactor coolant system and isolating secondary systems.

3. Control Room Foreman (CRF) -- responsible for tripping and manually loading equipment of 480V buses in the Screenhouse building and monitoring turbine-driven AFW.

4. Auxiliary Operator (AO) -- responsible for assisting the STA in establishing on-site power, verification of closure of pressure boundary and spurious operation valves, and assisting other operators in stabilizing the plant.

5. Shift Technical Advisor (STA) - responsible for assuring the availability of on-site power, starting the DGs, and assisting the HCO in stabilizing the plant.

6. Shift Supervisor (SS) -- responsible for stripping some DC electrical loads and maintaining oversight.

The HCO and the CO are assigned to Primary Shutdown Stations when not performing other duties in support of their prime functions. The Auxiliary Operator acts as a "rover" for the first hour. The STA and CRF are initially assigned to a Support Station and, upon completion of required actions, report back to the SS. These five operators and the STA would be augmented at the end of the first hour by the operators recalled as part of the accident recovery team.

For a fire in any plant area, all required safe shutdown functions can be achieved and maintained either by use of protected plant equipment operated from the Control Room in the normal mode, or by the operation of required equipment from a designated Primary Shutdown or Support Station. For the majority of fires, safe shutdown can be accomplished from the Control Room. However, for the five specified fire areas, shutdown from the Control Room may not be possible. Because of this, certain remote plant locations have been designated as Primary Shutdown or Support Stations. These locations contain the necessary control and instrumentation to achieve and maintain the required safe shutdown functions. A fire at these locations does not impair the achievement and maintenance of safe shutdown from the Control Room. These locations and the capabilities they provide are described as follows.

1. <u>Charging Pump Room (Primary Station - Auxiliary Building Basement)</u>

    a. Transfer switch to isolate control circuits of Charging Pump A Bus 14 power breakers from fire;

b. Independent VCT level and pressurizer level indication to local indicator panel;
c. Independent Appendix R DC power source for the local indicators panel;
d. Local start/stop switches to operate Charging Pump A from this location.

2. Auxiliary Feedwater Pump Area (Primary Station - Intermediate Building North)

a. Independent RCS loop temperature, steam generator level, steam generator pressure, turbine-driven AFW flow, pressurizer pressure and level indication;
b. Independent Appendix R DC power source for the local indicator panel;
c. Local operation of TDAFW pump DC lube oil pump;
d. Local source range monitor hookup.

3. Diesel Generator Area (Support Station)

a. Transfer switches to isolate required Control Room control circuits (for DG A);
b. Alternative local DG A start/stop speed and voltage control;
c. Alternative DG A diagnostic instrumentation.

4. 480V AC Bus 14 (Support Station - Auxiliary Building)

a. Local operation of DG A feeder breaker (52/EG1A1) and isolation of DC control power to control circuit;
b. Local operation of Bus 12 feeder breaker (Bus 14 480V feed from 4160V distribution);
c. Transfer switch to isolate the control power to Bus 14 and supply Charging Pump A control circuit with alternative DC power;
d. Manual stripping of all non-safe shutdown loads.

5. Battery Rooms A and B (Support Station)

Operation of breakers at Main Fuse Cabinets A and B, and Main DC Distribution Panels A and B to:

a. Verify required power supply to Turbine Building DC Distribution Panel;
b. Verify required power supply to Auxiliary Building Distribution Panels A and B;
c. Verify required power supply to DG A and B DC Distribution Panels;
d. Align TSC diesel generator DC power supply to Main Fuse Cabinet A and/or B for long-term DC supply if necessary;
e. Isolate DC control power to potential spurious operation components.

6. Motor Control Centers C and D (Support Station - Auxiliary Building)

Isolate motive power to potential spurious operation components.

7. 480V AC Bus 18 (Support Station - Screenhouse)

   a. Local operation of DG A feeder breaker (52/EG1A2) and isolation of DC control power to control circuit;
   b. Local operation of Bus 12 feeder breaker (Bus 18 480V feed from 4160V distribution) and isolation of DC control power to control circuit;
   c. Local operation of the feeder breaker for Service Water pump A and isolation of DC control power to control circuits.

8. Valve Locations

   Various valves must be checked and verified closed in order to ensure primary system integrity and to preclude spurious operation of these valves affecting the achievement and maintenance of safe shutdown. These valves are listed in the ER-FIRE procedures. Other valves located in the specific safe shutdown flow path for a particular safe shutdown system are verified open or closed by the operator before the operation of the system. All valves that must be verified open or closed, either to ensure normal system operation or to prevent a spurious operation, will have their associated power breakers (AC or DC) shut off prior to the manual operation.

Fire-induced failures (e.g., hot shorts, open circuits or shorts to ground) postulated to cause loss of control power prior to transferral to the remote shutdown location will not prevent operation nor cause mal-operation of the alternative or dedicated shutdown method. Such loss of control power or post-fire mal-operation is prevented by:

1. Isolation/transfer switches which electrically isolate the alternative shutdown circuits from the fire areas of concern;

2. The de-energization of unnecessary DC and AC control and power circuits at various distribution panels and buses;

3. The isolation of instrument air supply to potential spurious operation solenoid valves;

4. The provisions for alternative shutdown electrical power from sources which will be electrically protected and coordinated;

5. The separation of the alternative shutdown circuits from the fire areas of concern by rated fire barriers and penetration seals.

Operator actions that must take place locally in the event of Control Room evacuation to prevent core damage from fire were identified. The ER.FIRE series of procedures were previously developed to guide the operators during alternative shutdown operations. These procedures are entered directly from AP-CR.1 or in parallel to the EOPs. The fire procedures are as follows:

1. ER-FIRE.1 -- Alternate Shutdown for Control Complex Fire

2. ER-FIRE.2 -- Alternate Shutdown for Cable Tunnel Fire

3. ER-FIRE.3 -- Alternate Shutdown for Auxiliary Building Basement/Mezzanine Fire

4. ER-FIRE.4 -- Alternate Shutdown for Battery Room A Fire

5. ER-FIRE.5 -- Alternate Shutdown for Battery Room B Fire

The procedures were reviewed as part of the Fire IPEEE with specific human events added to the fault tree models to reflect each action (see response to RAI Question #8). The importances of these human actions are described in Section 9.6.3.2 of Attachment B.3. As is evident from this attachment, several of the ER-FIRE activities were identified as being of high or medium risk significance.

The ability of the Primary Stations to provide necessary indication to perform the above actions was also specifically modeled, i.e., failure of power or indication to the Stations was assumed to prevent the operator action with a probability = 1. The cumulative contribution to the overall fire CDF from failure to locally perform these human actions is to increase the CDF by a factor of 11.3. (If all these failures are assumed not to occur [i.e., failure probability = 0], the CDF is reduced by 9.5%.)

7. **The submittal indicates that the "automatic fire detection and suppression systems at Ginna were assumed to be installed per design specifications, following the National Fire Protection Association (NFPA) and NRC guidelines." The submittal also states that fire protection systems were assumed to be maintained regularly and that generic failure rates were used in the analysis. It is not clear that these assumptions were verified.**

Please verify that the automatic fire suppression systems at Ginna are, in fact, designed and maintained according to NFPA standards.

Ginna Station's fire protection systems were installed during three different periods: (1) with the original plant systems from 1966 to 1969, (2) beginning in 1979 with upgrades related to 10CFR50 Appendix A as a result of the Systematic Evaluation Program (SEP), and (3) finishing in 1985 with 10CFR50 Appendix R upgrades. Original plant fire suppression systems were designed utilizing codes and engineering judgement applicable in the 1966-1969 time frame. SEP-related suppression systems were designed by an A/E firm (Gilbert/Commonwealth, as per RG&E Engineering Work Request [EWR] 1833) using applicable NFPA codes beginning in 1979 for guidance and engineering judgement regarding the hazards to be protected. Plant fire detection and annunciation systems were designed by RG&E engineering personnel utilizing applicable NFPA codes for guidance and engineering judgement, as documented in EWR 1832. NRC SER's dated 2/14/79, 12/17/80, 2/6/81 and 6/22/81 document acceptability of installed systems and other plant fire protection features with respect to General Design Criterion 3.

Appendix R suppression systems were designed by an A/E firm (Gilbert/Commonwealth, as per RG&E EWR 4139) using NFPA codes applicable in 1985 for guidance and engineering judgement regarding the hazards to be protected for additional areas identified to require improved capability. Additional plant detection and annunciation systems were designed by RG&E engineering personnel utilizing applicable NFPA codes for guidance and engineering judgement, as documented in EWR 4176. Separate NRC SER's dated 2/27/85 and 3/21/85 document acceptability of these installed systems and general compliance with III.G and III.L of Appendix R to 10CFR50.

Plant fire protection systems are regularly tested and maintained as required by the applicable sections of the Ginna Station Technical Requirements Manual (i.e., tests previously required by technical specifications) and plant procedures. Data on the operation of plant suppression and detection systems are included in analysis DA-ME-97-081 which reviewed six years of plant performance history, in order to justify extended surveillance intervals. This was reviewed and accepted by NRC reviewers.

Therefore, due to the vintage of Ginna Station, the fire suppression systems were not designed to NFPA standards; however, as they have been modified, they have used NFPA standards for guidance. These systems, and their testing program, have been previously reviewed and approved by the NRC as documented above. As such, the impact of the assumption on the IPEEE as documented in the 1998 submittal is considered neglible.

8. **The Ginna fire IPEEE submittal identifies one plant improvement planned for implementation and five additional plant modifications that were being considered. It is not clear if these improvements and modification were credited in the analysis, and whether or not the changes have been, or will be, implemented.**

Please provide the current status of these planned and proposed plant modifications and indicate whether or not the changes have been credited in the analysis.

As discussed in Section 6 of the 1998 submittal, the following plant modification was planned and, therefore, credited in the analysis:

> "Fuses will be installed on control circuits routed in the screen house associated with the functioning of 4160 VAC circuit breakers 52/17SS and 52/18SS. The fuses will be designed to open if grounding occurs, as is postulated to occur for screen house fires, permitting the overcurrent protection function associated with circuit breakers 52/17SS and 52/18SS to remain intact."

This modification was implemented on March 4, 1999, with the installation of two fuses in series each with the two circuit breakers, namely fuses FUMCB/XSH1-N and FUMCB/XSH1-P for 52/18SS, and fuses FUMCB/XSH2-N and FUMCB/XSH2-P for 52/17SS.

The 1998 submittal also documented five additional plant modifications that were under consideration. In response to several NRC questions, and the desirability to incorporate the Fire IPEEE into the Ginna Station Risk Monitor (i.e., EOOS), the fire analysis was re-performed. This re-analysis maintained the previous fire frequencies and consequences (i.e., assumed fire-induced failures), but added models of the fire suppression systems and modeled required operator actions in more detail. The results of this re-analysis are presented in Attachment B.3.

As shown in Sections 11.6.2 and 11.6.3 (see Attachment B.3), no vulnerabilities were identified, and none of the five plant modifications identified in the 1998 submittal remain under consideration. The basis for eliminating the need for these plant modifications was primarily removing unnecessary conservatism and appropriately crediting existing procedural actions. As such, no plant modifications are under consideration. A procedural enhancement as discussed in Attachment B.3 was identified for commercial considerations only and is not required based on risk insights.

9. **Both manual actuation of automatic fire suppression systems and manual fire suppression were modeled for selected fire scenarios in the Ginna fire assessment. In some scenarios, failure of automatic fire suppression, failure to manually initiate automatic suppression systems, and failure to manually suppress the fire were modeled. The submittal does not address the potential for dependent failure of both automatic and manual suppression systems (e.g., common mode failures related to a common water source).**

Please indicate if dependent failures between the automatic and manual suppression systems were considered in the assignment of the suppression probabilities. Also indicate if dependencies between the failure of personnel to manually initiate an automatic suppression system and failure of personnel to manually suppress a fire were considered. Indicate if dependent failures that would cause the failure of an automatic suppression system to actuate and also prevent manually initiating the system were considered in the analysis.

The potential for dependent failures of systems and operator dependencies were considered and evaluated for the IPEEE. The discussion is presented in three parts: (1) considerations of potential dependencies between automatic and manual suppression systems, (2) considerations of potential dependencies between the failure of personnel to manually initiate automatic suppression systems and the failure of personnel to manually suppress a fire, and (3) considerations of potential dependencies between faults that cause automatic actuation to fail that would also prevent manual initiation of the system.

1. No significant dependencies were found to exist between manual suppression efforts and installed suppression systems at Ginna Station. Although manual suppression efforts may utilize the fire water system, which is shared by the installed fire sprinklers, the unavailability of fire water was found to be insignificant relative to the failures of manual suppression and the fire sprinkler unavailability. Fire water is supplied to the plant from three independent and redundant sources: city water provides one source (for plant hydrants), a diesel-driven fire pump supplying lake water provides a second source, and a motor-driven fire pump supplying lake water provides a third source (the pumps have independent suction lines, and actuation mechanisms). The diesel-driven and motor-driven fire pumps, and their actuation systems, were specifically modelled, while the city water system was not. However, there are no dependencies between the plant fire pumps and city water system that could be impacted by a fire. Additionally, many fires can be suppressed manually using extinguishers (in fact, the experience data indicates most fires are manually suppressed with extinguishers). This provides diverse equipment for fire suppression. Smoke sensors that alert operators of the presence of fire operate independently of installed suppression systems.

2. Due to the presence of multiple fire brigade personnel that dispatch in response to plant fires and the significant differences in the actions associated with manually initiating the installed fire sprinklers from the control room and manually suppressing the fire, no significant dependencies were judged to exist between these two actions. Note that modeling of manual actuation of the fire sprinkler system was included for "early" suppression (within a few minutes), while other manual

suppression efforts are longer term, again providing a basis for independence. Additionally, failure of smoke sensors, which would constitute a common cause failure of fire brigade dispatch, was examined. The smoke sensor circuits are designed such that a break in the circuit, or failure of a sensor, would not impact the remaining circuits and sensors. Also, such a failure will trigger an alarm indicating a circuit failure. Therefore, failure of the smoke sensors is significantly less likely than the combined failure probability for manual actuation of the sprinklers and manual suppression. Finally, a review of the results presented in Attachment B.3 (see Section 9.6.3.4) shows that only failures of the fire brigade to extinguish a fire in the Control and Battery Rooms were of medium risk significance (none were high). These two rooms have no installed suppression system.

3. Dependencies between the automatic sprinkler actuation system and the manual sprinkler actuation system were addressed by only allowing recovery of automatic actuation failures (i.e., start circuitry) vs. hardware failures of the diesel-driven and motor-driven fire pumps or sprinkler deluge valves. That is, the PSA explicitly modeled the manual actuation recoveries and accounted for any dependencies with the automatic actuation systems within the fault tree logic. It should be noted that the model did not specifically model the ability to cross-connect the city water system to the onsite system as this was assumed to be included within the human failure probability to extinguish the fire as discussed in the response to RAI Question #1.

References

1. EPRI, "Fire-Induced Vulnerability Evaluation (FIVE) ," EPRI TR-100370, April 1992.

2. J. Chen, et al., "Procedural and Submittal Guidance for the Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities," NUREG-1407, United States Nuclear Regulatory Commission, June 1991.

3. "Independent Plant Examination for External Events (IPEEE) for Severe Accident Vulnerabilities - 10CFR 50.54(f)," Generic Letter 88-20, Supplement No. 4, United States Nuclear Regulatory Commission, June 1991.

4. J. Lambright, et al., "Fire Risk Scoping Study: Investigation of Nuclear Power Plant Fire Risk, Including Previously Unaddressed Issues," NUREG/CR-5508, prepared for the United States Nuclear Regulatory Commission, January 1989.

5. "User's Guide for a Personal-Computer-Based Nuclear Power Plant Fire Data Base," NUREG/CR-4586, prepared for the United States Nuclear Regulatory Commission, August 1986.

ATTACHMENT B.1

EXTRACTS FROM APPENDICES B AND E TO THE 1998 SUBMITTAL

B. Location Characteristics Table

All relevant plant information was assembled into a relational database using the software Microsoft ACCESS®. The computer database imported existing plant information provided by the Ginna plant personnel and related each piece of plant information to the fire area and fire zones defined in this analysis. The information was then summarized into a set of location characteristics tables (LCT) for subsequent analyses.

An LCT was developed for each fire area within the control area of Ginna. Each LCT contains 7 items:

1. **Fire Area Description.** This section describes the fire zones within each fire area, the location and the floor area covered by the fire area.

2. **Fire/Smoke Hazards in this Fire Area.** The information contained in this section was obtained from review of the Ginna Station Appendix R program information. This section provides an estimate of the normal inventory of in-site and transient fire and smoke hazards. An estimate of the fire severity (in hours) is also included. The fire severity was obtained by dividing the fire loadings by the heat rate for Standard Exposure Fire (80,000 BTU/ft^2-hr) established by the National Fire Protection Association.

3. **Fire Protection Features in this Fire Area.** This section describes the fire detection and suppression capabilities equipped in the fire area. This includes the primary and backup suppression system and the barrier rating of the fire area. The information included in this section was obtained from Reference 11 (Tier 1).

4. **Fire Zone Adjacent to the Fire Zones in this Fire Area.** This section lists the adjacent fire zones to the fire zones within the fire area. The adjacency information is essential in the development of fire propagation scenarios.

5. **Potential Key Equipment and their Associated Basic Event Impacted by Fire/Smoke Hazards in this Fire Area.** This section includes a list of plant components, within each fire zone in the fire area, that can be affected by fire and smoke hazards and whose failure can lead to an initiating event, or can impact the accident mitigation systems.

   Some of the components included in this section also act as fire ignition sources and fire hazards. Thus, each component was categorized to a component type for identification purpose. This information is also used in the consideration of the fire frequency apportionment analysis (see Appendix D).

6. **Potential Raceway (Conduit and Cable Tray) and their Associated Equipment/Basic Event Impacted by Fire/Smoke Hazards in this Fire Area.** This section provides a list of raceways in each of the zones in the fire area, Failure of the raceway can lead to the loss of the intended function of plant components (that are not within the fire zone) whose failure can lead to an initiating event, or can impact the accident mitigation systems.

   The cable trays associated with the safety equipment were identified from a database relating cables and conduit to the equipment served. This database resides at the Electrical Engineering Department of the Ginna Station and contains all cable tray information related to the Appendix R and fire PRA programs. The fire zone location of each cable tray was then identified by looking up the identification number of the cable trays and finding the fire zone location from the cable routing diagrams.

7. **Walkdown Notes.** This section includes the notes taken during the two spatial interactions walkdowns.

LOCATION CHARACTERISTICS TABLE

FIRE AREA: ABBM

1. FIRE ZONES IN THIS FIRE AREA:

FIRE ZONE	ELEV (FT.)	FIRE ZONE DESCRIPTION	BUILDING	FLOOR AREA (SQ. FT.)
ABB	235' 8"	AUXILIARY BUILDING BASEMENT LEVEL	AB	9590
ABM	253'	AUXILIARY BUILDING MEZZANINE LEVEL	AB	10570

2. FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	COMBUSTIBLE LOADING (BTU)	FIRE SEVERITY (HRS)
ABB	8,150	6.1 min.
ABM	22,819	17.1 min.

3. FIRE PROTECTION FEATURES IN THIS FIRE AREA:

FIRE ZONE	FIRE DETECTION FEATURES	FIRE SUPPRESSION FEATURES
ABB	Smoke detectors	Preaction sprinklers, manual
ABM	Smoke detectors	Manual

4. FIRE ZONE(S) ADJACENT TO THE FIRE ZONE(S) IN THIS FIRE AREA:

FIRE ZONE	ADJACENT FIRE ZONE	PATHWAY	PATHWAY RATING (HOUR)
ABB	CHG	WALL/OPEN	3
ABB	RC-1	WALL	3
ABB	IBS-0	WALL	
ABM	RC-2	WALL	3
ABM	SB-1	WALL	3
ABM	IBS-1	WALL	3

5. POTENTIAL KEY EQUIPMENT AND THEIR ASSOCIATED BASIC EVENT(S) IMPACTED BY FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	EQUIPMENT AFFECTED	BASIC EVENT	BASIC EVENT DESCRIPTION
ABB	110B	CVAVP0110B	AOV 110B IN LINE FROM BA BLENDER TO CHARGING PUMP SUCTION FAILS TO OPEN (STDBY)
ABB	111	CVAVP00111	AOV 111 IN LINE FROM RMW PUMPS TO BA BLENDER FAILS TO OPEN (STANDBY)
ABB	112C	CVAVC0112C	AIR-OPERATED VALVE 112C FAILS TO CLOSE
ABB	313	CVMVX00313	MOV 313 Fails to Close
ABB	52/CSP1A	CSMPFSI02A	CONTAINMENT SPRAY PUMP PSI02A FAILS TO RUN (INJECTION)
ABB	52/CSP1B	CSMPFSI02B	CONTAINMENT SPRAY PUMP PSI02B FAILS TO RUN (INJECTION)
ABB	52/RHRP1A	RRMPFAC01A	MOTOR-DRIVEN PUMP PAC01A FAILS TO RUN [RECIRC]
ABB	52/RHRP1A	RHMPFAC01A	RHR PUMP A (PAC01A) FAILS TO RUN
ABB	52/RHRP1B	RHMPFAC01B	RHR PUMP B (PAC01B) FAILS TO RUN
ABB	52/RHRP1B	RRMPFAC01B	MOTOR-DRIVEN PUMP PAC01B FAILS TO RUN [RECIRC]
ABB	52/SIP1A	SIMPFSI01A	PSI01A FAILS TO RUN
ABB	52/SIP1A	SRMPFSI01A	PSI01A FAILS TO RUN
ABB	52/SIP1B	SIMPFSI01B	PSI01B FAILS TO RUN
ABB	52/SIP1B	SRMPFSI01B	PSI01B FAILS TO RUN
ABB	52/SIP1C1	SIMPFSI01C	PSI01C FAILS TO RUN
ABB	52/SIP1C2	SRMPFSI01C	PSI01C FAILS TO RUN
ABB	624	RRAVF00624	FAILURE OF AOV 624 TO THROTTLE FLOW
ABB	625	RRAVF00625	FAILURE OF AOV 625 TO THROTTLE FLOW
ABB	850A	RRMVP0850A	MOTOR-OPERATED VALVE 850A FAILS TO OPEN [RECIRC]
ABB	850B	RRMVP0850B	MOTOR-OPERATED VALVE 850B FAILS TO OPEN [RECIRC]
ABB	856	RHMVK00856	MOTOR-OPERATED VALVE 856 TRANSFERS CLOSED [INJECTION]
ABB	856	RRMVX00856	MOTOR-OPERATED VALVE 00856 FAILS TO CLOSE (STANDBY)
ABB	857A	RRMVP0857A	MOV 857A FAILS TO OPEN
ABB	857B	RRMVP0857B	MOV 857B FAILS TO OPEN
ABB	857C	RRMVP0857C	MOV 857C FAILS TO OPEN
ABB	860A	CSMVP0860A	MOTOR OPERATED VALVE 860A FAILS TO OPEN ON DEMAND (INJECTION)
ABB	860B	CSMVP0860B	MOTOR OPERATED VALVE 860B FAILS TO OPEN ON DEMAND (INJECTION)

LOCATION CHARACTERISTICS TABLE

FIRE AREA: ABBM

ABB	860C	CSMVP0860C	MOTOR OPERATED VALVE 860C FAILS TO OPEN ON DEMAND (INJECTION)
ABB	860D	CSMVP0860D	MOTOR OPERATED VALVE 860D FAILS TO OPEN ON DEMAND (INJECTION)
ABB	896A	CRMVZ0896A	MOTOR OPERATED VALVE 896A FAILS TO CLOSE ON DEMAND (RECIRCULATION)
ABB	896B	CRMVZ0896B	MOTOR OPERATED VALVE 896B FAILS TO CLOSE ON DEMAND (RECIRCULATION)
ABB	LT-920	CSLTLLT920	RWST LEVEL TRANSMITTER LT-920 FAILS LOW
ABB	LT-921	CSLTLLT921	RWST LEVEL TRANSMITTER LT-921 FAILS LOW
ABM	4615	SWMVC04615	Service Water Header Isolation MOV 4615 Fails To Close On Demand
ABM	4616	SWMVC04616	Service Water Header Isolation MOV 4616 Fails To Close On Demand
ABM	4735	SWMVC04735	Service Water Header Isolation MOV 4735 Fails To Close On Demand
ABM	52/16	ACCBD1611B	AC BREAKER 52/16 (BUS16/11B) FAILS TO OPERATE
ABM	52/16SS	ACT1FSST16	Fault on 4160 / 480 VAC Bus 16 supply Transformer PXABSS016
ABM	52/CCP1B	ACCBN1616B	AC BREAKER 52/CCP1B (BUS16/16B) FAILS TO OPEN
ABM	52/CF1B	ACCBN1613C	AC BREAKER 52/CF1B (BUS16/13C) FAILS TO OPEN
ABM	52/CF1C	ACCBN1614A	AC BREAKER 52/CF1C (BUS16/14A) FAILS TO OPEN
ABM	52/CHP1B	ACCBN1615B	AC BREAKER 52/CHP1B (BUS16/15B) FAILS TO OPEN
ABM	52/CHP1C	ACCBN1615C	AC BREAKER 52/CHP1C (BUS16/15C) FAILS TO OPEN
ABM	52/EG1B1	ACCBD1611C	DGB OUTPUT BREAKER 52/EG1B1 (BUS16/11C) FAILS TO OPERATE
ABM	52/MCCD	DCCFRA1BBP	Fuse FUDCPDPAB01B/2P Fails Open (To MCC D)
ABM	52/MCCD	ACCBRMCC1D	480 VAC MCCD Feeder Circuit Breaker 52/MCCD (BUS16/16C) Transfers Open)
ABM	52/SFPPB	ACCBN1617A	AC BREAKER 52/SFPPB (BUS16/17A) FAILS TO OPEN
ABM	738A	CCMVP0738A	MOTOR-OPERATED VALVE 738A FAILS TO OPEN
ABM	738B	CCMVP0738B	MOTOR-OPERATED VALVE 738B FAILS TO OPEN
ABM	817	CCMVK00817	MOTOR-OP VALVE 817 TRANSFERS CLOSED
ABM	83/16	DCREBBUS16	RELAY 83E/16 (BUS 16 DC THROWOVER) FAILS TO DEENERGIZE
ABM	9704A	AFMVX9704A	Motor operated valve 9704A fails to close
ABM	9704B	AFMVX9704B	Motor operated valve 9704B fails to close
ABM	ACPDPAB10	ACB2F0AB10	LOCAL FAULT ON 480 VAC DIST PANEL ACPDPAB10 TO PRZR PROPOR HEATER GROUP A1
ABM	ACPDPAB11	ACB2F0AB11	LOCAL FAULT ON 480 VAC DIST PANEL ACPDPAB11 TO PRZR PROPOR HEATER GROUP A2
ABM	ACPDPAB12	ACB2F0AB12	LOCAL FAULT ON 480 VAC DIST PANEL ACPDPAB12 TO PRZR BACKUP HEATER GROUP B1
ABM	ACPDPAB13	ACB2F0AB13	LOCAL FAULT ON 480 VAC DIST PANEL ACPDPAB13 TO PRZR BACKUP HEATER GROUP B2
ABM	BATP1B	CVMPAPCH3B	BORIC ACID MOTOR-DRIVEN PUMP PCH03B FAILS TO START
ABM	BUS16UV	UVREE0X316	Relay 27X3/16 fails to energize
ABM	BUS16UV	UVLCDBX46A	RELAY 27BX4/16 DRIVER (HEAT SINK ASSEMBLY #2) GENERATES A SPURIOUS SIGNAL
ABM	BUS16UV	UVLCDBX56A	RELAY 27BX5/16 DRIVER (HEAT SINK ASSEMBLY #2) GENERATES A SPURIOUS SIGNAL
ABM	BUS16UV	UVREE0X616	Relay 27X6/16 fails to energize
ABM	BUS16UV	UVLCDBX66A	RELAY 27BX6/16 DRIVER (HEAT SINK ASSEMBLY #2) GENERATES A SPURIOUS SIGNAL
ABM	BUS16UV	UVLCDBX16A	RELAY 27BX1/16 DRIVER (HEAT SINK ASSEMBLY #2) GENERATES A SPURIOUS SIGNAL
ABM	BUS16UV	UVLCDX316A	RELAY 27X3/16 DRIVER (HEAT SINK ASSEMBLY #1) GENERATES A SPURIOUS SIGNAL
ABM	BUS16UV	UVLCDX416A	RELAY 27X4/16 DRIVER (HEAT SINK ASSEMBLY #1) GENERATES A SPURIOUS SIGNAL
ABM	BUS16UV	UVLCDX516A	RELAY 27X5/16 DRIVER (HEAT SINK ASSEMBLY #1) GENERATES A SPURIOUS SIGNAL
ABM	BUS16UV	UVLCDX616A	RELAY 27X6/16 DRIVER (HEAT SINK ASSEMBLY #1) GENERATES A SPURIOUS SIGNAL
ABM	BUS16UV	AFCTR7B616	CONTACT 27BX6/16 (3-4) TRANSFERS OPEN
ABM	BUS16UV	UVREE0X216	Relay 27X2/16 fails to energize
ABM	BUS16UV	UVLCDBX616	Relay 27BX6/16 driver (Heat Sink Assembly #2) fails to energize
ABM	BUS16UV	AFCTR07616	CONTACT 27X6/16 (3-4) TRANSFERS OPEN
ABM	BUS16UV	UVLCDBX36A	RELAY 27BX3/16 DRIVER (HEAT SINK ASSEMBLY #2) GENERATES A SPURIOUS SIGNAL
ABM	BUS16UV	UVREE0X116	Relay 27X1/16 fails to energize
ABM	BUS16UV	UVREK0X416	BUS 16 UNDERVOLTAGE RELAY 27X4/16 TRANSFERS TO ENERGIZED
ABM	BUS16UV	UVCFR16FU2	Fuse #2 (FUARB1RC16/2-P) fails open (relay cabinet)
ABM	BUS16UV	UVREEBX316	Relay 27BX3/16 fails to energize
ABM	BUS16UV	UVREEBX216	Relay 27BX2/16 fails to energize
ABM	BUS16UV	UVLCDBX316	Relay 27BX3/16 driver (Heat Sink Assembly #2) fails to energize
ABM	BUS16UV	UVLCD0X416	Relay 27X4/16 driver (Heat Sink Assembly #1) fails to energize
ABM	BUS16UV	UVREEBX116	Relay 27BX1/16 fails to energize
ABM	BUS16UV	UVREEBX516	Relay 27BX5/16 fails to energize
ABM	BUS16UV	UVLCDBX116	Relay 27BX1/16 driver (Heat Sink Assembly #2) fails to energize

LOCATION CHARACTERISTICS TABLE

FIRE AREA: ABBM

ABM	BUS16UV	UVREEBX616	Relay 27BX6/16 fails to energize
ABM	BUS16UV	UVLCD0X616	Relay 27X6/16 driver (Heat Sink Assembly #1) fails to energize
ABM	BUS16UV	UVLCD0X516	Relay 27X5/16 driver (Heat Sink Assembly #1) fails to energize
ABM	BUS16UV	UVLCD0X316	Relay 27X3/16 driver (Heat Sink Assembly #1) fails to energize
ABM	BUS16UV	UVLCDBX516	Relay 27BX5/16 driver (Heat Sink Assembly #2) fails to energize
ABM	BUS16UV	UVLCD0X116	Relay 27X1/16 driver (Heat Sink Assembly #1) fails to energize
ABM	BUS16UV	UVCFR16FU3	Fuse #3 (FUARB1RC16/3-N) fails open (relay cabinet)
ABM	BUS16UV	UVLCDBX416	Relay 27BX4/16 driver (Heat Sink Assembly #2) fails to energize
ABM	BUS16UV	UVREKBX316	BUS 16 UNDERVOLTAGE RELAY 27BX3/16 TRANSFERS TO ENERGIZED
ABM	BUS16UV	UVLCDBX216	Relay 27BX2/16 driver (Heat Sink Assembly #2) fails to energize
ABM	BUS16UV	UVLCD0X216	Relay 27X2/16 driver (Heat Sink Assembly #1) fails to energize
ABM	BUS16UV	UVLCDX116A	RELAY 27X1/16 DRIVER (HEAT SINK ASSEMBLY #1) GENERATES A SPURIOUS SIGNAL
ABM	BUS16UV	UVREK0X116	BUS 16 UNDERVOLTAGE RELAY 27X1/16 TRANSFERS TO ENERGIZED
ABM	BUS16UV	UVREKBX616	BUS 16 UNDERVOLTAGE RELAY 27BX6/16 TRANSFERS TO ENERGIZED
ABM	BUS16UV	UVREEBX416	Relay 27BX4/16 fails to energize
ABM	BUS16UV	UVREKBX416	BUS 16 UNDERVOLTAGE RELAY 27BX4/16 TRANSFERS TO ENERGIZED
ABM	BUS16UV	UVREKBX116	BUS 16 UNDERVOLTAGE RELAY 27BX1/16 TRANSFERS TO ENERGIZED
ABM	BUS16UV	UVREK0X616	BUS 16 UNDERVOLTAGE RELAY 27X6/16 TRANSFERS TO ENERGIZED
ABM	BUS16UV	UVREK0X516	BUS 16 UNDERVOLTAGE RELAY 27X5/16 TRANSFERS TO ENERGIZED
ABM	BUS16UV	UVREE0X416	Relay 27X4/16 fails to energize
ABM	BUS16UV	UVREK0X316	BUS 16 UNDERVOLTAGE RELAY 27X3/16 TRANSFERS TO ENERGIZED
ABM	BUS16UV	UVREE0X516	Relay 27X5/16 fails to energize
ABM	BUS16UV	UVREKBX516	BUS 16 UNDERVOLTAGE RELAY 27BX5/16 TRANSFERS TO ENERGIZED
ABM	DCPDPAB01B/02	DCCSRA1BBX	Disconnect Switch DCPDPAB01B/02 Transfers Open (To MCC D)
ABM	DCPDPAB01B/04	DCCFRA1BDN	Fuse FUDCPDPAB01B/4N Fails Open (To Bus 16 - Normal)
ABM	DCPDPAB01B/05	DCCFRA1BEN	Fuse FUDCPDPAB01B/5N Fails Open (To Bus 14 - Emergency)
ABM	DCPDPCB03B/19	DCBDFAUXDB	Auxiliary Building DC Distribution Panel B (DCPDAB01B) Local Fault
ABM	LT-112	CVLTD00112	VOLUME CONTROL TANK (VCT) LEVEL TRANSMITTER LT-112 FAILS TO RESPOND
ABM	LT-139	CVLTD00139	VOLUME CONTROL TANK (VCT) LEVEL TRANSMITTER LT-139 FAILS TO RESPOND
ABM	MCCJ	ACCBRMCC1J	480 VAC MCCJ Feeder Circuit Breaker 52/MCCJ (MCCD/05KK) Transfers Open
ABM	MCCM	ACCBRMCC1M	480 VAC MCCM Feeder Circuit Breaker 52/MCCM (MCCD/15D) Transfers Open
ABM	PT-945	ESPTDPT945	CONTAINMENT HIGH PRESSURE TRANSMITTER PT-945 FAILS TO RESPOND ON DEMAND
ABM	PT-946	ESPTDPT946	CONTAINMENT HIGH PRESSURE TRANSMITTER PT-946 FAILS TO RESPOND ON DEMAND

6. POTENTIAL RACEWAYS (CONDUITS AND CABLE TRAYS) AND THEIR ASSOCIATED EQUIPMENT/BASIC EVENT(S) IMPACTED BY FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	RACEWAY AFFECTED	EQUIPMENT AFFECTED	CABLE FUNCTION	BASIC EVENT AFFECTED	BASIC EVENT DESCRIPTION
ABB	C0702	850A	P 480 VAC POWER	RRMVP0850A	MOTOR-OPERATED VALVE 850A FAILS TO OPEN [RECIRC]
ABB	C0702	850A	P 480 VAC POWER	RRMVR0850A	MOTOR-OP VALVE 850A TRANSFERS OPEN [RECIRCULATION]
ABB	C0702	850A	P 480 VAC POWER	RHMVR0850A	MOTOR-OP VALVE 850A TRANSFERS OPEN [INJECTION]
ABB	C0703	850A	C 125 VDC CONTROL	RRMVP0850A	MOTOR-OPERATED VALVE 850A FAILS TO OPEN [RECIRC]
ABB	C0703	850A	C 125 VDC CONTROL	RRMVR0850A	MOTOR-OP VALVE 850A TRANSFERS OPEN [RECIRCULATION]
ABB	C0703	850A	C 125 VDC CONTROL	RHMVR0850A	MOTOR-OP VALVE 850A TRANSFERS OPEN [INJECTION]
ABB	C0735	857A	P 480 VAC POWER	RHMVR0857A	MOTOR-OPERATED VALVE 857A TRANSFERS OPEN
ABB	C0735	857A	P 480 VAC POWER	RRMVP0857A	MOV 857A FAILS TO OPEN
ABB	C0735	857A	P 480 VAC POWER	RRMVR0857A	MOTOR-OPERATED VALVE 857A TRANSFERS OPEN
ABB	C0736	857A	C 125 VDC CONTROL	RRMVP0857A	MOV 857A FAILS TO OPEN
ABB	C0736	857A	C 125 VDC CONTROL	RRMVR0857A	MOTOR-OPERATED VALVE 857A TRANSFERS OPEN
ABB	C0736	857A	C 125 VDC CONTROL	RHMVR0857A	MOTOR-OPERATED VALVE 857A TRANSFERS OPEN

Pages B-6 through B-47 are similar and not included to reduce paper volume.

LOCATION CHARACTERISTICS TABLE

FIRE AREA: ABBM

ABM	R3408	PT-429	I ALARM/IND/CONT	ESPTDPT429	PRESSURIZER LOW PRESSURE TRANSMITTER PT-429 FAILS TO RESPOND ON DEMAND
ABM	R3408	PT-429	I ALARM/IND/CONT	EXPTLPT429	PRESSURIZER LOW PRESSURE TRANSMITTER PT-429 FAILS LOW
ABM	R3408	PT-429	I ALARM/IND/CONT	RCPTLPT429	PRESSURE TRANSMITTER PT-429 FAILS LOW
ABM	R3410	LT-426	I INDICATION	LT-426	PRZR LVL XMTR
ABM	R3412	FT-465	I RPS CHANNEL 2 (WHITE)	ESFTD00465	STEAM GENERATOR A FLOW TRANSMITTER FT-465 FAILS TO RESPOND
ABM	R3414	FT-474	I RPS CHANNEL 3 (BLUE)	ESFTD00474	SG B STEAM FLOW TRANSMITTER FT-474 FAILS TO RESPOND
ABM	R3689	LT-921	C	CSLTDLT921	RWST LEVEL TRANSMITTER LT-921 FAILS TO RESPOND
ABM	R3689	LT-921	C	CSLTLLT921	RWST LEVEL TRANSMITTER LT-921 FAILS LOW
ABM	R3969	TE-410B1	C	TE-410B1	TEMPERATURE ELEMENT FOR LOOP B COLD LEG
ABM	R3971	LT-427	I ALARM/IND/CONT	RCLYDLM427	INSTRUMENT LOOP CURRENT REPEATER LM-427 FAILS TO RESPOND
ABM	R3973	PT-430	I ALARM/IND/CONT	ESPTDPT430	PRESSURIZER LOW PRESSURE TRANSMITTER PT-430 FAILS TO RESPOND ON DEMAND
ABM	R3973	PT-430	I ALARM/IND/CONT	EXPTLPT430	PRESSURIZER LOW PRESSURE TRANSMITTER PT-430 FAILS LOW
ABM	R3973	PT-430	I ALARM/IND/CONT	RCPTLPT430	PRESSURE TRANSMITTER PT-430 FAILS LOW
ABM	R4086	LT-428A	I INDICATION	LT-428A	PRZR LVL WIDE RANGE-XMTR
ABM	R4088	PT-420B	C	PT-420B	PRESSURE TRANSMITTER REACTOR COOLANT SYSTEM INST LOOP 420B
ABM	R4360	LT-505	C	LT-505	STEAM GENERATOR EMS01A WIDE RANGE LEVEL TRANSMITTER
ABM	R4369	LT-507	C	LT-507	STEAM GENERATOR EMS01B WIDE RANGE LEVEL TRANSMITTER
ABM	SAC0212A	591	C 125 VDC CONTROL	RC-591	Spurious opening of RCS head vent if in conjunction with SV-590?
ABM	SAC0212A	8619B	C 125 VDC CONTROL	IASVP8619B	SOLENOID VALVE 8619B FAILS TO OPEN
ABM	SAC0212A	8619B	C 125 VDC CONTROL	RCREB451AX	RELAY PC-451-X FAILS TO DE-ENERGIZE
ABM	SAC0212B	8619B	C 125 VDC CONTROL	IASVP8619B	SOLENOID VALVE 8619B FAILS TO OPEN
ABM	SAC0212B	8619B	C 125 VDC CONTROL	RCREB451AX	RELAY PC-451-X FAILS TO DE-ENERGIZE
ABM	SAC0214	593	C 125 VDC CONTROL	RC-593	Spurious opening of RCS head vent if in conjunction with SV-592?
ABM	SAC0214	8616B	C 125 VDC CONTROL	IASVP8616B	SOLENOID VALVE 8616B FAILS TO OPEN
ABM	SAC0216	591	C 125 VDC CONTROL	RC-591	Spurious opening of RCS head vent if in conjunction with SV-590?
ABM	SAC0216	593	C 125 VDC CONTROL	RC-593	Spurious opening of RCS head vent if in conjunction with SV-592?

7. SPATIAL INTERACTIONS ANALYSIS WALKDOWN NOTES:

FIRE ZONE	WALKDOWN NOTES
ABB	3 SI pumps about 6' center-center (photos A2, A3). 2 CS pumps about 8' center-center, about 10' from SI pumps (photo A4). Contol panels south of SI pumps (photo A5). 3 MOVs west of RWST on other side of concrete wall and 1 small pump (photo A6). 2 SFP cooling pumps near west stairwell (photo A7). RHR pumps in pit below this level near west stairwell with 5 other pumps. PCs stored in rack just outside charging pump cubicle. 4/2/98 WD SI pump cables in conduit. There is some trash in cans. Charging pumps in separate cubicle with fire rated barriers. Heat tracing on the piping to SI and chg. No significant combustibles between RHR area on west end, and SI area, so fire in RHR area unlikely to spread. Conduits to RHR room and pumps are very separate.
ABM	2 SW MOVs (9704A, 9704B) near west stairwell, 3' apart (photo A8). 3 CCW MOVs (738A, 738B, 817) southwest of RWST, 6' apart (photo A9). 4 CCW MOVs just outside containment, west of RWST (photo A10). 2 MOVs (897, 898) east of RWST, 3' apart (photo A11). 2 SW MOVs near south wall, southeast of RWST (photo A12). Entry to cable tunnel (photos A13, A14). Cable trays near east stairwell, CT-111 (wrapped) and CT-110 (not wrapped) (photo A15). MCC 1M, Bus 16, MCC 1D, DC power cabinets. 2 small pumps near east stairwell. 4/2/98 WD Note that the line listed on the fire Response Plan diagram as H2 is actually N2. At the CT exit, there is a "smoke barrier" (which is similar to a fire barrier, but is not qualified), and the cables are sprayed for about 6'. There are spray shields on the MCC and bus 16. The charcoal filter unit is 5' from bus 16, and is totally enclosed with fire suppression. The mini-purge AOV CIV has no local operator, but has fire wrap above the valve. Stairwells between floors have fire water sprays to prevent fire spread between floors.

LOCATION CHARACTERISTICS TABLE

FIRE AREA: ABI

1. FIRE ZONES IN THIS FIRE AREA:

FIRE ZONE	ELEV (FT.)	FIRE ZONE DESCRIPTION	BUILDING	FLOOR AREA (SQ. FT.)
ABO	271'	AUXILIARY BUILDING OPERATING LEVEL	AB	12740
IBN-0	238'	INTERMEDIATE BUILDING SUB-BASEMENT NORTH	IB	3850
IBN-1	253' 6"	INTERMEDIATE BUILDING BASEMENT LEVEL NORTH	IB	3570
IBN-2	278' 4"	INTERMEDIATE BUILDING MEZZANINE LEVEL NORTH	IB	3570
IBN-3	298' 4"	INTERMEDIATE BUILDING UPPER LEVEL NORTH	IB	3570
IBN-4	315' 4"	INTERMEDIATE BUILDING TOP LEVEL NORTH	IB	3430
IBS-0	237'	INTERMEDIATE BUILDING SUB BASEMENT SOUTH	IB	2325
IBS-1	253' 6"	INTERMEDIATE BUILDING BASEMENT LEVEL SOUTH	IB	2325
IBS-2	271'	INTERMEDIATE BUILDING MEZZANINE LEVEL SOUTH	IB	2385
IBS-3	293'	INTERMEDIATE BUILDING TOP LEVEL SOUTH	IB	2325
N2	271'	NITROGEN STORAGE BUILDING	NS	430

2. FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	COMBUSTIBLE LOADING (BTU)	FIRE SEVERITY (HRS)
ABO	6,700	5.0 min.
IBN-0	0	0
IBN-1	74,286	55.7 min.
IBN-2	1,214	0.9 min.
IBN-3	4,693	3.5 min.
IBN-4	12,340	9.3 min.
IBS-0	0	0
IBS-1	20,754	15.6 min.
IBS-2	20,470	15.4 min.
IBS-3	4,101	3.1 min.
N2	0	0

3. FIRE PROTECTION FEATURES IN THIS FIRE AREA:

FIRE ZONE	FIRE DETECTION FEATURES	FIRE SUPPRESSION FEATURES
ABO	Smoke detectors	
IBN-0		
IBN-1		
IBN-2		
IBN-3		
IBN-4		
IBS-0		
IBS-1		
IBS-2		
IBS-3		
N2		

4. FIRE ZONE(S) ADJACENT TO THE FIRE ZONE(S) IN THIS FIRE AREA:

FIRE ZONE	ADJACENT FIRE ZONE	PATHWAY	PATHWAY RATING (HOUR)
ABO	SAF	WALL	3
ABO	N2	WALL	3
ABO	RC-3	WALL	3
ABO	SB-2	WALL	3
ABO	IBS-2	WALL	3
IBN-0	IBS-0	OPEN	
IBN-0	RC-1	WALL	3
IBN-1	IBS-1	OPEN	
IBN-1	CT	WALL	3
IBN-1	RC-2	WALL	3

LOCATION CHARACTERISTICS TABLE

FIRE AREA: ABI

IBN-1	SB-1	WALL/DOOR	3
IBN-1	TB-1	WALL/DOOR	3
IBN-1	SB-1HS	WALL/DOOR	3
IBN-2	None		
IBN-3	None		
IBN-4	None		
IBS-0	IBN-0	OPEN	
IBS-0	ABB	WALL	
IBS-0	RC-1	WALL	3
IBS-1	IBN-1	OPEN	
IBS-1	ABM	WALL	3
IBS-1	RC-2	WALL	3
IBS-1	SB-1HS	WALL/DOOR	3
IBS-1	SB-1	WALL	3
IBS-2	IBN-2	OPEN	
IBS-2	ABO	WALL	3
IBS-2	RC-3	WALL	3
IBS-2	SB-2	WALL	3
IBS-3	IBN-3	OPEN	
N2	ABO	WALL	3

5. POTENTIAL KEY EQUIPMENT AND THEIR ASSOCIATED BASIC EVENT(S) IMPACTED BY FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	EQUIPMENT AFFECTED	BASIC EVENT	BASIC EVENT DESCRIPTION
ABO	350	CVMVN00350	MOTOR-OPERATED VALVE 350 FAILS TO OPEN
ABO	4734	SWMVC04734	Service Water Header Isolation MOV 4734 Fails To Close On Demand
ABO	52/14	ACCBD1418B	AC BREAKER 52/14 (BUS14/18B) FAILS TO OPERATE
ABO	52/14SS	ACT1FSST14	Fault On 4160 / 480 VAC Bus 14 supply Transformer PXABSS014
ABO	52/ABEF1G	ACCBN1421A	AC BREAKER 52/ABEF1G (BUS14/21A) FAILS TO OPEN
ABO	52/CCP1A	CCMPFPUMPA	MOTOR-DRIVEN PUMP PACO2A FAILS TO RUN
ABO	52/CCP1A	ACCBN1423A	AC BREAKER 52/CCP1A (BUS14/23A) FAILS TO OPEN
ABO	52/CCP1B	CCMPFPUMPB	MOTOR-DRIVEN PUMP PACO2B FAILS TO RUN
ABO	52/CF1A	ACCBN1423C	AC BREAKER 52/CF1A (BUS14/23C) FAILS TO OPEN
ABO	52/CF1D	ACCBN1420C	AC BREAKER 52/CF1D (BUS14/20C) FAILS TO OPEN
ABO	52/CHP1A	ACCBN1423B	AC BREAKER 52/CHP1A (BUS14/23B) FAILS TO OPEN
ABO	52/EG1A1	ACCBD1418C	DG A OUTPUT BREAKER 52/EG1A1 (BUS14/18C) FAILS TO CLOSE
ABO	52/MCCC	DCCFR422NR	FUSE FUBUS14/22-N FAILS OPEN (RECIRCULATION)
ABO	52/MCCC	DCCFRA1ABN	Fuse FUDCPDPAB01A/2N Fails Open (To MCC C)
ABO	52/MCCC	ACCBRMCC1C	480 VAC MCCC Feeder Circuit Breaker 52/MCCC (BUS14/22C) Transfers Open
ABO	83/14	DCREBBUS14	RELAY 83E/14 (BUS 14 DC THROWOVER) FAILS TO DEENERGIZE
ABO	86/MCCC	DCREE86MCC	RELAY 86/MCCC FAILS TO ENERGIZE
ABO	9704A	ACCBRML10A	BREAKER 52/9704A MCCL POS 1J TRANSFERS OPEN
ABO	BATP1A	CVMPAPCH3A	BORIC ACID MOTOR-DRIVEN PUMP PCH03A FAILS TO START
ABO	BATP1A	CVMPAPCH3A	BORIC ACID MOTOR-DRIVEN PUMP PCH03A FAILS TO START
ABO	BATP1B	CVMPAPCH3B	BORIC ACID MOTOR-DRIVEN PUMP PCH03B FAILS TO START
ABO	BUS14UV	UVREK0X614	BUS 14 UNDERVOLTAGE RELAY 27X6/14 TRANSFERS TO ENERGIZED
ABO	BUS14UV	UVREE0X414	Relay 27X4/14 fails to energize
ABO	BUS14UV	UVREEBX514	Relay 27BX5/14 fails to energize
ABO	BUS14UV	UVREE0X314	Relay 27X3/14 fails to energize
ABO	BUS14UV	UVREEBX114	Relay 27BX1/14 fails to energize
ABO	BUS14UV	UVREE0X214	Relay 27X2/14 fails to energize
ABO	BUS14UV	UVREEBX314	Relay 27BX3/14 fails to energize
ABO	BUS14UV	UVREEBX414	Relay 27BX4/14 fails to energize
ABO	BUS14UV	UVREE0X514	Relay 27X5/14 fails to energize
ABO	BUS14UV	UVREEBX614	Relay 27BX6/14 fails to energize
ABO	BUS14UV	UVREK0X114	BUS 14 UNDERVOLTAGE RELAY 27X1/14 TRANSFERS TO ENERGIZED
ABO	BUS14UV	UVREK0X314	BUS 14 UNDERVOLTAGE RELAY 27X3/14 TRANSFERS TO ENERGIZED

LOCATION CHARACTERISTICS TABLE

FIRE AREA: ABI

ABO	BUS14UV	UVLCDX514A	RELAY 27X5/14 DRIVER (HEAT SINK ASSEMBLY #1) GENERATES A SPURIOUS SIGNAL
ABO	BUS14UV	UVREKBX114	BUS 14 UNDERVOLTAGE RELAY 27BX1/14 TRANSFERS TO ENERGIZED
ABO	BUS14UV	UVLCD0X214	Relay 27X2/14 driver (Heat Sink Assembly #1) fails to energize
ABO	BUS14UV	AFCTR7B614	CONTACT 27BX6/14 TRANSFERS OPEN
ABO	BUS14UV	AFCTR70614	CONTACT 27X6/14 (1-2) TRANSFERS OPEN
ABO	BUS14UV	UVREK0X414	BUS 14 UNDERVOLTAGE RELAY 27X4/14 TRANSFERS TO ENERGIZED
ABO	BUS14UV	UVREKBX614	BUS 14 UNDERVOLTAGE RELAY 27BX6/14 TRANSFERS TO ENERGIZED
ABO	BUS14UV	UVLCD0X314	Relay 27X3/14 driver (Heat Sink Assembly #1) fails to energize
ABO	BUS14UV	UVLCD14S#2	BUS 14 UNDERVOLTAGE SOLID STATE SWITCH #2 FAILS TO GENERATE A SIGNAL
ABO	BUS14UV	UVREKBX314	BUS 14 UNDERVOLTAGE RELAY 27BX3/14 TRANSFERS TO ENERGIZED
ABO	BUS14UV	UVCFR14FU3	Fuse #3 (FUARA1RC14/3-N) fails open (relay cabinet)
ABO	BUS14UV	UVREE0X614	Relay 27X6/14 fails to energize
ABO	BUS14UV	UVLCD0X114	Relay 27X1/14 driver (Heat Sink Assembly #1) fails to energize
ABO	BUS14UV	UVLCD0X514	Relay 27X5/14 driver (Heat Sink Assembly #1) fails to energize
ABO	BUS14UV	UVREKBX514	BUS 14 UNDERVOLTAGE RELAY 27BX5/14 TRANSFERS TO ENERGIZED
ABO	BUS14UV	UVLCDBX214	Relay 27BX2/14 driver (Heat Sink Assembly #2) fails to energize
ABO	BUS14UV	UVLCDBX34A	RELAY 27BX3/14 DRIVER (HEAT SINK ASSEMBLY #2) GENERATES A SPURIOUS SIGNAL
ABO	BUS14UV	UVLCDBX314	Relay 27BX3/14 driver (Heat Sink Assembly #2) fails to energize
ABO	BUS14UV	UVLCDBX14A	RELAY 27BX1/14 DRIVER (HEAT SINK ASSEMBLY #2) GENERATES A SPURIOUS SIGNAL
ABO	BUS14UV	UVLCDX614A	RELAY 27X6/14 DRIVER (HEAT SINK ASSEMBLY #1) GENERATES A SPURIOUS SIGNAL
ABO	BUS14UV	UVLCD0X414	Relay 27X4/14 driver (Heat Sink Assembly #1) fails to energize
ABO	BUS14UV	UVLCDBX114	Relay 27BX1/14 driver (Heat Sink Assembly #2) fails to energize
ABO	BUS14UV	UVREKBX414	BUS 14 UNDERVOLTAGE RELAY 27BX4/14 TRANSFERS TO ENERGIZED
ABO	BUS14UV	UVREK0X514	BUS 14 UNDERVOLTAGE RELAY 27X5/14 TRANSFERS TO ENERGIZED
ABO	BUS14UV	UVLCDX414A	RELAY 27X4/14 DRIVER (HEAT SINK ASSEMBLY #1) GENERATES A SPURIOUS SIGNAL
ABO	BUS14UV	UVLCDBX614	Relay 27BX6/14 driver (Heat Sink Assembly #2) fails to energize
ABO	BUS14UV	UVLCDX314A	RELAY 27X3/14 DRIVER (HEAT SINK ASSEMBLY #1) GENERATES A SPURIOUS SIGNAL
ABO	BUS14UV	UVREEBX214	Relay 27BX2/14 fails to energize
ABO	BUS14UV	UVLCD0X614	Relay 27X6/14 driver (Heat Sink Assembly #1) fails to energize
ABO	BUS14UV	UVLCDX114A	RELAY 27X1/14 DRIVER (HEAT SINK ASSEMBLY #1) GENERATES A SPURIOUS SIGNAL
ABO	BUS14UV	UVLCD14S#1	BUS 14 UNDERVOLTAGE SOLID STATE SWITCH # 1 FAILS TO GENERATE A SIGNAL
ABO	BUS14UV	UVCFR14FU2	Fuse #2 (FUARA1RC14/2-P) fails open (relay cabinet)
ABO	BUS14UV	UVREE0X114	Relay 27X1/14 fails to energize
ABO	BUS14UV	UVLCDBX64A	RELAY 27BX6/14 DRIVER (HEAT SINK ASSEMBLY #2) GENERATES A SPURIOUS SIGNAL
ABO	BUS14UV	UVLCDBX54A	RELAY 27BX5/14 DRIVER (HEAT SINK ASSEMBLY #2) GENERATES A SPURIOUS SIGNAL
ABO	BUS14UV	UVLCDBX514	Relay 27BX5/14 driver (Heat Sink Assembly #2) fails to energize
ABO	BUS14UV	UVLCDBX44A	RELAY 27BX4/14 DRIVER (HEAT SINK ASSEMBLY #2) GENERATES A SPURIOUS SIGNAL
ABO	BUS14UV	UVLCDBX414	Relay 27BX4/14 driver (Heat Sink Assembly #2) fails to energize
ABO	DCPDPAB01A/02	DCCSRA1ABX	Disconnect Switch DCPDPAB01A/02 Transfers Open (To MCC C)
ABO	DCPDPAB01A/04	DCCFRA1ADN	Fuse FUDCPDPAB01A/4N Fails Open (To Bus 14 - Normal)
ABO	DCPDPAB01A/05	DCCFRA1AEN	Fuse FUDCPDPAB01A/5N Fails Open (To Bus 16 - Emergency)
ABO	DCPDPCB03A/19	DCBDFAUXDA	Auxiliary Building DC Distribution Panel A (DCPDPAB01A) Local Fault
ABO	MCCH	ACCBRMCC1H	480 VAC MCCH Feeder Circuit Breaker 52/MCCH (MCCC/05MM) Transfers Open
ABO	MCCL	ACCBRMCC1L	480 VAC MCCL Feeder Circuit Breaker 52/MCCL (MCCC/11J) Transfers Open
ABO	PIC-617	CCPCDPC617	PRESSURE INDICATING CONTROLLER PS-617 FAILS TO RESPOND
ABO	RMWP1A	CVMPFPCH8A	Motor-driven pump PCH08A (RMU Pump A) fails to run
ABO	RMWP1A	CVMPFPCH8A	Motor-driven pump PCH08A (RMU Pump A) fails to run
ABO	RMWP1B	CVMPFPCH8B	Motor-driven pump PCH08B (RMU Pump B) fails to run
ABO	RMWP1B	CVMPFPCH8B	Motor-driven pump PCH08B (RMU Pump B) fails to run
ABO	TAFPACOP	ACCBRPOL10	AC BREAKER MCCC/02H TRANSFERS OPEN
ABO	TAFPACOP	ACCBRPOL10	AC BREAKER MCCC/02H TRANSFERS OPEN
IBN-1	4007	AFMVD04007	Motor operated valve 4007 fails to throttle flow
IBN-1	4008	AFMVD04008	Motor operated valve 4008 fails to throttle flow
IBN-1	4013	SWMVP04013	Motor operated valve 4013 fails to open
IBN-1	4027	SWMVP04027	Motor operated valve 4027 fails to open
IBN-1	4028	SWMVP04028	Motor operated valve 4028 fails to open

LOCATION CHARACTERISTICS TABLE

FIRE AREA: ABI

IBN-1	4324	SWSVP04324	Solenoid valve 4324 fails to open
IBN-1	4324	SWPSR02094	Differential pressure switch DPS-2094 fails to respond
IBN-1	4325	SWPSR02084	Differential pressure switch DPS-2084 fails to respond
IBN-1	4325	SWSVP04325	Solenoid valve 4325 fails to open
IBN-1	4326	SWPSR02085	Differential pressure switch DPS-2085 fails to respond
IBN-1	4326	SWSVP04326	Solenoid valve 4326 fails to open
IBN-1	4614	SWMVC04614	Service Water Header Isolation MOV 4614 Fails To Close On Demand
IBN-1	4663	SWMVC04663	Service Water Header Isolation MOV 4663 Fails To Close On Demand
IBN-1	4664	SWMVC04664	Service Water Header Isolation MOV 4664 Fails To Close On Demand
IBN-1	4733	SWMVC04733	Service Water Header Isolation MOV 4733 Fails To Close On Demand
IBN-1	52/MAFP1A	AFMPFPAF1A	AFW Motor-Driven Pump 1A fails to run
IBN-1	52/MAFP1B	AFMPFPAF1B	AFW Motor-Driven Pump 1B fails to run
IBN-1	5392	IAAVK05392	AIR-OPERATED VALVE 5392 TRANSFER CLOSED
IBN-1	FT-2001	AFFTDF2001	Flow transmitter FT-2001 fails to respond
IBN-1	FT-2002	AFFTDFT2002	Flow transmitter FT-2002 fails to respond
IBN-1	PT-468	ESPTDPT468	SG A LOW PRESSURE TRANSMITTER PT-468 FAILS TO RESPOND ON DEMAND
IBN-1	PT-468	EXPTLPT468	SG A LOW PRESSURE TRANSMITTER PT-468 FAILS LOW
IBN-1	PT-469	ESPTDPT469	SG A LOW PRESSURE TRANSMITTER PT-469 FAILS TO RESPOND ON DEMAND
IBN-1	PT-469	EXPTLPT469	SG A LOW PRESSURE TRANSMITTER PT-469 FAILS LOW
IBN-1	PT-478	ESPTDPT478	SG B LOW PRESSURE TRANSMITTER PT-478 FAILS TO RESPOND ON DEMAND
IBN-1	PT-478	EXPTLPT478	SG B LOW PRESSURE TRANSMITTER PT-478 FAILS LOW
IBN-1	PT-479	EXPTLPT479	SG B LOW PRESSURE TRANSMITTER PT-479 FAILS LOW
IBN-1	PT-479	ESPTDPT479	SG B LOW PRESSURE TRANSMITTER PT-479 FAILS TO RESPOND ON DEMAND
IBN-1	PT-482	ESPTDPT482	SG A LOW PRESSURE TRANSMITTER PT-482 FAILS TO RESPOND ON DEMAND
IBN-1	PT-482	EXPTLPT482	SG A LOW PRESSURE TRANSMITTER PT-482 FAILS LOW
IBN-1	PT-483	ESPTDPT483	SG B LOW PRESSURE TRANSMITTER PT-483 FAILS TO RESPOND ON DEMAND
IBN-1	PT-483	EXPTLPT483	SG B LOW PRESSURE TRANSMITTER PT-483 FAILS LOW
IBN-1	SI TRAIN A	EXREK000C1	CONTAINMENT ISOLATION SIGNAL MASTER RELAY C1 SPURIOUSLY ENERGIZES
IBN-1	TAOP	DCCSRT1BNX	Disconnect Switch DCPDPTB01B/13 Transfers Open (To TDAFW Pump Oil Pump)
IBN-2	3410	MSRVP03410	ARV 3410 FAILS TO OPEN (STANDBY)
IBN-2	3411	MSRVP03411	AIR-OPERATED VALVE 3411 FAILS TO OPEN (ARV A)
IBN-2	3504A	MSMVP3504A	Motor operated valve 3504A fails to open
IBN-2	3505A	MSMVP3505A	Motor operated valve 3505A fails to open
IBN-2	3516	MSAVX03516	MSIV 3516 Fails to Close
IBN-2	3517	MSAVX03517	MSIV 3517 Fails to Close
IBS-2	PT-947	ESPTDPT947	CONTAINMENT HIGH PRESSURE TRANSMITTER PT-947 FAILS TO RESPOND ON DEMAND
IBS-2	PT-948	ESPTDPT948	CONTAINMENT HIGH PRESSURE TRANSMITTER PT-948 FAILS TO RESPOND ON DEMAND
IBS-2	PT-949	ESPTDPT949	CONTAINMENT HIGH PRESSURE TRANSMITTER PT-949 FAILS TO RESPOND ON DEMAND
IBS-2	PT-950	ESPTDPT950	CONTAINMENT HIGH PRESSURE TRANSMITTER PT-950 FAILS TO RESPOND ON DEMAND

6. POTENTIAL RACEWAYS (CONDUITS AND CABLE TRAYS) AND THEIR ASSOCIATED EQUIPMENT/BASIC EVENT(S) IMPACTED BY FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	RACEWAY AFFECTED	EQUIPMENT AFFECTED	CABLE FUNCTION	BASIC EVENT AFFECTED	BASIC EVENT DESCRIPTION
ABO	AHC0201	9632A	P 120 VAC POWER	SWAVN9632A	AIR-OPERATED VALVE 9632A FAILS TO OPEN
ABO	AHC0202	9632A	C 120 VAC CONTROL	SWAVN9632A	AIR-OPERATED VALVE 9632A FAILS TO OPEN
ABO	AHC0203	9632A	C 120 VAC CONTROL	SWAVN9632A	AIR-OPERATED VALVE 9632A FAILS TO OPEN
ABO	AHC0219	AFP01	P 480 VAC POWER	HVMFFAFF1A	MOTOR-DRIVEN FAN AFF01A FAILS TO RUN
ABO	AHC0220	AFP01	C 120 VAC CONTROL	HVMFFAFF1A	MOTOR-DRIVEN FAN AFF01A FAILS TO RUN
ABO	C0544	BATP1A	C 125 VDC CONTROL	CVMPAPCH3A	BORIC ACID MOTOR-DRIVEN PUMP PCH03A FAILS TO START
ABO	C0545	BATP1A	P 480 VAC POWER	CVMPAPCH3A	BORIC ACID MOTOR-DRIVEN PUMP PCH03A FAILS TO START
ABO	C0546	BATP1A	C 125 VDC CONTROL	CVMPAPCH3A	BORIC ACID MOTOR-DRIVEN PUMP PCH03A FAILS TO START
ABO	C0547	BATP1A	C 125 VDC CONTROL	CVMPAPCH3A	BORIC ACID MOTOR-DRIVEN PUMP PCH03A FAILS TO START
ABO	C0590	TAFPACOP	P 480 VAC POWER	ACCBRPOL10	AC BREAKER MCCC/02H TRANSFERS OPEN

LOCATION CHARACTERISTICS TABLE

FIRE AREA: ABI

ABO	C0591	TAFPACOP	I IND/125 VDC CONTROL	ACCBRPOL10	AC BREAKER MCCC/02H TRANSFERS OPEN
ABO	C0640	CVTA1	P 480 VAC POWER	IBT6FCVTA2	Instrument Bus B (IBPDPCBBW) Constant Voltage Transformer CVTA1 Fails
ABO	C0644	BYCA	P 480 VAC POWER	DCBCF0000A	Battery Charger A (BYCA) No Output
ABO	C0687	MCCH	P 480 VAC POWER	DCCFRC3ACN	Fuse FUDCPDPCB03A/CN Fails Open (To MCC H)
ABO	C0687	MCCH	P 480 VAC POWER	ACCBRMCC1H	480 VAC MCCH Feeder Circuit Breaker 52/MCCH (MCCC/05MM) Transfers Open
ABO	C0690	516	P 480 VAC POWER	RCMVP00516	MOTOR-OPERATED VALVE 516 FAILS TO OPEN
ABO	C0690	516	P 480 VAC POWER	RCMVK00516	MOTOR-OPERATED VALVE 516 TRANSFERS CLOSED
ABO	C0692	516	C 125 VDC CONTROL	RCMVP00516	MOTOR-OPERATED VALVE 516 FAILS TO OPEN
ABO	C0692	516	C 125 VDC CONTROL	RCMVK00516	MOTOR-OPERATED VALVE 516 TRANSFERS CLOSED
ABO	C0694	516	C 125 VDC CONTROL	RCMVP00516	MOTOR-OPERATED VALVE 516 FAILS TO OPEN
ABO	C0694	516	C 125 VDC CONTROL	RCMVK00516	MOTOR-OPERATED VALVE 516 TRANSFERS CLOSED
ABO	C0697	4616	P 480 VAC POWER	SWMVC04616	Service Water Header Isolation MOV 4616 Fails To Close On Demand
ABO	C0697	4616	P 480 VAC POWER	SWMVK04616	Service Water Header Isolation MOV 4616 Transfers Closed
ABO	C0698	4616	C 125 VDC CONTROL	SWMVK04616	Service Water Header Isolation MOV 4616 Transfers Closed
ABO	C0698	4616	C 125 VDC CONTROL	SWMVC04616	Service Water Header Isolation MOV 4616 Fails To Close On Demand
ABO	C0699	4616	C 125 VDC CONTROL	SWMVK04616	Service Water Header Isolation MOV 4616 Transfers Closed
ABO	C0699	4616	C 125 VDC CONTROL	SWMVC04616	Service Water Header Isolation MOV 4616 Fails To Close On Demand
ABO	C0702	850A	P 480 VAC POWER	RRMVP0850A	MOTOR-OPERATED VALVE 850A FAILS TO OPEN [RECIRC]
ABO	C0702	850A	P 480 VAC POWER	RHMVR0850A	MOTOR-OP VALVE 850A TRANSFERS OPEN [INJECTION]
ABO	C0702	850A	P 480 VAC POWER	RRMVR0850A	MOTOR-OP VALVE 850A TRANSFERS OPEN [RECIRCULATION]
ABO	C0703	850A	C 125 VDC CONTROL	RRMVR0850A	MOTOR-OP VALVE 850A TRANSFERS OPEN [RECIRCULATION]
ABO	C0703	850A	C 125 VDC CONTROL	RHMVR0850A	MOTOR-OP VALVE 850A TRANSFERS OPEN [INJECTION]
ABO	C0703	850A	C 125 VDC CONTROL	RRMVP0850A	MOTOR-OPERATED VALVE 850A FAILS TO OPEN [RECIRC]
ABO	C0704	850A	C 125 VDC CONTROL	RHMVR0850A	MOTOR-OP VALVE 850A TRANSFERS OPEN [INJECTION]
ABO	C0704	850A	C 125 VDC CONTROL	RRMVP0850A	MOTOR-OPERATED VALVE 850A FAILS TO OPEN [RECIRC]
ABO	C0704	850A	C 125 VDC CONTROL	RRMVR0850A	MOTOR-OP VALVE 850A TRANSFERS OPEN [RECIRCULATION]
ABO	C0707	4007	P 480 VAC POWER	AFMVD04007	Motor operated valve 4007 fails to throttle flow
ABO	C0708	4007	C 125 VDC CONTROL	AFMVD04007	Motor operated valve 4007 fails to throttle flow
ABO	C0710	4007	C 125 VDC CONTROL	AFMVD04007	Motor operated valve 4007 fails to throttle flow
ABO	C0713	720	P 480 VAC POWER	RRMVQ00720	MOV 720 FAILS TO OPEN
ABO	C0713	720	P 480 VAC POWER	RCS-720	ISLOCA evaluation
ABO	C0713A	720	P 480 VAC POWER	RRMVQ00720	MOV 720 FAILS TO OPEN
ABO	C0713A	720	P 480 VAC POWER	RCS-720	ISLOCA evaluation
ABO	C0715	720	C 125 VDC CONTROL	RRMVQ00720	MOV 720 FAILS TO OPEN
ABO	C0715	720	C 125 VDC CONTROL	RCS-720	ISLOCA evaluation
ABO	C0717	720	C 125 VDC CONTROL	RRMVQ00720	MOV 720 FAILS TO OPEN
ABO	C0717	720	C 125 VDC CONTROL	RCS-720	ISLOCA evaluation
ABO	C0720	700	P 480 VAC POWER	RCS-700	ISLOCA evaluation
ABO	C0720	700	P 480 VAC POWER	RRMVQ00700	MOV 700 FAILS TO OPEN
ABO	C0720A	700	P 480 VAC POWER	RCS-700	ISLOCA evaluation
ABO	C0720A	700	P 480 VAC POWER	RRMVQ00700	MOV 700 FAILS TO OPEN
ABO	C0722	700	C 125 VDC CONTROL	RRMVQ00700	MOV 700 FAILS TO OPEN
ABO	C0722	700	C 125 VDC CONTROL	RCS-700	ISLOCA evaluation
ABO	C0724	700	C 125 VDC CONTROL	RRMVQ00700	MOV 700 FAILS TO OPEN
ABO	C0724	700	C 125 VDC CONTROL	RCS-700	ISLOCA evaluation

Pages B-55 through B-80 are similar and not included to reduce paper volume.

LOCATION CHARACTERISTICS TABLE

FIRE AREA: ABI

IBN-2	G1189	3517	C 125 VDC CONTROL	MSAVX03517	MSIV 3517 Fails to Close
IBN-2	G1191	3517	C 125 VDC CONTROL	MSAVX03517	MSIV 3517 Fails to Close
IBN-2	G1192	3517	C 125 VDC CONTROL	MSAVX03517	MSIV 3517 Fails to Close
IBN-2	G1193	3517	C 125 VDC CONTROL	MSAVX03517	MSIV 3517 Fails to Close
IBN-2	G1194	3517	C 125 VDC CONTROL	MSAVX03517	MSIV 3517 Fails to Close
IBN-2	G1195	3517	C 125 VDC CONTROL	MSAVX03517	MSIV 3517 Fails to Close
IBN-2	G1197	3516	C 125 VDC CONTROL	MSAVX03516	MSIV 3516 Fails to Close
IBN-2	G1198	3516	C 125 VDC CONTROL	MSAVX03516	MSIV 3516 Fails to Close
IBN-2	G1199	3516	C 125 VDC CONTROL	MSAVX03516	MSIV 3516 Fails to Close
IBN-2	G1200	3516	C 125 VDC CONTROL	MSAVX03516	MSIV 3516 Fails to Close
IBN-2	G1201	3516	C 125 VDC CONTROL	MSAVX03516	MSIV 3516 Fails to Close
IBN-2	R1279A	PT-468	C	ESPTDPT468	SG A LOW PRESSURE TRANSMITTER PT-468 FAILS TO RESPOND ON DEMAND
IBN-2	R1279A	PT-468	C	EXPTLPT468	SG A LOW PRESSURE TRANSMITTER PT-468 FAILS LOW
IBN-3	E0032	3505A	C 125 VDC CONTROL/POWER	MSMVP3505A	Motor operated valve 3505A fails to open
IBS-1	C0472	52/CTP	C 120 VAC CONTROL	AFMPFPCD04	Condensate Transfer Pump PCD04 fails to run
IBS-1	C0473	52/CTP	C 125 VDC CONTROL	AFMPFPCD04	Condensate Transfer Pump PCD04 fails to run
IBS-1	G0339	LT-2022A	INDICATION	AFLTD2022A	Condensate Storage Tank A level transmitter LT-2022A fails to respond
IBS-1	L0642	52/ABEF1G	C 125 VDC CONTROL	ACCBN1421A	AC BREAKER 52/ABEF1G (BUS14/21A) FAILS TO OPEN
IBS-1	R0940	PT-948	I ALARM/IND/CONT	ESPTDPT948	CONTAINMENT HIGH PRESSURE TRANSMITTER PT-948 FAILS TO RESPOND ON DEMAND
IBS-1	R0984	PT-947	I ANALOG SIGNAL	ESPTDPT947	CONTAINMENT HIGH PRESSURE TRANSMITTER PT-947 FAILS TO RESPOND ON DEMAND
IBS-1	R3176	5737	C	MSAVX05737	AOV 5737 Fails to Close
IBS-1	R3176	5738	C	MSAVX05738	AOV 5738 Fails to Close
IBS-1	R3183	5735	C 125 VDC CONTROL	MSAVX05735	AOV 5735 Fails to Close
IBS-1	R3183	5736	C 125 VDC CONTROL	MSAVX05736	AOV 5736 Fails to Close
IBS-1	R3184	5735	C 125 VDC CONTROL	MSAVX05735	AOV 5735 Fails to Close
IBS-1	R3185	5735	C 125 VDC CONTROL	MSAVX05735	AOV 5735 Fails to Close
IBS-1	R3186	5735	C 125 VDC CONTROL	MSAVX05735	AOV 5735 Fails to Close
IBS-1	R3187	5736	C 125 VDC CONTROL	MSAVX05736	AOV 5736 Fails to Close
IBS-1	R3188	5736	C 125 VDC CONTROL	MSAVX05736	AOV 5736 Fails to Close
IBS-1	R3189	5736	C 125 VDC CONTROL	MSAVX05736	AOV 5736 Fails to Close
IBS-1	R3192	5737	C	MSAVX05737	AOV 5737 Fails to Close
IBS-1	R3192	5738	C	MSAVX05738	AOV 5738 Fails to Close
IBS-1	R3193	5735	C 125 VDC CONTROL	MSAVX05735	AOV 5735 Fails to Close
IBS-1	R3193	5736	C 125 VDC CONTROL	MSAVX05736	AOV 5736 Fails to Close
IBS-1	R3194	5735	C 125 VDC CONTROL	MSAVX05735	AOV 5735 Fails to Close
IBS-1	R3194	5736	C 125 VDC CONTROL	MSAVX05736	AOV 5736 Fails to Close
IBS-1	R3194	5737	C 125 VDC CONTROL	MSAVX05737	AOV 5737 Fails to Close
IBS-1	R3194	5738	C 125 VDC CONTROL	MSAVX05738	AOV 5738 Fails to Close
IBS-1	R3520	LT-2022A	C	AFLTD2022A	Condensate Storage Tank A level transmitter LT-2022A fails to respond
IBS-1	R3521	LT-2022B	C	AFLTD2022B	Condensate Storage Tank B level transmitter LT-2022B fails to respond
IBS-2	L0642	52/ABEF1G	C 125 VDC CONTROL	ACCBN1421A	AC BREAKER 52/ABEF1G (BUS14/21A) FAILS TO OPEN
IBS-2	L0643	52/ABEF1G	C 125 VDC CONTROL	ACCBN1421A	AC BREAKER 52/ABEF1G (BUS14/21A) FAILS TO OPEN

7. SPATIAL INTERACTIONS ANALYSIS WALKDOWN NOTES:

FIRE ZONE	WALKDOWN NOTES
ABO	2 RMW pumps, 1 monitor tank pump, 2 WCT pumps near south wall (photo A16). MCC 1C near east stairwell (photo A17). Boric acid transfer pumps in cubicle with grating above. MCC 1E near north wall, Bus 14 east of RWST. Water curtain at stairwell to ABM. 4/2/98 WD Bus 14 is fed from level below. Standby AFW cables in conduit above bus and MCCs. Charging swapover dc power switch is in the Bus 14.
ABO	2 CCW pumps just south of middle of room (photos A1, A18). Containment penetration cooling fans just west of RWST (photo A19). Water curtain at stairwell to ABM. 4/2/98 WD CCW pump cables are in conduit coming up from floor below, and very separated from any other cables or fire sources. Some protective clothing stored about 12' away.

LOCATION CHARACTERISTICS TABLE

FIRE AREA: ABI

ABO	Typical smoke detector (photo A20) approximately 12'-15' up from floor. Spent fuel pool. 4/2/98 WD O2 and H2 lines for recombiners are separated from all safety equipment and not a problem for fire.
IBN-0	4/2/98 WD did not walkdown. No safety critical equipment, except TDAFW lube oil piping, which would not be damaged by fire.
IBN-1	1 T-D AFW pump, 2 M-D AFW pumps (photo B7), 8' apart, about 30' from T-D AFW pump. 2 A/C chiller water pumps (photo B5), 3' apart. 2 A/C chillers (photo B6), 5' apart. Several MOVs. Reactor trip breakers at north wall in northeast corner of building. CRD M-G sets in northeast corner of building. 4/2/98 WD large flood drain to ensure fire sprinkler water would not cause flood. Sprinklers over TDAFW and associated lube oil. Some instr. Cables wrapped near cable tunnel area. Significant amount of cable. MG sets and cabinets and Rx trip breakers are below critical cables, but the deluge system is in cables. Rod control cabinets have spray shield 2' over top, which would also tend to shield cables as if in a tray with a bottom. Cables are about 6' above spray shield, and ceiling is about 15' higher. Mini purge CIV OK (AOV, no manual operator). H2 lines are not filled to H2 recombiner control panel, and are in a area separated by block wall from AFW pumps.
IBN-2	Main steam header, main steam valves, safety valves, T-D AFW pump MOVs. 4/2/98 WD Atmos. relief valves and MSIVs not by fire sources. ARV is AOV, but with manual operator as well. Block valve is manual. TDP steam supply valve are MOV. H2 piping in southwest is separated by block wall, and is not valved in during normal operation.
IBN-3	4/2/98 WD not walked down. No safety critical equipment.
IBN-4	4/2/98 WD not walked down. No critical safety equipment for fire ipeee.
IBS-0	4/2/98 WD not walked down. No critical safety equipment for fire ipeee.
IBS-1	4/2/98 WD H2 lines are not filled to H2 recombiner control panel, and are in a area separated by block wall from AFW pumps.
IBS-2	4/2/98 WD H2 lines are valved out, and are in a area separated by block wall from north area.
IBS-3	2 Intermediate building exhaust fans, 3 auxiliary building exhaust fans, containment purge supply fans.
N2	

LOCATION CHARACTERISTICS TABLE

FIRE AREA: EDG1A

1. FIRE ZONES IN THIS FIRE AREA:

FIRE ZONE	ELEV (FT.)	FIRE ZONE DESCRIPTION	BUILDING	FLOOR AREA (SQ. FT.)
EDG1A-0	244' 6"	DIESEL GENERATOR 1A CABLE VAULT	DG	230
EDG1A-1	253' 6"	DIESEL GENERATOR ROOM 1A	DG	1265
EDG1A-X	244' 6"	DIESEL GENERATOR CABLE AREA	DG	

2. FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	COMBUSTIBLE LOADING (BTU)	FIRE SEVERITY (HRS)
EDG1A-0	56,000	42 min.
EDG1A-1	60,266	45.2 min.

3. FIRE PROTECTION FEATURES IN THIS FIRE AREA:

FIRE ZONE	FIRE DETECTION FEATURES	FIRE SUPPRESSION FEATURES
EDG1A-0		
EDG1A-1		

4. FIRE ZONE(S) ADJACENT TO THE FIRE ZONE(S) IN THIS FIRE AREA:

FIRE ZONE	ADJACENT FIRE ZONE	PATHWAY	PATHWAY RATING (HOUR)
EDG1A-0	EDG1A-1	OPEN	
EDG1A-1	EDG1B-1	WALL	3
EDG1A-1	TO	WALL	3
EDG1A-1	TB-1	WALL/DOOR	3
EDG1A-X	EDG1A-0		
EDG1A-0	EDG1A-X		

5. POTENTIAL KEY EQUIPMENT AND THEIR ASSOCIATED BASIC EVENT(S) IMPACTED BY FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	EQUIPMENT AFFECTED	BASIC EVENT	BASIC EVENT DESCRIPTION
EDG1A-1	ADF01A	HVMCNDD01A	DG A ROOM FAN AIR-OPERATED DAMPER ADD01A FAILS TO OPEN
EDG1A-1	ADF01B	HVMCNDD01B	DG A ROOM FAN AIR-OPERATED DAMPER ADD01B FAILS TO OPEN
EDG1A-1	DCPDPCB03A/07	DCBDFDG00A	D/G DC Distribution Panel A (DCPDPDG01A) Local Fault
EDG1A-1	DCPDPDG01A/03	DCCSRD1ACX	Disconnect Switch DCPDPDG01A/03 Transfers Open (To D/G A - Normal)
EDG1A-1	DCPDPDG01A/03	DCCFRD1ACP	Fuse FUDCPDPDG01A/3P Fails Open (To D/G A - Normal)
EDG1A-1	DCPDPDG01A/03	DCCFRD1ACN	Fuse FUDCPDPDG01A/3N Fails Open (To D/G A - Normal)
EDG1A-1	DCPDPDG01A/04	DCCSRD1ADX	Disconnect Switch DCPDPDG01A/04 Transfers Open (To D/G B - Emergency)
EDG1A-1	DTP1A	ACRERDTP1A	STARTING CIRCUIT RELAY 42/DTP1A TRANSFERS TO DE-ENERGIZED
EDG1A-1	DTP1A	ACRERDTP1A	STARTING CIRCUIT RELAY 42/DTP1A TRANSFERS TO DE-ENERGIZED
EDG1A-1	KDG01A	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN

6. POTENTIAL RACEWAYS (CONDUITS AND CABLE TRAYS) AND THEIR ASSOCIATED EQUIPMENT/BASIC EVENT(S) IMPACTED BY FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	RACEWAY AFFECTED	EQUIPMENT AFFECTED	CABLE FUNCTION	BASIC EVENT AFFECTED	BASIC EVENT DESCRIPTION
EDG1A-0	C1933	DTP1A	C 125 VDC CONTROL	ACRERDTP1A	STARTING CIRCUIT RELAY 42/DTP1A TRANSFERS TO DE-ENERGIZED
EDG1A-0	C1940	ADF01A	C 125 VDC CONTROL	HVMCNDD01A	DG A ROOM FAN AIR-OPERATED DAMPER ADD01A FAILS TO OPEN
EDG1A-0	C1944	ADF01B	C 125 VDC CONTROL	HVMCNDD01B	DG A ROOM FAN AIR-OPERATED DAMPER ADD01B FAILS TO OPEN
EDG1A-0	C1952	4670	C 125 VDC CONTROL	SWMVK04670	Service Water Header Isolation MOV 4670 Transfers Closed
EDG1A-0	C1952	4670	C 125 VDC CONTROL	SWMVC04670	Service Water Header Isolation MOV 4670 Fails To Close On Demand
EDG1A-0	C1954	4609	P 480 VAC POWER	SWMVC04609	Service Water Header Isolation MOV 4609 Fails To Close On Demand
EDG1A-0	C5075	4670	C 125 VDC CONTROL	SWMVK04670	Service Water Header Isolation MOV 4670 Transfers Closed

LOCATION CHARACTERISTICS TABLE

FIRE AREA: EDG1A

EDG1A-0	C5075	4670	C 125 VDC CONTROL	SWMVC04670	Service Water Header Isolation MOV 4670 Fails To Close On Demand
EDG1A-0	C5076	4609	C MISC CONTROL	SWMVC04609	Service Water Header Isolation MOV 4609 Fails To Close On Demand
EDG1A-0	E0018	DCPDPDG01B/04	P 125 VDC POWER	DCCFRD1BDP	Fuse FUDCPDPDG01B/4P Fails Open (To D/G A - Emergency)
EDG1A-0	E0018	DCPDPDG01B/04	P 125 VDC POWER	DCCFRD1BDN	Fuse FUDCPDPDG01B/4N Fails Open (To D/G A - Emergency)
EDG1A-0	E0018	DCPDPDG01B/04	P 125 VDC POWER	DCCSRD1BDX	Disconnect Switch DCPDPDG01B/04 Transfers Open (To D/G A - Emergency)
EDG1A-0	E0019	DCPDPDG01A/03	C 125 VDC POWER	DCCSRD1ACX	Disconnect Switch DCPDPDG01A/03 Transfers Open (To D/G A - Normal)
EDG1A-0	E0019	DCPDPDG01A/03	C 125 VDC POWER	DCCFRD1ACN	Fuse FUDCPDPDG01A/3N Fails Open (To D/G A - Normal)
EDG1A-0	E0019	DCPDPDG01A/03	C 125 VDC POWER	DCCFRD1ACP	Fuse FUDCPDPDG01A/3P Fails Open (To D/G A - Normal)
EDG1A-0	E0020	DCPDPCB03A/07	C 125 VDC POWER	DCBDFDG00A	D/G DC Distribution Panel A (DCPDPDG01A) Local Fault
EDG1A-0	E0020	DCPDPCB03A/07	C 125 VDC POWER	DCCFRC3AGN	Fuse FUDCPDPCB03A/GN Fails Open (To D/G DC Distribution Panel A)
EDG1A-0	E0022	DCPDPCB03A/03	P 125 VDC POWER	DCCSRC3ACX	Disconnect Switch DCPDPCB03A/03 Transfers Open (To MCC H)
EDG1A-0	E0022	MCCH	P 125 VDC POWER	DCCFRC3ACN	Fuse FUDCPDPCB03A/CN Fails Open (To MCC H)
EDG1A-0	E0022	MCCH	P 125 VDC POWER	ACCBRMCC1H	480 VAC MCCH Feeder Circuit Breaker 52/MCCH (MCCC/05MM) Transfers Open
EDG1A-0	L0318	52/EG1A1	P 480 VAC POWER	ACREKEG1A1	DG A SUPPLY BREAKER TO BUS 14 CLOSED RELAY 18CX1/EG1A1 TRANSFERS TO ENERGIZED
EDG1A-0	L0318	52/EG1A1	P 480 VAC POWER	ACCBD1418C	DG A OUTPUT BREAKER 52/EG1A1 (BUS14/18C) FAILS TO CLOSE
EDG1A-0	L0320	52/EG1A1	C 125 VDC CONTROL	ACCBD1418C	DG A OUTPUT BREAKER 52/EG1A1 (BUS14/18C) FAILS TO CLOSE
EDG1A-0	L0320	52/EG1A1	C 125 VDC CONTROL	ACREKEG1A1	DG A SUPPLY BREAKER TO BUS 14 CLOSED RELAY 18CX1/EG1A1 TRANSFERS TO ENERGIZED
EDG1A-0	L0508	52/EG1A1	P 480 VAC POWER	ACCBD1418C	DG A OUTPUT BREAKER 52/EG1A1 (BUS14/18C) FAILS TO CLOSE
EDG1A-0	L0508	52/EG1A1	P 480 VAC POWER	ACREKEG1A1	DG A SUPPLY BREAKER TO BUS 14 CLOSED RELAY 18CX1/EG1A1 TRANSFERS TO ENERGIZED
EDG1A-0	L0508	52/EG1A2	P 480 VAC POWER	ACCBD1831C	AC BREAKER 52/EG1A2 (BUS18/31C) FAILS TO OPERATE
EDG1A-0	L0509	52/EG1A2	C 125 VDC CONTROL	ACCBD1831C	AC BREAKER 52/EG1A2 (BUS18/31C) FAILS TO OPERATE
EDG1A-0	L0530	KDG01A	I IND/125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0531	KDG01A	I ALARM/IND/CONT	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0532	KDG01A	C 120 VAC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0536	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0537	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0541	KDG01A	P 480 VAC POWER	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0545	KDG01A	P 480 VAC POWER	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0546	KDG01A	P 480 VAC POWER	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0547	KDG01A	P 480 VAC POWER	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0550	KDG01A	I METERING/RELAYIN G	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0554	KDG01A	I METERING/RELAYIN G	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0555	KDG01A	P 120 VAC POWER	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0560	KDG01A	I METERING/RELAYIN G	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0561	KDG01A	I METERING/RELAYIN G	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0562	KDG01A	I METERING/RELAYIN G	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN

LOCATION CHARACTERISTICS TABLE

FIRE AREA: EDG1A

EDG1A-0	L0563	KDG01A	I METERING/RELAYING	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0564	KDG01A	I METERING/RELAYING	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0565	KDG01A	I METERING/RELAYING	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0752	52/1H1B	CONTROL	ACCBN1727A	AC BREAKER 52/1H1B (BUS17/27A) FAILS TO OPEN
EDG1A-0	L0754	52/1H1D	CONTROL	ACCBN1727B	AC BREAKER 52/1H1D (BUS17/27B) FAILS TO OPEN
EDG1A-0	L0760	52/1H1A	C	ACCBN1829A	AC BREAKER 52/1H1A (BUS18/29A) FAILS TO OPEN
EDG1A-0	L0762	52/1H1C	CONTROL	ACCBN1829B	AC BREAKER 52/1H1C (BUS18/29B) FAILS TO OPEN
EDG1A-0	L0778	52/17SS	CONTROL	ACT1FSST17	Fault On 4160 / 480 VAC Bus 17 supply Transformer PXSHSS017
EDG1A-0	L0779	52/18SS	CONTROL	ACT1FSST18	Fault On 4160 / 480 VAC Bus 18 supply Transformer PXSHSS018
EDG1A-0	L0837	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0837A	KDG01A	C 120 VAC CONTROL/POWER	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0838	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0838A	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0838B	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0838C	KDG01A	C 120 VAC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0850	KDG01A	I INDICATION	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0851	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-0	L0858	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	C0687	MCCH	P 480 VAC POWER	DCCFRC3ACN	Fuse FUDCPDPCB03A/CN Fails Open (To MCC H)
EDG1A-1	C0687	MCCH	P 480 VAC POWER	ACCBRMCC1H	480 VAC MCCH Feeder Circuit Breaker 52/MCCH (MCCC/05MM) Transfers Open
EDG1A-1	C1927	DTP1A	C 125 VDC CONTROL	ACRERDTP1A	STARTING CIRCUIT RELAY 42/DTP1A TRANSFERS TO DE-ENERGIZED
EDG1A-1	C1927	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	C1932	DTP1A	C 125 VDC CONTROL	ACRERDTP1A	STARTING CIRCUIT RELAY 42/DTP1A TRANSFERS TO DE-ENERGIZED
EDG1A-1	C1933	DTP1A	C 125 VDC CONTROL	ACRERDTP1A	STARTING CIRCUIT RELAY 42/DTP1A TRANSFERS TO DE-ENERGIZED
EDG1A-1	C1938	ADF01A	P 480 VAC POWER	HVMCNDD01A	DG A ROOM FAN AIR-OPERATED DAMPER ADD01A FAILS TO OPEN
EDG1A-1	C1939	ADF01A	C 125 VDC CONTROL	HVMCNDD01A	DG A ROOM FAN AIR-OPERATED DAMPER ADD01A FAILS TO OPEN
EDG1A-1	C1940	ADF01A	C 125 VDC CONTROL	HVMCNDD01A	DG A ROOM FAN AIR-OPERATED DAMPER ADD01A FAILS TO OPEN
EDG1A-1	C1941	ADF01A	P 125 VDC POWER	HVMCNDD01A	DG A ROOM FAN AIR-OPERATED DAMPER ADD01A FAILS TO OPEN
EDG1A-1	C1941	ADF01B	P 125 VDC POWER	HVMCNDD01B	DG A ROOM FAN AIR-OPERATED DAMPER ADD01B FAILS TO OPEN
EDG1A-1	C1942	ADF01B	P 480 VAC POWER	HVMCNDD01B	DG A ROOM FAN AIR-OPERATED DAMPER ADD01B FAILS TO OPEN
EDG1A-1	C1943	ADF01B	P 125 VDC POWER	HVMCNDD01B	DG A ROOM FAN AIR-OPERATED DAMPER ADD01B FAILS TO OPEN
EDG1A-1	C1944	ADF01B	C 125 VDC CONTROL	HVMCNDD01B	DG A ROOM FAN AIR-OPERATED DAMPER ADD01B FAILS TO OPEN
EDG1A-1	C1949	KDG01A	I ALARM	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	C1950	4670	P 480 VAC POWER	SWMVC04670	Service Water Header Isolation MOV 4670 Fails To Close On Demand
EDG1A-1	C1950	4670	P 480 VAC POWER	SWMVK04670	Service Water Header Isolation MOV 4670 Transfers Closed
EDG1A-1	C1951	4670	C 125 VDC CONTROL	SWMVK04670	Service Water Header Isolation MOV 4670 Transfers Closed
EDG1A-1	C1951	4670	C 125 VDC CONTROL	SWMVC04670	Service Water Header Isolation MOV 4670 Fails To Close On Demand
EDG1A-1	C1952	4670	C 125 VDC CONTROL	SWMVK04670	Service Water Header Isolation MOV 4670 Transfers Closed
EDG1A-1	C1952	4670	C 125 VDC CONTROL	SWMVC04670	Service Water Header Isolation MOV 4670 Fails To Close On Demand

LOCATION CHARACTERISTICS TABLE

FIRE AREA: EDG1A

EDG1A-1	C1954	4609	P 480 VAC POWER	SWMVC04609	Service Water Header Isolation MOV 4609 Fails To Close On Demand
EDG1A-1	C1956	4609	C 125 VDC CONTROL	SWMVC04609	Service Water Header Isolation MOV 4609 Fails To Close On Demand
EDG1A-1	C3603	ADF01A	C 125 VDC CONTROL	HVMCNDD01A	DG A ROOM FAN AIR-OPERATED DAMPER ADD01A FAILS TO OPEN
EDG1A-1	C3606	ADF01A	C 125 VDC CONTROL	HVMCNDD01A	DG A ROOM FAN AIR-OPERATED DAMPER ADD01A FAILS TO OPEN
EDG1A-1	C5075	4670	C 125 VDC CONTROL	SWMVK04670	Service Water Header Isolation MOV 4670 Transfers Closed
EDG1A-1	C5075	4670	C 125 VDC CONTROL	SWMVC04670	Service Water Header Isolation MOV 4670 Fails To Close On Demand
EDG1A-1	C5076	4609	C MISC CONTROL	SWMVC04609	Service Water Header Isolation MOV 4609 Fails To Close On Demand
EDG1A-1	C5343	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	C5343A	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	C5343B	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	C5343C	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	C5343D	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	C5343E	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	C5343F	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	C5343G	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	C5343H	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	C5343J	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	C5345	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	C5345A	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	C5345B	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	C5346	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	C5346A	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	C5346B	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	E0018	DCPDPDG01B/04	P 125 VDC POWER	DCCFRD1BDN	Fuse FUDCPDPDG01B/4N Fails Open (To D/G A - Emergency)
EDG1A-1	E0018	DCPDPDG01B/04	P 125 VDC POWER	DCCSRD1BDX	Disconnect Switch DCPDPDG01B/04 Transfers Open (To D/G A - Emergency)
EDG1A-1	E0018	DCPDPDG01B/04	P 125 VDC POWER	DCCFRD1BDP	Fuse FUDCPDPDG01B/4P Fails Open (To D/G A - Emergency)
EDG1A-1	E0019	DCPDPDG01A/03	C 125 VDC POWER	DCCSRD1ACX	Disconnect Switch DCPDPDG01A/03 Transfers Open (To D/G A - Normal)
EDG1A-1	E0019	DCPDPDG01A/03	C 125 VDC POWER	DCCFRD1ACN	Fuse FUDCPDPDG01A/3N Fails Open (To D/G A - Normal)
EDG1A-1	E0019	DCPDPDG01A/03	C 125 VDC POWER	DCCFRD1ACP	Fuse FUDCPDPDG01A/3P Fails Open (To D/G A - Normal)
EDG1A-1	E0020	DCPDPCB03A/07	C 125 VDC POWER	DCCFRC3AGN	Fuse FUDCPDPCB03A/GN Fails Open (To D/G DC Distribution Panel A)
EDG1A-1	E0020	DCPDPCB03A/07	C 125 VDC POWER	DCBDFDG00A	D/G DC Distribution Panel A (DCPDPDG01A) Local Fault
EDG1A-1	E0022	DCPDPCB03A/03	P 125 VDC POWER	DCCSRC3ACX	Disconnect Switch DCPDPCB03A/03 Transfers Open (To MCC H)
EDG1A-1	E0022	MCCH	P 125 VDC POWER	ACCBRMCC1H	480 VAC MCCH Feeder Circuit Breaker 52/MCCH (MCCC/05MM) Transfers Open
EDG1A-1	E0022	MCCH	P 125 VDC POWER	DCCFRC3ACN	Fuse FUDCPDPCB03A/CN Fails Open (To MCC H)
EDG1A-1	E0088	DCPDPDG01A/04	C 125 VDC POWER	DCCSRD1ADX	Disconnect Switch DCPDPDG01A/04 Transfers Open (To D/G B - Emergency)
EDG1A-1	L0318	52/EG1A1	P 480 VAC POWER	ACCBD1418C	DG A OUTPUT BREAKER 52/EG1A1 (BUS14/18C) FAILS TO CLOSE
EDG1A-1	L0318	52/EG1A1	P 480 VAC POWER	ACREKEG1A1	DG A SUPPLY BREAKER TO BUS 14 CLOSED RELAY 18CX1/EG1A1 TRANSFERS TO ENERGIZED
EDG1A-1	L0320	52/EG1A1	C 125 VDC CONTROL	ACREKEG1A1	DG A SUPPLY BREAKER TO BUS 14 CLOSED RELAY 18CX1/EG1A1 TRANSFERS TO ENERGIZED
EDG1A-1	L0320	52/EG1A1	C 125 VDC CONTROL	ACCBD1418C	DG A OUTPUT BREAKER 52/EG1A1 (BUS14/18C) FAILS TO CLOSE
EDG1A-1	L0508	52/EG1A1	P 480 VAC POWER	ACREKEG1A1	DG A SUPPLY BREAKER TO BUS 14 CLOSED RELAY 18CX1/EG1A1 TRANSFERS TO ENERGIZED
EDG1A-1	L0508	52/EG1A1	P 480 VAC POWER	ACCBD1418C	DG A OUTPUT BREAKER 52/EG1A1 (BUS14/18C) FAILS TO CLOSE

LOCATION CHARACTERISTICS TABLE

FIRE AREA: EDG1A

EDG1A-1	L0508	52/EG1A2	P 480 VAC POWER	ACCBD1831C	AC BREAKER 52/EG1A2 (BUS18/31C) FAILS TO OPERATE
EDG1A-1	L0509	52/EG1A2	C 125 VDC CONTROL	ACCBD1831C	AC BREAKER 52/EG1A2 (BUS18/31C) FAILS TO OPERATE
EDG1A-1	L0530	KDG01A	I IND/125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0531	KDG01A	I ALARM/IND/CONT	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0532	KDG01A	C 120 VAC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0533	KDG01A	C 120 VAC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0534	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0534A	KDG01A	I MISC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0536	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0537	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0541	KDG01A	P 480 VAC POWER	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0550	KDG01A	I METERING/RELAYING	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0554	KDG01A	I METERING/RELAYING	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0555	KDG01A	P 120 VAC POWER	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0560	KDG01A	I METERING/RELAYING	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0561	KDG01A	I METERING/RELAYING	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0562	KDG01A	I METERING/RELAYING	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0752	52/IH1B	CONTROL	ACCBN1727A	AC BREAKER 52/IH1B (BUS17/27A) FAILS TO OPEN
EDG1A-1	L0754	52/IH1D	CONTROL	ACCBN1727B	AC BREAKER 52/IH1D (BUS17/27B) FAILS TO OPEN
EDG1A-1	L0760	52/IH1A	C	ACCBN1829A	AC BREAKER 52/IH1A (BUS18/29A) FAILS TO OPEN
EDG1A-1	L0762	52/IH1C	CONTROL	ACCBN1829B	AC BREAKER 52/IH1C (BUS18/29B) FAILS TO OPEN
EDG1A-1	L0778	52/17SS	CONTROL	ACT1FSST17	Fault On 4160 / 480 VAC Bus 17 supply Transformer PXSHSS017
EDG1A-1	L0779	52/18SS	CONTROL	ACT1FSST18	Fault On 4160 / 480 VAC Bus 18 supply Transformer PXSHSS018
EDG1A-1	L0781	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0783	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0837	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0837A	KDG01A	C 120 VAC CONTROL/POWER	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0838	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0838A	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0838B	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0838C	KDG01A	C 120 VAC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0839	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0839A	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0839C	KDG01A	C 120 VAC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0839D	KDG01A	P 120 VAC POWER	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0839E	KDG01A	P 120 VAC POWER	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0841	KDG01A	P 125 VDC POWER	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0850	KDG01A	I INDICATION	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0851	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-1	L0858	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
EDG1A-X	C0687	MCCH	P 480 VAC POWER	ACCBRMCC1H	480 VAC MCCH Feeder Circuit Breaker 52/MCCH (MCCC/05MM) Transfers Open
EDG1A-X	C0687	MCCH	P 480 VAC POWER	DCCFRC3ACN	Fuse FUDCPDPCB03A/CN Fails Open (To MCC H)
EDG1A-X	C1952	4670	C 125 VDC CONTROL	SWMVK04670	Service Water Header Isolation MOV 4670 Transfers Closed
EDG1A-X	C1952	4670	C 125 VDC CONTROL	SWMVC04670	Service Water Header Isolation MOV 4670 Fails To Close On Demand

LOCATION CHARACTERISTICS TABLE

FIRE AREA: EDG1A

EDG1A-X	C5075	4670	C 125 VDC CONTROL	SWMVC04670	Service Water Header Isolation MOV 4670 Fails To Close On Demand
EDG1A-X	C5075	4670	C 125 VDC CONTROL	SWMVK04670	Service Water Header Isolation MOV 4670 Transfers Closed
EDG1A-X	C5076	4609	C MISC CONTROL	SWMVC04609	Service Water Header Isolation MOV 4609 Fails To Close On Demand
EDG1A-X	E0018	DCPDPDG01B/04	P 125 VDC POWER	DCCFRD1BDP	Fuse FUDCPDPDG01B/4P Fails Open (To D/G A - Emergency)
EDG1A-X	E0018	DCPDPDG01B/04	P 125 VDC POWER	DCCFRD1BDN	Fuse FUDCPDPDG01B/4N Fails Open (To D/G A - Emergency)
EDG1A-X	E0018	DCPDPDG01B/04	P 125 VDC POWER	DCCSRD1BDX	Disconnect Switch DCPDPDG01B/04 Transfers Open (To D/G A - Emergency)
EDG1A-X	E0020	DCPDPCB03A/07	C 125 VDC POWER	DCBDFDG00A	D/G DC Distribution Panel A (DCPDPDG01A) Local Fault
EDG1A-X	E0020	DCPDPCB03A/07	C 125 VDC POWER	DCCFRC3AGN	Fuse FUDCPDPCB03A/GN Fails Open (To D/G DC Distribution Panel A)
EDG1A-X	E0022	DCPDPCB03A/03	P 125 VDC POWER	DCCSRC3ACX	Disconnect Switch DCPDPCB03A/03 Transfers Open (To MCC H)
EDG1A-X	E0022	MCCH	P 125 VDC POWER	ACCBRMCC1H	480 VAC MCCH Feeder Circuit Breaker 52/MCCH (MCCC/05MM) Transfers Open
EDG1A-X	E0022	MCCH	P 125 VDC POWER	DCCFRC3ACN	Fuse FUDCPDPCB03A/CN Fails Open (To MCC H)
EDG1A-X	L0318	52/EG1A1	P 480 VAC POWER	ACCBD1418C	DG A OUTPUT BREAKER 52/EG1A1 (BUS14/18C) FAILS TO CLOSE
EDG1A-X	L0318	52/EG1A1	P 480 VAC POWER	ACREKEG1A1	DG A SUPPLY BREAKER TO BUS 14 CLOSED RELAY 18CX1/EG1A1 TRANSFERS TO ENERGIZED
EDG1A-X	L0320	52/EG1A1	C 125 VDC CONTROL	ACREKEG1A1	DG A SUPPLY BREAKER TO BUS 14 CLOSED RELAY 18CX1/EG1A1 TRANSFERS TO ENERGIZED
EDG1A-X	L0320	52/EG1A1	C 125 VDC CONTROL	ACCBD1418C	DG A OUTPUT BREAKER 52/EG1A1 (BUS14/18C) FAILS TO CLOSE
EDG1A-X	L0554	KDG01A	I METERING/RELAYIN G	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN

7. SPATIAL INTERACTIONS ANALYSIS WALKDOWN NOTES:

FIRE ZONE	WALKDOWN NOTES
EDG1A-0	Sealed compartment below diesel generator room.
EDG1A-1	D-G fuel oil transfer pump. Fire water hookup for cooling D-G. 4/2/98 WD Contains emerg local control panel and App. R locker. B DG does not have similar control panel, and may not be as easy to start if control room is evacuated. Fully sprinklered area. Either DG can be switched to either battery.

LOCATION CHARACTERISTICS TABLE

FIRE AREA: EDG1B

1. FIRE ZONES IN THIS FIRE AREA:

FIRE ZONE	ELEV (FT.)	FIRE ZONE DESCRIPTION	BUILDING	FLOOR AREA (SQ. FT.)
EDG1B-0	244' 6"	DIESEL GENERATOR 1B CABLE VAULT	DG	260
EDG1B-1	253' 6"	DIESEL GENERATOR ROOM 1B	DG	1265

2. FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	COMBUSTIBLE LOADING (BTU)	FIRE SEVERITY (HRS)
EDG1B-0	56,000	42 min.
EDG1B-1	77,099	57.8 min.

3. FIRE PROTECTION FEATURES IN THIS FIRE AREA:

FIRE ZONE	FIRE DETECTION FEATURES	FIRE SUPPRESSION FEATURES
EDG1B-0		
EDG1B-1		

4. FIRE ZONE(S) ADJACENT TO THE FIRE ZONE(S) IN THIS FIRE AREA:

FIRE ZONE	ADJACENT FIRE ZONE	PATHWAY	PATHWAY RATING (HOUR)
EDG1B-0	EDG1B-1	OPEN	
EDG1B-1	EDG1A-1	WALL	3
EDG1B-1	TB-1	WALL/DOOR	3

5. POTENTIAL KEY EQUIPMENT AND THEIR ASSOCIATED BASIC EVENT(S) IMPACTED BY FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	EQUIPMENT AFFECTED	BASIC EVENT	BASIC EVENT DESCRIPTION
EDG1B-1	4670	SWMVC04670	Service Water Header Isolation MOV 4670 Fails To Close On Demand
EDG1B-1	52/EG1B3	ACCBR001B3	AC BREAKER 52/EG1B3 TRANSFERS OPEN
EDG1B-1	ADF02A	HVMCNDD02A	DG ROOM B FAN B1 AIR-OPERATED DAMPER ADD02A FAILS TO OPEN
EDG1B-1	ADF02B	HVMCNDD02B	DG B ROOM FAN B2 AIR-OPERATED DAMPER ADD02B FAILS TO OPEN
EDG1B-1	DCPDPCB03B/16	DCBDFDG00B	D/G DC Distribution Panel B (DCPDPDG01B) Local Fault
EDG1B-1	DCPDPDG01B/03	DCCFRD1BCN	Fuse FUDCPDPDG01B/3N Fails Open (To D/G B - Normal)
EDG1B-1	DCPDPDG01B/03	DCCFRD1BCP	Fuse FUDCPDPDG01B/3P Fails Open (To D/G B - Normal)
EDG1B-1	DCPDPDG01B/03	DCCSRD1BCX	Disconnect Switch DCPDPDG01B/03 Transfers Open (To D/G B - Normal)
EDG1B-1	DCPDPDG01B/04	DCCFRD1BDN	Fuse FUDCPDPDG01B/4N Fails Open (To D/G A - Emergency)
EDG1B-1	DCPDPDG01B/04	DCCFRD1BDP	Fuse FUDCPDPDG01B/4P Fails Open (To D/G A - Emergency)
EDG1B-1	DCPDPDG01B/04	DCCSRD1BDX	Disconnect Switch DCPDPDG01B/04 Transfers Open (To D/G A - Emergency)
EDG1B-1	DTP1B	ACRERDTP1B	STARTING CIRCUIT RELAY 42/DTP1B TRANSFERS TO DE-ENERGIZED
EDG1B-1	DTP1B	ACRERDTP1B	STARTING CIRCUIT RELAY 42/DTP1B TRANSFERS TO DE-ENERGIZED
EDG1B-1	KDG01B	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN

6. POTENTIAL RACEWAYS (CONDUITS AND CABLE TRAYS) AND THEIR ASSOCIATED EQUIPMENT/BASIC EVENT(S) IMPACTED BY FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	RACEWAY AFFECTED	EQUIPMENT AFFECTED	CABLE FUNCTION	BASIC EVENT AFFECTED	BASIC EVENT DESCRIPTION
EDG1B-0	C1049	MCCJ	P 480 VAC POWER	ACCBRMCC1J	480 VAC MCCJ Feeder Circuit Breaker 52/MCCJ (MCCD/05KK) Transfers Open
EDG1B-0	C1955	4609	C 125 VDC CONTROL	SWMVC04609	Service Water Header Isolation MOV 4609 Fails To Close On Demand
EDG1B-0	C1990	ADF02A	C 125 VDC CONTROL	HVMCNDD02A	DG ROOM B FAN B1 AIR-OPERATED DAMPER ADD02A FAILS TO OPEN
EDG1B-0	C1994	ADF02B	C 125 VDC CONTROL	HVMCNDD02B	DG B ROOM FAN B2 AIR-OPERATED DAMPER ADD02B FAILS TO OPEN
EDG1B-0	C1997	KDG01B	C	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	C2004	4780	P 480 VAC POWER	SWMVC04780	Service Water Header Isolation MOV 4780 Fails To Close On Demand
EDG1B-0	C2005	4780	C 125 VDC CONTROL	SWMVC04780	Service Water Header Isolation MOV 4780 Fails To Close On Demand

LOCATION CHARACTERISTICS TABLE

FIRE AREA: EDG1B

EDG1B-0	E0018	DCPDPDG01B/04	P 125 VDC POWER	DCCFRD1BDN	Fuse FUDCPDPDG01B/4N Fails Open (To D/G A - Emergency)
EDG1B-0	E0018	DCPDPDG01B/04	P 125 VDC POWER	DCCSRD1BDX	Disconnect Switch DCPDPDG01B/04 Transfers Open (To D/G A - Emergency)
EDG1B-0	E0018	DCPDPDG01B/04	P 125 VDC POWER	DCCFRD1BDP	Fuse FUDCPDPDG01B/4P Fails Open (To D/G A - Emergency)
EDG1B-0	E0030	DCPDPCB03A/11	C 125 VDC POWER	DCCFRC3ALN	Fuse FUDCPDPCB03A/LN Fails Open (To Screen House DC Distribution Panel A)
EDG1B-0	E0030	DCPDPCB03A/11	C 125 VDC POWER	DCBDFSCRNA	Screen House DC Distribution Panel 1A (DCPDPSH01A) Local Fault
EDG1B-0	E0088	DCPDPDG01A/04	C 125 VDC POWER	DCCSRD1ADX	Disconnect Switch DCPDPDG01A/04 Transfers Open (To D/G B - Emergency)
EDG1B-0	E0089	DCPDPDG01B/03	C 125 VDC POWER	DCCSRD1BCX	Disconnect Switch DCPDPDG01B/03 Transfers Open (To D/G B - Normal)
EDG1B-0	E0089	DCPDPDG01B/03	C 125 VDC POWER	DCCFRD1BCN	Fuse FUDCPDPDG01B/3N Fails Open (To D/G B - Normal)
EDG1B-0	E0089	DCPDPDG01B/03	C 125 VDC POWER	DCCFRD1BCP	Fuse FUDCPDPDG01B/3P Fails Open (To D/G B - Normal)
EDG1B-0	E0090	DCPDPCB03B/16	C 125 VDC CONTROL/POWER	DCBDFDG0CB	D/G DC Distribution Panel B (DCPDPDG01B) Local Fault
EDG1B-0	E0090	DCPDPCB03B/16	C 125 VDC CONTROL/POWER	DCCFRC3BRN	Fuse FUDCPDPCB03B/RN Fails Open (To D/G DC Distribution Panel B)
EDG1B-0	E0091	DCPDPCB03B/04	C 125 VDC CONTROL/POWER	DCCFRC3BDN	Fuse FUDCPDPCB03B/DN Fails Open (To MCC J)
EDG1B-0	E0091	MCCJ	C 125 VDC CONTROL/POWER	ACCBRMCC1J	480 VAC MCCJ Feeder Circuit Breaker 52/MCCJ (MCCD/05KK) Transfers Open
EDG1B-0	E0127	DCPDPCB02B/05	I MISC POWER	DCBDFSCRNB	Screen House DC Distribution Panel 1B (DCPDPSH01B) Local Fault
EDG1B-0	E0127	DCPDPCB02B/05	I MISC POWER	DCCFRC2BEN	Fuse FUDCPDPCB02B/5N Fails Open (To Screen House DC Distribution Panel B)
EDG1B-0	L0180	52/16	C 125 VDC CONTROL	ACCBD1611B	AC BREAKER 52/16 (BUS16/11B) FAILS TO OPERATE
EDG1B-0	L0180	52/16	C 125 VDC CONTROL	ACCBR00016	480 VAC Bus 16 Feeder Circuit Breaker 52/16 (BUS16/11B) Transfers open
EDG1B-0	L0188	52/EG1B1	P 480 VAC POWER	ACCBD1611C	DGB OUTPUT BREAKER 52/EG1B1 (BUS16/11C) FAILS TO OPERATE
EDG1B-0	L0188	52/EG1B1	P 480 VAC POWER	ACREKEG1B1	DG B SUPPLY BREAKER TO BUS 16 CLOSED RELAY 11XC1/EG1B1 TRANSFERS TO ENERGIZED
EDG1B-0	L0190	52/EG1B1	C 125 VDC CONTROL	ACCBD1611C	DGB OUTPUT BREAKER 52/EG1B1 (BUS16/11C) FAILS TO OPERATE
EDG1B-0	L0190	52/EG1B1	C 125 VDC CONTROL	ACREKEG1B1	DG B SUPPLY BREAKER TO BUS 16 CLOSED RELAY 11XC1/EG1B1 TRANSFERS TO ENERGIZED
EDG1B-0	L0429	52/17	C 125 VDC CONTROL	ACCBR00017	480 VAC Bus 17 Feeder Circuit Breaker 52/17 (BUS17/25B) Transfers open
EDG1B-0	L0429	52/17	C 125 VDC CONTROL	DCCFRS1BGN	Fuse FUDCPDPSH01B/7N Fails Open (To Bus 17 - Normal)
EDG1B-0	L0429	52/17	C 125 VDC CONTROL	DCCFRS1AAN	Fuse FUDCPDPSH01A/1N Fails Open (To Bus 17 - Emergency)
EDG1B-0	L0429	52/17	C 125 VDC CONTROL	ACCBD1725B	AC BREAKER 52/17 (BUS17/25B) FAILS TO OPERATE
EDG1B-0	L0429	52/BT17-18	C 125 VDC CONTROL	ACCBR17_18	Breaker 52/bt17-18 transfers open
EDG1B-0	L0432	52/EG1B2	P 480 VAC POWER	ACCBD1725C	DG B OUTPUT BREAKER 52/EG1B2 (BUS17/25C) FAILS TO OPERATE
EDG1B-0	L0432	52/EG1B3	P 480 VAC POWER	ACCBR001B3	AC BREAKER 52/EG1B3 TRANSFERS OPEN
EDG1B-0	L0432A	52/EG1B1	P 480 VAC POWER	ACREKEG1B1	DG B SUPPLY BREAKER TO BUS 16 CLOSED RELAY 11XC1/EG1B1 TRANSFERS TO ENERGIZED
EDG1B-0	L0432A	52/EG1B1	P 480 VAC POWER	ACCBD1611C	DGB OUTPUT BREAKER 52/EG1B1 (BUS16/11C) FAILS TO OPERATE
EDG1B-0	L0432A	52/EG1B2	P 480 VAC POWER	ACCBD1725C	DG B OUTPUT BREAKER 52/EG1B2 (BUS17/25C) FAILS TO OPERATE
EDG1B-0	L0432A	52/EG1B3	P 480 VAC POWER	ACCBR001B3	AC BREAKER 52/EG1B3 TRANSFERS OPEN
EDG1B-0	L0434	52/EG1B2	C 125 VDC POWER	ACCBD1725C	DG B OUTPUT BREAKER 52/EG1B2 (BUS17/25C) FAILS TO OPERATE
EDG1B-0	L0435	52/EG1B2	C 125 VDC POWER	ACCBD1725C	DG B OUTPUT BREAKER 52/EG1B2 (BUS17/25C) FAILS TO OPERATE
EDG1B-0	L0446	52/MCC1G2	C	ACCBN1726C	AC BREAKER 52/MCC1G2 (BUS17/26C) FAILS TO OPEN
EDG1B-0	L0462	52/SWP1B	C 125 VDC CONTROL	SWMPFSW01B	Service Water Pump PSW01B Fails To Run For The Required Mission Time

LOCATION CHARACTERISTICS TABLE

FIRE AREA: EDG1B

EDG1B-0	L0462	52/SWP1B	C 125 VDC CONTROL	ACCBN1727C	AC BREAKER 52/SWP1B (BUS17/27C) FAILS TO OPEN
EDG1B-0	L0463	52/SWP1B	I ALARM/125 VDC CONTROL	SWMPFSW01B	Service Water Pump PSW01B Fails To Run For The Required Mission Time
EDG1B-0	L0463	52/SWP1B	I ALARM/125 VDC CONTROL	ACCBN1727C	AC BREAKER 52/SWP1B (BUS17/27C) FAILS TO OPEN
EDG1B-0	L0463	52/SWP1D	I ALARM/125 VDC CONTROL	ACCBN1727D	AC BREAKER 52/SWP1D (BUS17/27D) FAILS TO OPEN
EDG1B-0	L0463	52/SWP1D	I ALARM/125 VDC CONTROL	SWMPFSW01D	Service Water Pump PSW01D Fails To Run For The Required Mission Time
EDG1B-0	L0466	52/SWP1D	C 125 VDC CONTROL	ACCBN1727D	AC BREAKER 52/SWP1D (BUS17/27D) FAILS TO OPEN
EDG1B-0	L0466	52/SWP1D	C 125 VDC CONTROL	SWMPFSW01D	Service Water Pump PSW01D Fails To Run For The Required Mission Time
EDG1B-0	L0469	52/BT17-18	C 125 VDC CONTROL	ACCBR17_18	Breaker 52/bt17-18 transfers open
EDG1B-0	L0472	52/14	C 125 VDC CONTROL	ACCBR00014	480 VAC Bus 14 Feeder Circuit Breaker 52/14 (BUS14/18B) Transfers open
EDG1B-0	L0472	52/14	C 125 VDC CONTROL	ACCBD1418B	AC BREAKER 52/14 (BUS14/18B) FAILS TO OPERATE
EDG1B-0	L0472	52/BT17-18	C 125 VDC CONTROL	ACCBR17_18	Breaker 52/bt17-18 transfers open
EDG1B-0	L0483	52/SWP1A	C 125 VDC CONTROL	ACCBN1829C	AC BREAKER 52/SWP1A (BUS18/29C) FAILS TO OPEN
EDG1B-0	L0483	52/SWP1A	C 125 VDC CONTROL	SWMPFSW01A	Service Water Pump PSW01A Fails To Run For The Required Mission Time
EDG1B-0	L0484	52/SWP1A	I ALARM/120 VAC CONTROL	SWMPFSW01A	Service Water Pump PSW01A Fails To Run For The Required Mission Time
EDG1B-0	L0484	52/SWP1A	I ALARM/120 VAC CONTROL	ACCBN1829C	AC BREAKER 52/SWP1A (BUS18/29C) FAILS TO OPEN
EDG1B-0	L0484	52/SWP1C	I ALARM/120 VAC CONTROL	ACCBN1829D	AC BREAKER 52/SWP1C (BUS18/29D) FAILS TO OPEN
EDG1B-0	L0484	52/SWP1C	I ALARM/120 VAC CONTROL	SWMPFSW01C	Service Water Pump PSW01C Fails To Run For The Required Mission Time
EDG1B-0	L0487	52/SWP1C	C 125 VDC CONTROL	SWMPFSW01C	Service Water Pump PSW01C Fails To Run For The Required Mission Time
EDG1B-0	L0487	52/SWP1C	C 125 VDC CONTROL	ACCBN1829D	AC BREAKER 52/SWP1C (BUS18/29D) FAILS TO OPEN
EDG1B-0	L0499	52/MCC1G1	C 125 VDC CONTROL	ACCBN1830C	AC BREAKER 52/MCC1G1 (BUS18/30C) FAILS TO OPEN
EDG1B-0	L0504	52/18	C 125 VDC CONTROL	ACCBD1831B	AC BREAKER 52/18 (BUS18/31B) FAILS TO OPERATE
EDG1B-0	L0504	52/18	C 125 VDC CONTROL	ACCBR00018	480 VAC Bus 18 Feeder Circuit Breaker 52/18 (BUS18/31B) Transfers open
EDG1B-0	L0504	52/18	C 125 VDC CONTROL	DCCFRS1BFN	Fuse FUDCPDPSH01B/6N Fails Open (To Bus 18 - Emergency)
EDG1B-0	L0505	52/18	C 125 VDC CONTROL	ACCBD1831B	AC BREAKER 52/18 (BUS18/31B) FAILS TO OPERATE
EDG1B-0	L0505	52/18	C 125 VDC CONTROL	ACCBR00018	480 VAC Bus 18 Feeder Circuit Breaker 52/18 (BUS18/31B) Transfers open
EDG1B-0	L0505	52/18	C 125 VDC CONTROL	DCCFRS1BFN	Fuse FUDCPDPSH01B/6N Fails Open (To Bus 18 - Emergency)
EDG1B-0	L0510	52/EG1A2	C 125 VDC POWER	ACCBD1831C	AC BREAKER 52/EG1A2 (BUS18/31C) FAILS TO OPERATE
EDG1B-0	L0570	KDG01B	I MISC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0571	KDG01B	I MISC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0572	KDG01B	C 120 VAC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0576	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0577	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0579	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0582	KDG01B	P 480 VAC POWER	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0583	KDG01B	P 480 VAC POWER	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0585	KDG01B	P 480 VAC POWER	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0586	KDG01B	P 480 VAC POWER	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0587	KDG01B	P 480 VAC POWER	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0590	KDG01B	I METERING/RELAYIN G	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0591	KDG01B	I METERING/RELAYIN G	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN

LOCATION CHARACTERISTICS TABLE

FIRE AREA: EDG1B

EDG1B-0	L0592	KDG01B	I METERING/RELAYING	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0593	KDG01B	I METERING/RELAYING	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0594	KDG01B	I METERING/RELAYING	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0600	KDG01B	I METERING/RELAYING	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0602	KDG01B	I METERING/RELAYING	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0603	KDG01B	I METERING/RELAYING	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0604	KDG01B	I METERING/RELAYING	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0605	KDG01B	I METERING/RELAYING	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0785	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0787	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0854	LIT-2051A	INSTRUMENTATION	DGPSL2051A	PRESSURE SWITCH LC-2051A FAILS, INDICATING FALSE LOW LEVEL IN TDG04B
EDG1B-0	L0854	LIT-2051A	INSTRUMENTATION	DGPSH2051A	PRESSURE SWITCH LC-2051A-2 FAILS, INDICATING FALSE HIGH LEVEL IN TDG04B
EDG1B-0	L0855	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0855	LIT-2051A	C 125 VDC CONTROL	DGPSL2051A	PRESSURE SWITCH LC-2051A FAILS, INDICATING FALSE LOW LEVEL IN TDG04B
EDG1B-0	L0855	LIT-2051A	C 125 VDC CONTROL	DGPSH2051A	PRESSURE SWITCH LC-2051A-2 FAILS, INDICATING FALSE HIGH LEVEL IN TDG04B
EDG1B-0	L0856	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-0	L0856	LIT-2051A	C 125 VDC CONTROL	DGPSH2051A	PRESSURE SWITCH LC-2051A-2 FAILS, INDICATING FALSE HIGH LEVEL IN TDG04B
EDG1B-0	L0856	LIT-2051A	C 125 VDC CONTROL	DGPSL2051A	PRESSURE SWITCH LC-2051A FAILS, INDICATING FALSE LOW LEVEL IN TDG04B
EDG1B-0	M0089	52/18SS	M 4160 VAC POWER	ACT1FSST18	Fault On 4160 / 480 VAC Bus 18 supply Transformer PXSHSS018
EDG1B-0	M0108	52/17SS	M 4160 VAC POWER	ACT1FSST17	Fault On 4160 / 480 VAC Bus 17 supply Transformer PXSHSS017
EDG1B-1	C1049	MCCJ	P 480 VAC POWER	ACCBRMCC1J	480 VAC MCCJ Feeder Circuit Breaker 52/MCCJ (MCCD/05KK) Transfers Open
EDG1B-1	C1950	4670	P 480 VAC POWER	SWMVK04670	Service Water Header Isolation MOV 4670 Transfers Closed
EDG1B-1	C1950	4670	P 480 VAC POWER	SWMVC04670	Service Water Header Isolation MOV 4670 Fails To Close On Demand
EDG1B-1	C1951	4670	C 125 VDC CONTROL	SWMVC04670	Service Water Header Isolation MOV 4670 Fails To Close On Demand
EDG1B-1	C1951	4670	C 125 VDC CONTROL	SWMVK04670	Service Water Header Isolation MOV 4670 Transfers Closed
EDG1B-1	C1955	4609	C 125 VDC CONTROL	SWMVC04609	Service Water Header Isolation MOV 4609 Fails To Close On Demand
EDG1B-1	C1956	4609	C 125 VDC CONTROL	SWMVC04609	Service Water Header Isolation MOV 4609 Fails To Close On Demand
EDG1B-1	C1977	DTP1B	C	ACRERDTP1B	STARTING CIRCUIT RELAY 42/DTP1B TRANSFERS TO DE-ENERGIZED
EDG1B-1	C1982	DTP1B	C 125 VDC CONTROL	ACRERDTP1B	STARTING CIRCUIT RELAY 42/DTP1B TRANSFERS TO DE-ENERGIZED
EDG1B-1	C1988	ADF02A	P 480 VAC POWER	HVMCNDD02A	DG ROOM B FAN B1 AIR-OPERATED DAMPER ADD02A FAILS TO OPEN
EDG1B-1	C1989	ADF02A	C 125 VDC CONTROL	HVMCNDD02A	DG ROOM B FAN B1 AIR-OPERATED DAMPER ADD02A FAILS TO OPEN
EDG1B-1	C1990	ADF02A	C 125 VDC CONTROL	HVMCNDD02A	DG ROOM B FAN B1 AIR-OPERATED DAMPER ADD02A FAILS TO OPEN
EDG1B-1	C1991	ADF02A	P 125 VDC POWER	HVMCNDD02A	DG ROOM B FAN B1 AIR-OPERATED DAMPER ADD02A FAILS TO OPEN
EDG1B-1	C1991	ADF02B	P 125 VDC POWER	HVMCNDD02B	DG B ROOM FAN B2 AIR-OPERATED DAMPER ADD02B FAILS TO OPEN

LOCATION CHARACTERISTICS TABLE

FIRE AREA: EDG1B

EDG1B-1	C1992	ADF02B	P 480 VAC POWER	HVMCNDD02B	DG B ROOM FAN B2 AIR-OPERATED DAMPER ADD02B FAILS TO OPEN
EDG1B-1	C1993	ADF02B	C 125 VDC CONTROL	HVMCNDD02B	DG B ROOM FAN B2 AIR-OPERATED DAMPER ADD02B FAILS TO OPEN
EDG1B-1	C1994	ADF02B	C 125 VDC CONTROL	HVMCNDD02B	DG B ROOM FAN B2 AIR-OPERATED DAMPER ADD02B FAILS TO OPEN
EDG1B-1	C1997	KDG01B	C	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	C2000	KDG01B	I ALARM	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	C2004	4780	P 480 VAC POWER	SWMVC04780	Service Water Header Isolation MOV 4780 Fails To Close On Demand
EDG1B-1	C2005	4780	C 125 VDC CONTROL	SWMVC04780	Service Water Header Isolation MOV 4780 Fails To Close On Demand
EDG1B-1	C2006	4780	I MISC CONTROL	SWMVC04780	Service Water Header Isolation MOV 4780 Fails To Close On Demand
EDG1B-1	C3604	ADF02A	C 125 VDC CONTROL	HVMCNDD02A	DG ROOM B FAN B1 AIR-OPERATED DAMPER ADD02A FAILS TO OPEN
EDG1B-1	C3605	ADF02A	C 125 VDC CONTROL	HVMCNDD02A	DG ROOM B FAN B1 AIR-OPERATED DAMPER ADD02A FAILS TO OPEN
EDG1B-1	C5077	4780	I MISC CONTROL	SWMVC04780	Service Water Header Isolation MOV 4780 Fails To Close On Demand
EDG1B-1	C5334	LIT-2051A	P 120 VAC POWER	DGPSH2051A	PRESSURE SWITCH LC-2051A-2 FAILS, INDICATING FALSE HIGH LEVEL IN TDG04B
EDG1B-1	C5334	LIT-2051A	P 120 VAC POWER	DGPSL2051A	PRESSURE SWITCH LC-2051A FAILS, INDICATING FALSE LOW LEVEL IN TDG04B
EDG1B-1	C5344	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	C5344A	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	C5344B	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	C5344C	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	C5344D	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	C5344E	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	C5344F	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	C5344G	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	C5344H	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	C5344J	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	C5347	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	C5347A	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	C5347B	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	C5348	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	C5348A	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	C5348B	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	E0018	DCPDPDG01B/04	P 125 VDC POWER	DCCFRD1BDP	Fuse FUDCPDPDG01B/4P Fails Open (To D/G A - Emergency)
EDG1B-1	E0018	DCPDPDG01B/04	P 125 VDC POWER	DCCFRD1BDN	Fuse FUDCPDPDG01B/4N Fails Open (To D/G A - Emergency)
EDG1B-1	E0018	DCPDPDG01B/04	P 125 VDC POWER	DCCSRD1BDX	Disconnect Switch DCPDPDG01B/04 Transfers Open (To D/G A - Emergency)
EDG1B-1	E0030	DCPDPCB03A/11	C 125 VDC POWER	DCCFRC3ALN	Fuse FUDCPDPCB03A/LN Fails Open (To Screen House DC Distribution Panel A)
EDG1B-1	E0030	DCPDPCB03A/11	C 125 VDC POWER	DCBDFSCRNA	Screen House DC Distribution Panel 1A (DCPDPSH01A) Local Fault
EDG1B-1	E0088	DCPDPDG01A/04	C 125 VDC POWER	DCCSRD1ADX	Disconnect Switch DCPDPDG01A/04 Transfers Open (To D/G B - Emergency)
EDG1B-1	E0089	DCPDPDG01B/03	C 125 VDC POWER	DCCFRD1BCP	Fuse FUDCPDPDG01B/3P Fails Open (To D/G B - Normal)
EDG1B-1	E0089	DCPDPDG01B/03	C 125 VDC POWER	DCCSRD1BCX	Disconnect Switch DCPDPDG01B/03 Transfers Open (To D/G B - Normal)
EDG1B-1	E0089	DCPDPDG01B/03	C 125 VDC POWER	DCCFRD1BCN	Fuse FUDCPDPDG01B/3N Fails Open (To D/G B - Normal)
EDG1B-1	E0090	DCPDPCB03B/16	C 125 VDC CONTROL/POWER	DCBDFDG00B	D/G DC Distribution Panel B (DCPDPDG01B) Local Fault
EDG1B-1	E0090	DCPDPCB03B/16	C 125 VDC CONTROL/POWER	DCCFRC3BRN	Fuse FUDCPDPCB03B/RN Fails Open (To D/G DC Distribution Panel B)
EDG1B-1	E0091	DCPDPCB03B/04	C 125 VDC CONTROL/POWER	DCCFRC3BDN	Fuse FUDCPDPCB03B/DN Fails Open (To MCC J)
EDG1B-1	E0091	MCCJ	C 125 VDC CONTROL/POWER	ACCBRMCC1J	480 VAC MCCJ Feeder Circuit Breaker 52/MCCJ (MCCD/05KK) Transfers Open
EDG1B-1	L0180	52/16	C 125 VDC CONTROL	ACCBD1611B	AC BREAKER 52/16 (BUS16/11B) FAILS TO OPERATE

LOCATION CHARACTERISTICS TABLE

FIRE AREA: EDG1B

EDG1B-1	L0180	52/16	C 125 VDC CONTROL	ACCBR00016	480 VAC Bus 16 Feeder Circuit Breaker 52/16 (BUS16/11B) Transfers open
EDG1B-1	L0188	52/EG1B1	P 480 VAC POWER	ACREKEG1B1	DG B SUPPLY BREAKER TO BUS 16 CLOSED RELAY 11XC1/EG1B1 TRANSFERS TO ENERGIZED
EDG1B-1	L0188	52/EG1B1	P 480 VAC POWER	ACCBD1611C	DGB OUTPUT BREAKER 52/EG1B1 (BUS16/11C) FAILS TO OPERATE
EDG1B-1	L0190	52/EG1B1	C 125 VDC CONTROL	ACCBD1611C	DGB OUTPUT BREAKER 52/EG1B1 (BUS16/11C) FAILS TO OPERATE
EDG1B-1	L0190	52/EG1B1	C 125 VDC CONTROL	ACREKEG1B1	DG B SUPPLY BREAKER TO BUS 16 CLOSED RELAY 11XC1/EG1B1 TRANSFERS TO ENERGIZED
EDG1B-1	L0429	52/17	C 125 VDC CONTROL	ACCBR00017	480 VAC Bus 17 Feeder Circuit Breaker 52/17 (BUS17/25B) Transfers open
EDG1B-1	L0429	52/17	C 125 VDC CONTROL	DCCFRS1AAN	Fuse FUDCPDPSH01A/1N Fails Open (To Bus 17 - Emergency)
EDG1B-1	L0429	52/17	C 125 VDC CONTROL	ACCBD1725B	AC BREAKER 52/17 (BUS17/25B) FAILS TO OPERATE
EDG1B-1	L0429	52/17	C 125 VDC CONTROL	DCCFRS1BGN	Fuse FUDCPDPSH01B/7N Fails Open (To Bus 17 - Normal)
EDG1B-1	L0429	52/BT17-18	C 125 VDC CONTROL	ACCBR17_18	Breaker 52/bt17-18 transfers open
EDG1B-1	L0432	52/EG1B2	P 480 VAC POWER	ACCBD1725C	DG B OUTPUT BREAKER 52/EG1B2 (BUS17/25C) FAILS TO OPERATE
EDG1B-1	L0432	52/EG1B3	P 480 VAC POWER	ACCBR001B3	AC BREAKER 52/EG1B3 TRANSFERS OPEN
EDG1B-1	L0432A	52/EG1B1	P 480 VAC POWER	ACCBD1611C	DGB OUTPUT BREAKER 52/EG1B1 (BUS16/11C) FAILS TO OPERATE
EDG1B-1	L0432A	52/EG1B1	P 480 VAC POWER	ACREKEG1B1	DG B SUPPLY BREAKER TO BUS 16 CLOSED RELAY 11XC1/EG1B1 TRANSFERS TO ENERGIZED
EDG1B-1	L0432A	52/EG1B2	P 480 VAC POWER	ACCBD1725C	DG B OUTPUT BREAKER 52/EG1B2 (BUS17/25C) FAILS TO OPERATE
EDG1B-1	L0432A	52/EG1B3	P 480 VAC POWER	ACCBR001B3	AC BREAKER 52/EG1B3 TRANSFERS OPEN
EDG1B-1	L0434	52/EG1B2	C 125 VDC POWER	ACCBD1725C	DG B OUTPUT BREAKER 52/EG1B2 (BUS17/25C) FAILS TO OPERATE
EDG1B-1	L0446	52/MCC1G2	C	ACCBN1726C	AC BREAKER 52/MCC1G2 (BUS17/26C) FAILS TO OPEN
EDG1B-1	L0463	52/SWP1B	I ALARM/125 VDC CONTROL	SWMPFSW01B	Service Water Pump PSW01B Fails To Run For The Required Mission Time
EDG1B-1	L0463	52/SWP1B	I ALARM/125 VDC CONTROL	ACCBN1727C	AC BREAKER 52/SWP1B (BUS17/27C) FAILS TO OPEN
EDG1B-1	L0463	52/SWP1D	I ALARM/125 VDC CONTROL	SWMPFSW01D	Service Water Pump PSW01D Fails To Run For The Required Mission Time
EDG1B-1	L0463	52/SWP1D	I ALARM/125 VDC CONTROL	ACCBN1727D	AC BREAKER 52/SWP1D (BUS17/27D) FAILS TO OPEN
EDG1B-1	L0499	52/MCC1G1	C 125 VDC CONTROL	ACCBN1830C	AC BREAKER 52/MCC1G1 (BUS18/30C) FAILS TO OPEN
EDG1B-1	L0504	52/18	C 125 VDC CONTROL	DCCFRS1BFN	Fuse FUDCPDPSH01B/6N Fails Open (To Bus 18 - Emergency)
EDG1B-1	L0504	52/18	C 125 VDC CONTROL	ACCBR00018	480 VAC Bus 18 Feeder Circuit Breaker 52/18 (BUS18/31B) Transfers open
EDG1B-1	L0504	52/18	C 125 VDC CONTROL	ACCBD1831B	AC BREAKER 52/18 (BUS18/31B) FAILS TO OPERATE
EDG1B-1	L0505	52/18	C 125 VDC CONTROL	DCCFRS1BFN	Fuse FUDCPDPSH01B/6N Fails Open (To Bus 18 - Emergency)
EDG1B-1	L0505	52/18	C 125 VDC CONTROL	ACCBR00018	480 VAC Bus 18 Feeder Circuit Breaker 52/18 (BUS18/31B) Transfers open
EDG1B-1	L0505	52/18	C 125 VDC CONTROL	ACCBD1831B	AC BREAKER 52/18 (BUS18/31B) FAILS TO OPERATE
EDG1B-1	L0570	KDG01B	I MISC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0571	KDG01B	I MISC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0572	KDG01B	C 120 VAC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0573	KDG01B	I MISC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0574	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0576	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0577	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0579	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0581	KDG01B	P 480 VAC POWER	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0582	KDG01B	P 480 VAC POWER	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0584	KDG01B	P 480 VAC POWER	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN

LOCATION CHARACTERISTICS TABLE

FIRE AREA: EDG1B

EDG1B-1	L0590	KDG01B	I METERING/RELAYING	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0594	KDG01B	I METERING/RELAYING	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0595	KDG01B	P 120 VAC POWER	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0600	KDG01B	I METERING/RELAYING	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0601	KDG01B	I METERING/RELAYING	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0602	KDG01B	I METERING/RELAYING	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0785	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0787	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0854	LIT-2051A	INSTRUMENTATION	DGPSH2051A	PRESSURE SWITCH LC-2051A-2 FAILS, INDICATING FALSE HIGH LEVEL IN TDG04B
EDG1B-1	L0854	LIT-2051A	INSTRUMENTATION	DGPSL2051A	PRESSURE SWITCH LC-2051A FAILS, INDICATING FALSE LOW LEVEL IN TDG04B
EDG1B-1	L0855	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0855	LIT-2051A	C 125 VDC CONTROL	DGPSH2051A	PRESSURE SWITCH LC-2051A-2 FAILS, INDICATING FALSE HIGH LEVEL IN TDG04B
EDG1B-1	L0855	LIT-2051A	C 125 VDC CONTROL	DGPSL2051A	PRESSURE SWITCH LC-2051A FAILS, INDICATING FALSE LOW LEVEL IN TDG04B
EDG1B-1	L0856	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
EDG1B-1	L0856	LIT-2051A	C 125 VDC CONTROL	DGPSH2051A	PRESSURE SWITCH LC-2051A-2 FAILS, INDICATING FALSE HIGH LEVEL IN TDG04B
EDG1B-1	L0856	LIT-2051A	C 125 VDC CONTROL	DGPSL2051A	PRESSURE SWITCH LC-2051A FAILS, INDICATING FALSE LOW LEVEL IN TDG04B
EDG1B-1	M0089	52/18SS	M 4160 VAC POWER	ACT1FSST18	Fault On 4160 / 480 VAC Bus 18 supply Transformer PXSHSS018
EDG1B-1	M0108	52/17SS	M 4160 VAC POWER	ACT1FSST17	Fault On 4160 / 480 VAC Bus 17 supply Transformer PXSHSS017

7. SPATIAL INTERACTIONS ANALYSIS WALKDOWN NOTES:

FIRE ZONE	WALKDOWN NOTES
EDG1B-0	Sealed compartment below diesel generator room.
EDG1B-1	D-G fuel oil transfer pump. Fire water hookup for cooling D-G. 4/2/98 WD see notes for DG A room.

LOCATION CHARACTERISTICS TABLE

FIRE AREA: H2

1. FIRE ZONES IN THIS FIRE AREA:

FIRE ZONE	ELEV (FT.)	FIRE ZONE DESCRIPTION	BUILDING	FLOOR AREA (SQ. FT.)
H2	256' 6"	HYDROGEN STORAGE ROOM	HS	550

2. FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	COMBUSTIBLE LOADING (BTU)	FIRE SEVERITY (HRS)
H2	14,846	11.1 min.

3. FIRE PROTECTION FEATURES IN THIS FIRE AREA:

FIRE ZONE	FIRE DETECTION FEATURES	FIRE SUPPRESSION FEATURES
H2		

4. FIRE ZONE(S) ADJACENT TO THE FIRE ZONE(S) IN THIS FIRE AREA:

FIRE ZONE	ADJACENT FIRE ZONE	PATHWAY	PATHWAY RATING (HOUR)
H2	TO	WALL	3
H2	TB-1	WALL	3

5. POTENTIAL KEY EQUIPMENT AND THEIR ASSOCIATED BASIC EVENT(S) IMPACTED BY FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

6. POTENTIAL RACEWAYS (CONDUITS AND CABLE TRAYS) AND THEIR ASSOCIATED EQUIPMENT/BASIC EVENT(S) IMPACTED BY FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

7. SPATIAL INTERACTIONS ANALYSIS WALKDOWN NOTES:

FIRE ZONE	WALKDOWN NOTES
H2	Adjacent to turbine oil storage room. 2 D-G fuel oil storage tanks (6000 gallons each) underground below hydrogen storage area. 4/2/98 WD no safety critical equipment

LOCATION CHARACTERISTICS TABLE

FIRE AREA: RC

1. FIRE ZONES IN THIS FIRE AREA:

FIRE ZONE	ELEV (FT.)	FIRE ZONE DESCRIPTION	BUILDING	FLOOR AREA (SQ. FT.)
RC-1	235' 8"	REACTOR CONTAINMENT BASEMENT	RC	8825
RC-2	253' 3"	REACTOR CONTAINMENT MEZZANINE	RC	8825
RC-3	74' 6" & 278' 4	REACTION CONTAINMENT OPERATING LEVEL	RC	8825

2. FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	COMBUSTIBLE LOADING (BTU)	FIRE SEVERITY (HRS)
RC-1	23,187	17.4 min.
RC-2	5,731	4.3 min.
RC-3	3,182	2.4 min.

3. FIRE PROTECTION FEATURES IN THIS FIRE AREA:

FIRE ZONE	FIRE DETECTION FEATURES	FIRE SUPPRESSION FEATURES
RC-1		
RC-2		
RC-3		

4. FIRE ZONE(S) ADJACENT TO THE FIRE ZONE(S) IN THIS FIRE AREA:

FIRE ZONE	ADJACENT FIRE ZONE	PATHWAY	PATHWAY RATING (HOUR)
RC-1	ABB	WALL	3
RC-1	IBN-0	WALL	3
RC-1	IBS-0	WALL	3
RC-2	ABM	WALL	3
RC-2	IBN-1	WALL	3
RC-2	IBS-1	WALL	3
RC-3	ABO	WALL	3
RC-3	IBN-2	WALL	3
RC-3	IBS-2	WALL	3

5. POTENTIAL KEY EQUIPMENT AND THEIR ASSOCIATED BASIC EVENT(S) IMPACTED BY FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	EQUIPMENT AFFECTED	BASIC EVENT	BASIC EVENT DESCRIPTION
RC-1	294	CVAVK00294	AIR-OPERATED VALVE 294 TRANSFER CLOSED
RC-1	392A	CVRVP0392A	aov/rv392a fails to releve to rcs
RC-1	52/CF1C	HVMCP05876	AIR-OPERATED DAMPER 5876 FAILS TO OPEN (CONTAINMENT)
RC-1	52/CF1C	HVMCP05874	AIR-OPERATED DAMPER 5874 FAILS TO OPEN (CONTAINMENT)
RC-1	52/CF1C	HVMCC05875	AIR OPERATED DAMPER 5875 FAILS TO CLOSE
RC-1	52/CF1D	HVMCK05877	AIR-OP DAMPER 5877 TRANSFERS CLOSED
RC-1	700	RRMVQ00700	MOV 700 FAILS TO OPEN
RC-1	701	RRMVQ00701	MOV 701 FAILS TO OPEN
RC-1	720	RRMVQ00720	MOV 720 FAILS TO OPEN
RC-1	721	RRMVQ00721	MOV 721 FAILS TO OPEN
RC-1	852A	RHMVQ0852A	MOV 852A FAILS TO OPEN
RC-1	852B	RHMVQ0852B	MOV 852B FAILS TO OPEN
RC-1	PT-452	RCBINPC452	ALARM PC-452 FAILS TO OPERATE ON DEMAND
RC-2	52/CF1A	HVMFFACF8A	MOTOR-DRIVEN FAN ACF8A FAILS TO RUN (CONTAINMENT)
RC-2	52/RCP1A	RCMPFRCP1A	REACTOR COOLANT PUMP PRC01A FAILS TO RUN
RC-2	52/RCP1B	RCMPFRCP1B	REACTOR COOLANT PUMP PRC01B FAILS TO RUN
RC-2	8620A	IASVP8620A	SOLENOID VALVE 8620A FAILS TO OPEN
RC-2	8620B	IASVP8620B	SOLENOID VALVE 8620B FAILS TO OPEN
RC-2	LT-427	RCLYDLM427	INSTRUMENT LOOP CURRENT REPEATER LM-427 FAILS TO RESPOND
RC-2	LT-428	RCLYDLM428	INSTRUMENT LOOP CURRENT REPEATER LM-428 FAILS TO RESPOND
RC-2	LT-934	SILTHLT934	LEVEL TRANSMITTER LT-934 FAILS HIGH

LOCATION CHARACTERISTICS TABLE

FIRE AREA: RC

RC-2	LT-935	SILTHLT935	LEVEL TRANSMITTER LT-935 FAILS HIGH
RC-2	LT-938	SILTHLT938	LEVEL TRANSMITTER LT-938 FAILS HIGH
RC-2	LT-939	SILTHLT939	LEVEL TRANSMITTER LT-939 FAILS HIGH
RC-2	PT-420	RRPTHPT420	PRESSURE TRANSMITTER PT-420 FAILS HIGH
RC-2	PT-429	RCPTLPT429	PRESSURE TRANSMITTER PT-429 FAILS LOW
RC-2	PT-430	RCPTLPT430	PRESSURE TRANSMITTER PT-430 FAILS LOW
RC-2	PT-431	RCPTLPT431	PRESSURE TRANSMITTER PT-431 FAILS LOW
RC-2	PT-449	RCPTLPT449	PRESSURE TRANSMITTER PT-449 FAILS LOW
RC-3	431A	RCAVN0431A	AIR-OPERATED VALVE PCV-431A FAILS TO OPEN
RC-3	431B	RCAVN0431B	AIR-OPERATED VALVE PCV-431B FAILS TO OPEN
RC-3	515	RCMVP00515	MOTOR-OPERATED VALVE 515 FAILS TO OPEN
RC-3	516	RCMVP00516	MOTOR-OPERATED VALVE 516 FAILS TO OPEN
RC-3	8612A	IAPVK8612A	PRESSURE CONTROL VLV 8612A TRANSFERS CLOSED
RC-3	8612B	IAPVK8612B	PRESSURE CONTROL VLV 8612B TRANSFERS CLOSED
RC-3	8616A	IASVP8616A	SOLENOID VALVE 8616A FAILS TO OPEN
RC-3	8616B	IASVP8616B	SOLENOID VALVE 8616B FAILS TO OPEN
RC-3	8619A	IASVP8619A	SOLENOID VALVE 8619A FAILS TO OPEN
RC-3	8619B	IASVP8619B	SOLENOID VALVE 8619B FAILS TO OPEN
RC-3	CRSF1A	HVMFFACF5A	CONTROL ROD SHROUD FAN A FAILS TO RUN
RC-3	CRSF1B	HVMFFACF5B	CONTROL ROD SHROUD FAN B FAILS TO RUN
RC-3	FT-464	ESFTD00464	STEAM GENERATOR A FLOW TRANSMITTER FT-464 FAILS TO RESPOND
RC-3	FT-465	ESFTD00465	STEAM GENERATOR A FLOW TRANSMITTER FT-465 FAILS TO RESPOND
RC-3	FT-474	ESFTD00474	SG B STEAM FLOW TRANSMITTER FT-474 FAILS TO RESPOND
RC-3	FT-475	ESFTD00475	SG B STEAM FLOW TRANSMITTER FT-475 FAILS TO RESPOND
RC-3	LT-461	MFLTD00461	Level transmitter LT-461 fails to respond
RC-3	LT-462	MFLTD00462	Level transmitter LT-462 fails to respond
RC-3	LT-463	MFLTD00463	Level transmitter LT-463 fails to respond
RC-3	LT-471	MFLTD00471	Level transmitter LT-471 fails to respond
RC-3	LT-472	MFLTD00472	Level transmitter LT-472 fails to respond
RC-3	LT-473	MFLTD00473	Level transmitter LT-473 fails to respond

6. POTENTIAL RACEWAYS (CONDUITS AND CABLE TRAYS) AND THEIR ASSOCIATED EQUIPMENT/BASIC EVENT(S) IMPACTED BY FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	RACEWAY AFFECTED	EQUIPMENT AFFECTED	CABLE FUNCTION	BASIC EVENT AFFECTED	BASIC EVENT DESCRIPTION
RC-1	C0714	720	P 480 VAC POWER	RRMVQ00720	MOV 720 FAILS TO OPEN
RC-1	C0714	720	P 480 VAC POWER	RCS-720	ISLOCA evaluation
RC-1	C0716	720	C 125 VDC CONTROL	RCS-720	ISLOCA evaluation
RC-1	C0716	720	C 125 VDC CONTROL	RRMVQ00720	MOV 720 FAILS TO OPEN
RC-1	C0721	700	P 480 VAC POWER	RRMVQ00700	MOV 700 FAILS TO OPEN
RC-1	C0721	700	P 480 VAC POWER	RCS-700	ISLOCA evaluation
RC-1	C0723	700	C 125 VDC CONTROL	RRMVQ00700	MOV 700 FAILS TO OPEN
RC-1	C0723	700	C 125 VDC CONTROL	RCS-700	ISLOCA evaluation
RC-1	C0729	852A	P 480 VAC POWER	RHMVQ0852A	MOV 852A FAILS TO OPEN
RC-1	C0731	852A	C 125 VDC CONTROL	RHMVQ0852A	MOV 852A FAILS TO OPEN
RC-1	C0741	878A	P 480 VAC POWER	SIXVR0878A	MOV 878A TRANSFERS OPEN
RC-1	C0741	878A	P 480 VAC POWER	SRXVR0878A	MOV 878A TRANSFERS OPEN
RC-1	C0743	878A	C 125 VDC CONTROL	SIXVR0878A	MOV 878A TRANSFERS OPEN
RC-1	C0743	878A	C 125 VDC CONTROL	SRXVR0878A	MOV 878A TRANSFERS OPEN
RC-1	C0748	878C	P 480 VAC POWER	SIXVR0878C	MOV 878C TRANSFERS OPEN
RC-1	C0748	878C	P 480 VAC POWER	SRXVR0878C	MOV 878C TRANSFERS OPEN
RC-1	C0750	878C	C 125 VDC CONTROL	SIXVR0878C	MOV 878C TRANSFERS OPEN
RC-1	C0750	878C	C 125 VDC CONTROL	SRXVR0878C	MOV 878C TRANSFERS OPEN
RC-1	C1080	721	P 480 VAC POWER	RCS-721	ISLOCA evaluation
RC-1	C1080	721	P 480 VAC POWER	RRMVQ00721	MOV 721 FAILS TO OPEN
RC-1	C1082	721	C 125 VDC CONTROL	RRMVQ00721	MOV 721 FAILS TO OPEN
RC-1	C1082	721	C 125 VDC CONTROL	RCS-721	ISLOCA evaluation

Pages B-339 through B-350 are similar and not included to reduce paper volume.

LOCATION CHARACTERISTICS TABLE

FIRE AREA: RC

RC-2	R3594	592	P	RC-592	Spurious opening of RCS head vent if in conjunction with SV-593?
RC-2	R3595	592	P	RC-592	Spurious opening of RCS head vent if in conjunction with SV-593?
RC-2	R3596	593	P	RC-593	Spurious opening of RCS head vent if in conjunction with SV-592?
RC-2	R3597	593	C	RC-593	Spurious opening of RCS head vent if in conjunction with SV-592?
RC-2	R3598	591	P	RC-591	Spurious opening of RCS head vent if in conjunction with SV-590?
RC-2	R3599	591	C 125 VDC CONTROL	RC-591	Spurious opening of RCS head vent if in conjunction with SV-590?
RC-2	R3968	TE-410B1	C	TE-410B1	TEMPERATURE ELEMENT FOR LOOP B COLD LEG
RC-2	R3970	LT-427	C	RCLYDLM427	INSTRUMENT LOOP CURRENT REPEATER LM-427 FAILS TO RESPOND
RC-2	R3972	PT-430	C	EXPTLPT430	PRESSURIZER LOW PRESSURE TRANSMITTER PT-430 FAILS LOW
RC-2	R3972	PT-430	C	ESPTDPT430	PRESSURIZER LOW PRESSURE TRANSMITTER PT-430 FAILS TO RESPOND ON DEMAND
RC-2	R3972	PT-430	C	RCPTLPT430	PRESSURE TRANSMITTER PT-430 FAILS LOW
RC-2	R3993	TE-409B1	C	TE-409B1	LOOP "B" HOT LEG TEMP ELEMENT
RC-2	R4081	LT-460A	I INDICATION	LT-460A	STEAM GENERATOR EMS01A LEVEL WIDE RANGE APPENDIX R TRANSMITTER
RC-2	R4085	LT-428A	C 125 VDC CONTROL	LT-428A	PRZR LVL WIDE RANGE-XMTR
RC-2	R4087	PT-420B	I ALARM/IND/CONT	PT-420B	PRESSURE TRANSMITTER REACTOR COOLANT SYSTEM INST LOOP 420B
RC-2	R4295	LT-504	C	LT-504	STEAM GENERATOR EMS01A WIDE RANGE LEVEL TRANSMITTER
RC-2	R4298	LT-507	C	LT-507	STEAM GENERATOR EMS01B WIDE RANGE LEVEL TRANSMITTER
RC-2	SAC0201A	8619A	C 125 VDC CONTROL	IASVP8619A	SOLENOID VALVE 8619A FAILS TO OPEN
RC-2	SAC0201B	8619A	C	IASVP8619A	SOLENOID VALVE 8619A FAILS TO OPEN
RC-2	SAC0202A	8619B	C	IASVP8619B	SOLENOID VALVE 8619B FAILS TO OPEN
RC-2	SAC0202A	8619B	C	RCREB451AX	RELAY PC-451-X FAILS TO DE-ENERGIZE
RC-2	SAC0202B	8619B	C	RCREB451AX	RELAY PC-451-X FAILS TO DE-ENERGIZE
RC-2	SAC0202B	8619B	C	IASVP8619B	SOLENOID VALVE 8619B FAILS TO OPEN
RC-2	SAC0205A	8616A	C	IASVP8616A	SOLENOID VALVE 8616A FAILS TO OPEN
RC-2	SAC0206A	8616B	C	IASVP8616B	SOLENOID VALVE 8616B FAILS TO OPEN
RC-2	SAI0101	PT-450	I RPS CHANNEL 3 (BLUE)	RCBINPC450	ALARM PC-450 FAILS TO OPERATE ON DEMAND
RC-2	SAI0102	PT-451	I RPS CHANNEL 2 (WHITE)	RCBINPC451	ALARM PC-451 FAILS TO OPERATE ON DEMAND
RC-2	SAI0103	PT-452	I RPS CHANNEL 1 (RED)	RCBINPC452	ALARM PC-452 FAILS TO OPERATE ON DEMAND
RC-3	C0691	516	P 480 VAC POWER	RCMVK00516	MOTOR-OPERATED VALVE 516 TRANSFERS CLOSED
RC-3	C0691	516	P 480 VAC POWER	RCMVP00516	MOTOR-OPERATED VALVE 516 FAILS TO OPEN
RC-3	C0691A	516	P 480 VAC POWER	RCMVK00516	MOTOR-OPERATED VALVE 516 TRANSFERS CLOSED
RC-3	C0691A	516	P 480 VAC POWER	RCMVP00516	MOTOR-OPERATED VALVE 516 FAILS TO OPEN
RC-3	C0693	516	C 125 VDC CONTROL	RCMVP00516	MOTOR-OPERATED VALVE 516 FAILS TO OPEN
RC-3	C0693	516	C 125 VDC CONTROL	RCMVK00516	MOTOR-OPERATED VALVE 516 TRANSFERS CLOSED
RC-3	C0693A	516	C 125 VDC CONTROL	RCMVK00516	MOTOR-OPERATED VALVE 516 TRANSFERS CLOSED
RC-3	C0693A	516	C 125 VDC CONTROL	RCMVP00516	MOTOR-OPERATED VALVE 516 FAILS TO OPEN
RC-3	C1057	515	P 480 VAC POWER	RCMVP00515	MOTOR-OPERATED VALVE 515 FAILS TO OPEN
RC-3	C1057	515	P 480 VAC POWER	RCMVK00515	MOTOR-OPERATED VALVE 515 TRANSFERS CLOSED
RC-3	C1057A	515	P 480 VAC POWER	RCMVK00515	MOTOR-OPERATED VALVE 515 TRANSFERS CLOSED
RC-3	C1057A	515	P 480 VAC POWER	RCMVP00515	MOTOR-OPERATED VALVE 515 FAILS TO OPEN
RC-3	C1059	515	C 125 VDC CONTROL	RCMVK00515	MOTOR-OPERATED VALVE 515 TRANSFERS CLOSED
RC-3	C1059	515	C 125 VDC CONTROL	RCMVP00515	MOTOR-OPERATED VALVE 515 FAILS TO OPEN
RC-3	C1059A	515	C 125 VDC CONTROL	RCMVK00515	MOTOR-OPERATED VALVE 515 TRANSFERS CLOSED

LOCATION CHARACTERISTICS TABLE

FIRE AREA: RC

RC-3	C1059A	515	C 125 VDC CONTROL	RCMVP00515	MOTOR-OPERATED VALVE 515 FAILS TO OPEN
RC-3	L0082	CRSF1B	P 480 VAC POWER	HVMFFACF5B	CONTROL ROD SHROUD FAN B FAILS TO RUN
RC-3	L0082A	CRSF1B	P 480 VAC POWER	HVMFFACF5B	CONTROL ROD SHROUD FAN B FAILS TO RUN
RC-3	L0093	CRSF1A	P 480 VAC POWER	HVMFFACF5A	CONTROL ROD SHROUD FAN A FAILS TO RUN
RC-3	L0093A	CRSF1A	P 480 VAC POWER	HVMFFACF5A	CONTROL ROD SHROUD FAN A FAILS TO RUN
RC-3	L0343	52/CF1A	C 125 VDC CONTROL	HVMFFACF8A	MOTOR-DRIVEN FAN ACF8A FAILS TO RUN (CONTAINMENT)
RC-3	L0343	52/CF1A	C 125 VDC CONTROL	ACCBN1423C	AC BREAKER 52/CF1A (BUS14/23C) FAILS TO OPEN
RC-3	L0346	52/CF1A	C 125 VDC CONTROL	HVMFFACF8A	MOTOR-DRIVEN FAN ACF8A FAILS TO RUN (CONTAINMENT)
RC-3	L0346	52/CF1A	C 125 VDC CONTROL	ACCBN1423C	AC BREAKER 52/CF1A (BUS14/23C) FAILS TO OPEN
RC-3	L0360	52/CF1D	C 125 VDC CONTROL	ACCBN1420C	AC BREAKER 52/CF1D (BUS14/20C) FAILS TO OPEN
RC-3	L0360	52/CF1D	C 125 VDC CONTROL	HVMFFACF8D	MOTOR-DRIVEN FAN ACF8D FAILS TO RUN (CONTAINMENT)
RC-3	L0360	52/CF1D	C 125 VDC CONTROL	HVMCK05877	AIR-OP DAMPER 5877 TRANSFERS CLOSED
RC-3	R0872	FT-464	I ALARM/IND/CONT	ESFTD00464	STEAM GENERATOR A FLOW TRANSMITTER FT-464 FAILS TO RESPOND
RC-3	R0876	LT-461	I ALARM/IND/CONT	MFLTD00461	Level transmitter LT-461 fails to respond
RC-3	R0916	FT-465	I ALARM/IND/CONT	ESFTD00465	STEAM GENERATOR A FLOW TRANSMITTER FT-465 FAILS TO RESPOND
RC-3	R0965	LT-462	I ANALOG SIGNAL	MFLTD00462	Level transmitter LT-462 fails to respond
RC-3	R1014	LT-463	I ANALOG SIGNAL	MFLTD00463	Level transmitter LT-463 fails to respond
RC-3	R1018	LT-471	I ANALOG SIGNAL	MFLTD00471	Level transmitter LT-471 fails to respond
RC-3	R3592	590	P	RC-590	Spurious opening of RCS head vent if in conjunction with SV-591?
RC-3	R3593	590	P	RC-590	Spurious opening of RCS head vent if in conjunction with SV-591?
RC-3	R3594	592	P	RC-592	Spurious opening of RCS head vent if in conjunction with SV-593?
RC-3	R3595	592	P	RC-592	Spurious opening of RCS head vent if in conjunction with SV-593?
RC-3	R3596	593	P	RC-593	Spurious opening of RCS head vent if in conjunction with SV-592?
RC-3	R3597	593	C	RC-593	Spurious opening of RCS head vent if in conjunction with SV-592?
RC-3	R3598	591	P	RC-591	Spurious opening of RCS head vent if in conjunction with SV-590?
RC-3	R3599	591	C 125 VDC CONTROL	RC-591	Spurious opening of RCS head vent if in conjunction with SV-590?
RC-3	SAC0201A	8619A	C 125 VDC CONTROL	IASVP8619A	SOLENOID VALVE 8619A FAILS TO OPEN
RC-3	SAC0201B	8619A	C	IASVP8619A	SOLENOID VALVE 8619A FAILS TO OPEN
RC-3	SAC0201C	8619A	C 125 VDC CONTROL	IASVP8619A	SOLENOID VALVE 8619A FAILS TO OPEN
RC-3	SAC0202A	8619B	C	RCREB451AX	RELAY PC-451-X FAILS TO DE-ENERGIZE
RC-3	SAC0202A	8619B	C	IASVP8619B	SOLENOID VALVE 8619B FAILS TO OPEN
RC-3	SAC0202B	8619B	C	IASVP8619B	SOLENOID VALVE 8619B FAILS TO OPEN
RC-3	SAC0202B	8619B	C	RCREB451AX	RELAY PC-451-X FAILS TO DE-ENERGIZE
RC-3	SAC0202C	8619B	C	IASVP8619B	SOLENOID VALVE 8619B FAILS TO OPEN
RC-3	SAC0202C	8619B	C	RCREB451AX	RELAY PC-451-X FAILS TO DE-ENERGIZE
RC-3	SAC0203	8620A	C	IASVP8620A	SOLENOID VALVE 8620A FAILS TO OPEN
RC-3	SAC0204	8620B	C	IASVP8620B	SOLENOID VALVE 8620B FAILS TO OPEN
RC-3	SAC0205A	8616A	C	IASVP8616A	SOLENOID VALVE 8616A FAILS TO OPEN
RC-3	SAC0205B	8616A	C	IASVP8616A	SOLENOID VALVE 8616A FAILS TO OPEN
RC-3	SAC0206A	8616B	C	IASVP8616B	SOLENOID VALVE 8616B FAILS TO OPEN
RC-3	SAC0206B	8616B	C	IASVP8616B	SOLENOID VALVE 8616B FAILS TO OPEN

7. SPATIAL INTERACTIONS ANALYSIS WALKDOWN NOTES:

FIRE ZONE	WALKDOWN NOTES
RC-1	4/2/98 WD did not enter containment for fire walkdown
RC-2	4/2/98 WD did not enter containment for fire walkdown. RGE staff noted that PORVs and block valve cables are all in conduit, and are routed separately.
RC-3	4/2/98 WD did not enter containment for fire walkdown

LOCATION CHARACTERISTICS TABLE

FIRE AREA: SH

1. FIRE ZONES IN THIS FIRE AREA:

FIRE ZONE	ELEV (FT.)	FIRE ZONE DESCRIPTION	BUILDING	FLOOR AREA (SQ. FT.)
SH-1	243' 6"	SCREEN HOUSE BASEMENT LEVEL	SH	2640
SH-2	253' 6"	SCREEN HOUSE OPERATING LEVEL	SH	9645

2. FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	COMBUSTIBLE LOADING (BTU)	FIRE SEVERITY (HRS)
SH-1	9,106	6.8 min.
SH-2	7,685	5.8 min.

3. FIRE PROTECTION FEATURES IN THIS FIRE AREA:

FIRE ZONE	FIRE DETECTION FEATURES	FIRE SUPPRESSION FEATURES
SH-1		
SH-2		

4. FIRE ZONE(S) ADJACENT TO THE FIRE ZONE(S) IN THIS FIRE AREA:

FIRE ZONE	ADJACENT FIRE ZONE	PATHWAY	PATHWAY RATING (HOUR)
SH-1	SH-2	STAIRWELL	
SH-2	SH-1	STAIRWELL	

5. POTENTIAL KEY EQUIPMENT AND THEIR ASSOCIATED BASIC EVENT(S) IMPACTED BY FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	EQUIPMENT AFFECTED	BASIC EVENT	BASIC EVENT DESCRIPTION
SH-1	4609	SWMVC04609	Service Water Header Isolation MOV 4609 Fails To Close On Demand
SH-1	4780	SWMVC04780	Service Water Header Isolation MOV 4780 Fails To Close On Demand
SH-1	52/17	DCCFRS1AAN	Fuse FUDCPDPSH01A/1N Fails Open (To Bus 17 - Emergency)
SH-1	52/17	ACCBD1725B	AC BREAKER 52/17 (BUS17/25B) FAILS TO OPERATE
SH-1	52/17	DCCFRS1BGN	Fuse FUDCPDPSH01B/7N Fails Open (To Bus 17 - Normal)
SH-1	52/17SS	ACT1FSST17	Fault On 4160 / 480 VAC Bus 17 supply Transformer PXSHSS017
SH-1	52/18	DCCFRS1BFN	Fuse FUDCPDPSH01B/6N Fails Open (To Bus 18 - Emergency)
SH-1	52/18	ACCBD1831B	AC BREAKER 52/18 (BUS18/31B) FAILS TO OPERATE
SH-1	52/18SS	ACT1FSST18	Fault On 4160 / 480 VAC Bus 18 supply Transformer PXSHSS018
SH-1	52/EG1A2	ACCBD1831C	AC BREAKER 52/EG1A2 (BUS18/31C) FAILS TO OPERATE
SH-1	52/EG1B2	ACCBD1725C	DG B OUTPUT BREAKER 52/EG1B2 (BUS17/25C) FAILS TO OPERATE
SH-1	52/IH1A	ACCBN1829A	AC BREAKER 52/IH1A (BUS18/29A) FAILS TO OPEN
SH-1	52/IH1B	ACCBN1727A	AC BREAKER 52/IH1B (BUS17/27A) FAILS TO OPEN
SH-1	52/IH1C	ACCBN1829B	AC BREAKER 52/IH1C (BUS18/29B) FAILS TO OPEN
SH-1	52/IH1D	ACCBN1727B	AC BREAKER 52/IH1D (BUS17/27B) FAILS TO OPEN
SH-1	52/MCC1G1	ACCBN1830C	AC BREAKER 52/MCC1G1 (BUS18/30C) FAILS TO OPEN
SH-1	52/MCC1G2	ACCBN1726C	AC BREAKER 52/MCC1G2 (BUS17/26C) FAILS TO OPEN
SH-1	52/SWP1A	SWMPFSW01A	Service Water Pump PSW01A Fails To Run For The Required Mission Time
SH-1	52/SWP1A	ACCBN1829C	AC BREAKER 52/SWP1A (BUS18/29C) FAILS TO OPEN
SH-1	52/SWP1B	SWMPFSW01B	Service Water Pump PSW01B Fails To Run For The Required Mission Time
SH-1	52/SWP1B	ACCBN1727C	AC BREAKER 52/SWP1B (BUS17/27C) FAILS TO OPEN
SH-1	52/SWP1C	SWMPFSW01C	Service Water Pump PSW01C Fails To Run For The Required Mission Time
SH-1	52/SWP1C	ACCBN1829D	AC BREAKER 52/SWP1C (BUS18/29D) FAILS TO OPEN
SH-1	52/SWP1D	SWMPFSW01D	Service Water Pump PSW01D Fails To Run For The Required Mission Time
SH-1	52/SWP1D	ACCBN1727D	AC BREAKER 52/SWP1D (BUS17/27D) FAILS TO OPEN
SH-1	83/17	DCREBBUS17	RELAY 83E/17 (BUS 17 DC THROWOVER) FAILS TO DEENERGIZE
SH-1	83/18	DCREBBUS18	RELAY 83E/18 (BUS 18 DC THROWOVER) FAILS TO DEENERGIZE
SH-1	DCPDPCB02B/05	DCBDFSCRNB	Screen House DC Distribution Panel 1B (DCPDPSH01B) Local Fault
SH-1	DCPDPCB03A/11	DCBDFSCRNA	Screen House DC Distribution Panel 1A (DCPDPSH01A) Local Fault
SH-1	DCPDPSH01A/02	DCCFRS1ABN	Fuse FUDCPDPSH01A/2N Fails Open (To Bus 18 - Normal)
SH-1	DCPDPSH01A/04	DCCFRS1ADN	Fuse FUDCPDPSH01A/4N Fails Open (To Bus 18 - Norm, Bus 17 - Emerg UV Ctrl Cab)

LOCATION CHARACTERISTICS TABLE

FIRE AREA: SH

SH-1	DCPDPSH01A/04	DCCFRS1ADP	Fuse FUDCPDPSH01A/4P Fails Open (To Bus 18 - Norm, Bus 17 - Emerg UV Ctrl Cab)
SH-1	DCPDPSH01B/06	DCCSRS1BFX	Disconnect Switch DCPDPSH01B/06 Transfers Open (To Bus 18 - Emergency)
SH-1	DCPDPSH01B/07	DCCSRS1BGX	Disconnect Switch DCPDPSH01B/07 Transfers Open (To Bus 17 - Normal)
SH-1	DCPDPSH01B/08	DCCFRS1BHP	Fuse FUDCPDPSH01B/8P Fails Open (To Bus 17 - Norm, Bus 18 - Emerg UV Ctrl Cab)
SH-1	DCPDPSH01B/08	DCCFRS1BHN	Fuse FUDCPDPSH01B/8N Fails Open (To Bus 17 - Norm, Bus 18 - Emerg UV Ctrl Cab)
SH-1	DCPDPSH01B/08	DCCSRS1BHX	Disconnect Switch DCPDPSH01B/08 Transfers Open (To Bus 17 - Norm UV Ctrl Cab)
SH-2	4609	SWMVC04609	Service Water Header Isolation MOV 4609 Fails To Close On Demand
SH-2	4780	SWMVC04780	Service Water Header Isolation MOV 4780 Fails To Close On Demand
SH-2	52/17	ACCBD1725B	AC BREAKER 52/17 (BUS17/25B) FAILS TO OPERATE
SH-2	52/17	DCCFRS1AAN	Fuse FUDCPDPSH01A/1N Fails Open (To Bus 17 - Emergency)
SH-2	52/17	DCCFRS1BGN	Fuse FUDCPDPSH01B/7N Fails Open (To Bus 17 - Normal)
SH-2	52/17SS	ACT1FSST17	Fault On 4160 / 480 VAC Bus 17 supply Transformer PXSHSS017
SH-2	52/18	DCCFRS1BFN	Fuse FUDCPDPSH01B/6N Fails Open (To Bus 18 - Emergency)
SH-2	52/18	ACCBD1831B	AC BREAKER 52/18 (BUS18/31B) FAILS TO OPERATE
SH-2	52/18SS	ACT1FSST18	Fault On 4160 / 480 VAC Bus 18 supply Transformer PXSHSS018
SH-2	52/EG1A2	ACCBD1831C	AC BREAKER 52/EG1A2 (BUS18/31C) FAILS TO OPERATE
SH-2	52/EG1B2	ACCBD1725C	DG B OUTPUT BREAKER 52/EG1B2 (BUS17/25C) FAILS TO OPERATE
SH-2	52/IH1A	ACCBN1829A	AC BREAKER 52/IH1A (BUS18/29A) FAILS TO OPEN
SH-2	52/IH1B	ACCBN1727A	AC BREAKER 52/IH1B (BUS17/27A) FAILS TO OPEN
SH-2	52/IH1C	ACCBN1829B	AC BREAKER 52/IH1C (BUS18/29B) FAILS TO OPEN
SH-2	52/IH1D	ACCBN1727B	AC BREAKER 52/IH1D (BUS17/27B) FAILS TO OPEN
SH-2	52/MCC1G1	ACCBN1830C	AC BREAKER 52/MCC1G1 (BUS18/30C) FAILS TO OPEN
SH-2	52/MCC1G2	ACCBN1726C	AC BREAKER 52/MCC1G2 (BUS17/26C) FAILS TO OPEN
SH-2	52/SWP1A	SWMPFSW01A	Service Water Pump PSW01A Fails To Run For The Required Mission Time
SH-2	52/SWP1A	ACCBN1829C	AC BREAKER 52/SWP1A (BUS18/29C) FAILS TO OPEN
SH-2	52/SWP1B	ACCBN1727C	AC BREAKER 52/SWP1B (BUS17/27C) FAILS TO OPEN
SH-2	52/SWP1B	SWMPFSW01B	Service Water Pump PSW01B Fails To Run For The Required Mission Time
SH-2	52/SWP1C	SWMPFSW01C	Service Water Pump PSW01C Fails To Run For The Required Mission Time
SH-2	52/SWP1C	ACCBN1829D	AC BREAKER 52/SWP1C (BUS18/29D) FAILS TO OPEN
SH-2	52/SWP1D	SWMPFSW01D	Service Water Pump PSW01D Fails To Run For The Required Mission Time
SH-2	52/SWP1D	ACCBN1727D	AC BREAKER 52/SWP1D (BUS17/27D) FAILS TO OPEN
SH-2	83/17	DCREBBUS17	RELAY 83E/17 (BUS 17 DC THROWOVER) FAILS TO DEENERGIZE
SH-2	83/18	DCREBBUS18	RELAY 83E/18 (BUS 18 DC THROWOVER) FAILS TO DEENERGIZE
SH-2	BUS17UV	UVREK0X117	BUS 17 UNDERVOLTAGE RELAY 27X1/17 TRANSFERS TO ENERGIZED
SH-2	BUS17UV	UVRER27BD7	BUS 17 UNDERVOLTAGE RELAY 27D/B/17 TRANSFERS TO DE-ENERGIZED
SH-2	BUS17UV	UVRER27B17	BUS 17 UNDERVOLTAGE RELAY 27B/17 TRANSFERS TO DE-ENERGIZED
SH-2	BUS17UV	UVLCD17LB1	BUS 17 UNDERVOLTAGE CONTROL LOGIC BOARD #1 FAILS TO GENERATE A SIGNAL
SH-2	BUS17UV	UVLCD0X317	Relay 27X3/17 driver (Heat Sink Assembly #1) fails to energize
SH-2	BUS17UV	UVREKBX217	BUS 17 UNDERVOLTAGE RELAY 27BX2/17 TRANSFERS TO ENERGIZED
SH-2	BUS17UV	UVLCD0X217	Relay 27X2/17 driver (Heat Sink Assembly #1) fails to energize
SH-2	BUS17UV	UVREKBX117	BUS 17 UNDERVOLTAGE RELAY 27BX1/17 TRANSFERS TO ENERGIZED
SH-2	BUS17UV	UVREK0X317	BUS 17 UNDERVOLTAGE RELAY 27X3/17 TRANSFERS TO ENERGIZED
SH-2	BUS17UV	UVLCD0X117	Relay 27X1/17 driver (Heat Sink Assembly #1) fails to energize
SH-2	BUS17UV	UVLCD17LB2	BUS 17 UNDERVOLTAGE CONTROL LOGIC BOARD #2 FAILS TO GENERATE A SIGNAL
SH-2	BUS17UV	UVLCDBX117	Relay 27BX1/17 driver (Heat Sink Assembly #2) fails to energize
SH-2	BUS17UV	UVREKBX317	BUS 17 UNDERVOLTAGE RELAY 27BX3/17 TRANSFERS TO ENERGIZED
SH-2	BUS17UV	UVREK0X217	BUS 17 UNDERVOLTAGE RELAY 27X2/17 TRANSFERS TO ENERGIZED
SH-2	BUS17UV	UVCFR17FU6	Fuse #6 (FUARB2CC17/6-N) fails open (control cabinet)
SH-2	BUS17UV	UVLCDBX27A	RELAY 27BX2/17 DRIVER (HEAT SINK ASSEMBLY #2) GENERATES A SPURIOUS SIGNAL
SH-2	BUS17UV	UVCFR17FU3	Fuse #3 (FUARB2RC17/3-N) fails open (relay cabinet)
SH-2	BUS17UV	UVLCDBX217	Relay 27BX2/17 driver (Heat Sink Assembly #2) fails to energize
SH-2	BUS17UV	UVLCDBX17A	RELAY 27BX1/17 DRIVER (HEAT SINK ASSEMBLY #2) GENERATES A SPURIOUS SIGNAL
SH-2	BUS17UV	UVREEBX217	Relay 27BX2/17 fails to energize
SH-2	BUS17UV	UVRER27D17	BUS 17 UNDERVOLTAGE RELAY 27D/17 TRANSFERS TO DE-ENERGIZED
SH-2	BUS17UV	UVCFR17FU5	Fuse #5 (FUARB2CC17/5-P) fails open (control cabinet)
SH-2	BUS17UV	UVLCDBX317	Relay 27BX3/17 driver (Heat Sink Assembly #2) fails to energize

LOCATION CHARACTERISTICS TABLE

FIRE AREA: SH

SH-2	BUS17UV	UVREEBX117	Relay 27BX1/17 fails to energize
SH-2	BUS17UV	UVREE0X317	Relay 27X3/17 fails to energize
SH-2	BUS17UV	UVREE0X217	Relay 27X2/17 fails to energize
SH-2	BUS17UV	UVREEBX317	Relay 27BX3/17 fails to energize
SH-2	BUS17UV	UVREE0X117	Relay 27X1/17 fails to energize
SH-2	BUS17UV	UVRUB27B17	Undervoltage relay 27B/17 fails to de-energize
SH-2	BUS17UV	UVCFR17FU2	Fuse #2 (FUARB2RC17/2-P) fails open (relay cabinet)
SH-2	BUS17UV	UVRUB27D17	Undervoltage relay 27D/17 fails to de-energize
SH-2	BUS17UV	UVLCDBX37A	RELAY 27BX3/17 DRIVER (HEAT SINK ASSEMBLY #2) GENERATES A SPURIOUS SIGNAL
SH-2	BUS17UV	UVLCDX117A	RELAY 27X1/17 DRIVER (HEAT SINK ASSEMBLY #1) GENERATES A SPURIOUS SIGNAL
SH-2	BUS17UV	UVLCDX217A	RELAY 27X2/17 DRIVER (HEAT SINK ASSEMBLY #1) GENERATES A SPURIOUS SIGNAL
SH-2	BUS17UV	UVLCD17S#1	BUS 17 UNDERVOLTAGE SOLID STATE SWITCH # 1 FAILS TO GENERATE A SIGNAL
SH-2	BUS17UV	UVRUB27017	Undervoltage relay 27/17 fails to de-energize
SH-2	BUS17UV	UVLCD17S#2	BUS 17 UNDERVOLTAGE SOLID STATE SWITCH #2 FAILS TO GENERATE A SIGNAL
SH-2	BUS17UV	UVLCDX317A	RELAY 27X3/17 DRIVER (HEAT SINK ASSEMBLY #1) GENERATES A SPURIOUS SIGNAL
SH-2	BUS17UV	UVRUB27BD7	Undervoltage relay 27D/B/17 fails to de-energize
SH-2	BUS17UV	UVRER02717	BUS 17 UNDERVOLTAGE RELAY 27/17 TRANSFERS TO DE-ENERGIZED
SH-2	BUS18UV	UVCFR18FU6	Fuse #6 (FUARA2CC18/6-N) fails open (control cabinet)
SH-2	BUS18UV	UVCFR18FU5	Fuse #5 (FUARA2CC18/5-P) fails open (control cabinet)
SH-2	BUS18UV	UVLCD18LB1	BUS 18 UNDERVOLTAGE CONTROL LOGIC BOARD #1 FAILS TO GENERATE A SIGNAL
SH-2	BUS18UV	UVCFR18FU3	Fuse #3 (FUARA2RC18/3-N) fails open (relay cabinet)
SH-2	BUS18UV	UVLCD0X218	Relay 27X2/18 driver (Heat Sink Assembly #1) fails to energize
SH-2	BUS18UV	UVLCD18LB2	BUS 18 UNDERVOLTAGE CONTROL LOGIC BOARD #2 FAILS TO GENERATE A SIGNAL
SH-2	BUS18UV	UVLCD18S#1	BUS 18 UNDERVOLTAGE SOLID STATE SWITCH #1 FAILS TO GENERATE A SIGNAL
SH-2	BUS18UV	UVLCD18S#2	BUS 18 UNDERVOLTAGE SOLID STATE SWITCH #2 FAILS TO GENERATE A SIGNAL
SH-2	BUS18UV	UVLCD0X118	Relay 27X1/18 driver (Heat Sink Assembly #1) fails to energize
SH-2	BUS18UV	UVLCD0X318	Relay 27X3/18 driver (Heat Sink Assembly #1) fails to energize
SH-2	BUS18UV	UVCFR18FU2	Fuse #2 (FUARA2RC18/2-P) fails open (relay cabinet)
SH-2	BUS18UV	UVLCDBX18A	RELAY 27BX1/18 DRIVER (HEAT SINK ASSEMBLY #2) GENERATES A SPURIOUS SIGNAL
SH-2	BUS18UV	UVRER27D18	BUS 18 UNDERVOLTAGE RELAY 27D/18 TRANSFERS TO DE-ENERGIZED
SH-2	BUS18UV	UVRUB27BD8	Undervoltage relay 27D/B/18 fails to de-energize
SH-2	BUS18UV	UVRUB27018	Undervoltage relay 27/18 fails to de-energize
SH-2	BUS18UV	UVLCDBX118	Relay 27BX1/18 driver (Heat Sink Assembly #2) fails to energize
SH-2	BUS18UV	UVRER27B18	BUS 18 UNDERVOLTAGE RELAY 27B/18 TRANSFERS TO DE-ENERGIZED
SH-2	BUS18UV	UVREEBX318	Relay 27BX3/18 fails to energize
SH-2	BUS18UV	UVLCDX218A	RELAY 27X2/18 DRIVER (HEAT SINK ASSEMBLY #1) GENERATES A SPURIOUS SIGNAL
SH-2	BUS18UV	UVLCDX118A	RELAY 27X1/18 DRIVER (HEAT SINK ASSEMBLY #1) GENERATES A SPURIOUS SIGNAL
SH-2	BUS18UV	UVRER02718	BUS 18 UNDERVOLTAGE RELAY 27/18 TRANSFERS TO DE-ENERGIZED
SH-2	BUS18UV	UVLCDBX28A	RELAY 27BX2/18 DRIVER (HEAT SINK ASSEMBLY #2) GENERATES A SPURIOUS SIGNAL
SH-2	BUS18UV	UVRUB27B18	Undervoltage relay 27B/18 fails to de-energize
SH-2	BUS18UV	UVLCDBX318	Relay 27BX3/18 driver (Heat Sink Assembly #2) fails to energize
SH-2	BUS18UV	UVLCDBX218	Relay 27BX2/18 driver (Heat Sink Assembly #2) fails to energize
SH-2	BUS18UV	UVLCDX318A	RELAY 27X3/18 DRIVER (HEAT SINK ASSEMBLY #1) GENERATES A SPURIOUS SIGNAL
SH-2	BUS18UV	UVREEBX218	Relay 27BX2/18 fails to energize
SH-2	BUS18UV	UVREEBX118	Relay 27BX1/18 fails to energize
SH-2	BUS18UV	UVREE0X318	Relay 27X3/18 fails to energize
SH-2	BUS18UV	UVREE0X118	Relay 27X1/18 fails to energize
SH-2	BUS18UV	UVREE0X218	Relay 27X2/18 fails to energize
SH-2	BUS18UV	UVLCDBX38A	RELAY 27BX3/18 DRIVER (HEAT SINK ASSEMBLY #2) GENERATES A SPURIOUS SIGNAL
SH-2	BUS18UV	UVREKBX318	BUS 18 UNDERVOLTAGE RELAY 27BX3/18 TRANSFERS TO ENERGIZED
SH-2	BUS18UV	UVREKBX218	BUS 18 UNDERVOLTAGE RELAY 27BX2/18 TRANSFERS TO ENERGIZED
SH-2	BUS18UV	UVREKBX118	BUS 18 UNDERVOLTAGE RELAY 27BX1/18 TRANSFERS TO ENERGIZED
SH-2	BUS18UV	UVREK0X318	BUS 18 UNDERVOLTAGE RELAY 27X3/18 TRANSFERS TO ENERGIZED
SH-2	BUS18UV	UVREK0X218	BUS 18 UNDERVOLTAGE RELAY 27X2/18 TRANSFERS TO ENERGIZED
SH-2	BUS18UV	UVREK0X118	BUS 18 UNDERVOLTAGE RELAY 27X1/18 TRANSFERS TO ENERGIZED
SH-2	BUS18UV	UVRER27BD8	BUS 18 UNDERVOLTAGE RELAY 27D/B/18 TRANSFERS TO DE-ENERGIZED

LOCATION CHARACTERISTICS TABLE

FIRE AREA: SH

SH-2	BUS18UV	UVRUB27D18	Undervoltage relay 27D/18 fails to de-energize
SH-2	DCPDPCB02B/05	DCBDFSCRNB	Screen House DC Distribution Panel 1B (DCPDPSH01B) Local Fault
SH-2	DCPDPCB03A/11	DCBDFSCRNA	Screen House DC Distribution Panel 1A (DCPDPSH01A) Local Fault
SH-2	DCPDPSH01A/01	DCCSRS1AAX	Disconnect Switch DCPDPSH01A/01 Transfers Open (To Bus 17 - Emergency)
SH-2	DCPDPSH01A/02	DCCSRS1ABX	Disconnect Switch DCPDPSH01A/02 Transfers Open (To Bus 18 - Normal)
SH-2	DCPDPSH01A/02	DCCFRS1ABN	Fuse FUDCPDPSH01A/2N Fails Open (To Bus 18 - Normal)
SH-2	DCPDPSH01A/04	DCCFRS1ADN	Fuse FUDCPDPSH01A/4N Fails Open (To Bus 18 - Norm, Bus 17 - Emerg UV Ctrl Cab)
SH-2	DCPDPSH01A/04	DCCSRS1ADX	Disconnect Switch DCPDPSH01A/04 Transfers Open (To Bus 18 and 17 UV Ctrl Cab)
SH-2	DCPDPSH01A/04	DCCFRS1ADP	Fuse FUDCPDPSH01A/4P Fails Open (To Bus 18 - Norm, Bus 17 - Emerg UV Ctrl Cab)
SH-2	DCPDPSH01B/06	DCCSRS1BFX	Disconnect Switch DCPDPSH01B/06 Transfers Open (To Bus 18 - Emergency)
SH-2	DCPDPSH01B/07	DCCSRS1BGX	Disconnect Switch DCPDPSH01B/07 Transfers Open (To Bus 17 - Normal)
SH-2	DCPDPSH01B/08	DCCSRS1BHX	Disconnect Switch DCPDPSH01B/08 Transfers Open (To Bus 17 - Norm UV Ctrl Cab)
SH-2	DCPDPSH01B/08	DCCFRS1BHP	Fuse FUDCPDPSH01B/8P Fails Open (To Bus 17 - Norm, Bus 18 - Emerg UV Ctrl Cab)
SH-2	DCPDPSH01B/08	DCCFRS1BHN	Fuse FUDCPDPSH01B/8N Fails Open (To Bus 17 - Norm, Bus 18 - Emerg UV Ctrl Cab)
SH-2	FUARA2CC18/11-P	UVCFR7FU11	Fuse #11 (FUARA2CC18/11-P) fails open
SH-2	FUARA2CC18/12-N	UVCFR7FU12	Fuse #12 (FUARA2CC18/12-N) fails open
SH-2	FUARB2CC17/11-P	UVCFR8FU11	Fuse #11 (FUARB2CC17/11-P) fails open
SH-2	FUARB2CC17/12-N	UVCFR8FU12	Fuse #12 (FUARB2CC17/12-N) fails open

6. POTENTIAL RACEWAYS (CONDUITS AND CABLE TRAYS) AND THEIR ASSOCIATED EQUIPMENT/BASIC EVENT(S) IMPACTED BY FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	RACEWAY AFFECTED	EQUIPMENT AFFECTED	CABLE FUNCTION	BASIC EVENT AFFECTED	BASIC EVENT DESCRIPTION
SH-1	C1954	4609	P 480 VAC POWER	SWMVC04609	Service Water Header Isolation MOV 4609 Fails To Close On Demand
SH-1	C1955	4609	C 125 VDC CONTROL	SWMVC04609	Service Water Header Isolation MOV 4609 Fails To Close On Demand
SH-1	C2004	4780	P 480 VAC POWER	SWMVC04780	Service Water Header Isolation MOV 4780 Fails To Close On Demand
SH-1	C2005	4780	C 125 VDC CONTROL	SWMVC04780	Service Water Header Isolation MOV 4780 Fails To Close On Demand
SH-1	E0030	DCPDPCB03A/11	C 125 VDC POWER	DCBDFSCRNA	Screen House DC Distribution Panel 1A (DCPDPSH01A) Local Fault
SH-1	E0030	DCPDPCB03A/11	C 125 VDC POWER	DCCFRC3ALN	Fuse FUDCPDPCB03A/LN Fails Open (To Screen House DC Distribution Panel A)
SH-1	E0031	83/17	C 125 VDC CONTROL/POWER	DCREBBUS17	RELAY 83E/17 (BUS 17 DC THROWOVER) FAILS TO DEENERGIZE
SH-1	E0031	DCPDPSH01A/01	C 125 VDC CONTROL/POWER	DCCSRS1AAX	Disconnect Switch DCPDPSH01A/01 Transfers Open (To Bus 17 - Emergency)
SH-1	E0031A	83/17	P 125 VDC POWER	DCREBBUS17	RELAY 83E/17 (BUS 17 DC THROWOVER) FAILS TO DEENERGIZE
SH-1	E0031A	DCPDPSH01B/07	P 125 VDC POWER	DCCSRS1BGX	Disconnect Switch DCPDPSH01B/07 Transfers Open (To Bus 17 - Normal)
SH-1	E0127	DCPDPCB02B/05	I MISC POWER	DCCFRC2BEN	Fuse FUDCPDPCB02B/5N Fails Open (To Screen House DC Distribution Panel B)
SH-1	E0127	DCPDPCB02B/05	I MISC POWER	DCBDFSCRNB	Screen House DC Distribution Panel 1B (DCPDPSH01B) Local Fault
SH-1	E0159	83/18	P 125 VDC POWER	DCREBBUS18	RELAY 83E/18 (BUS 18 DC THROWOVER) FAILS TO DEENERGIZE
SH-1	E0159	DCPDPSH01B/06	P 125 VDC POWER	DCCSRS1BFX	Disconnect Switch DCPDPSH01B/06 Transfers Open (To Bus 18 - Emergency)
SH-1	E0160	83/18	C	DCREBBUS18	RELAY 83E/18 (BUS 18 DC THROWOVER) FAILS TO DEENERGIZE
SH-1	E0160	DCPDPSH01A/02	C	DCCSRS1ABX	Disconnect Switch DCPDPSH01A/02 Transfers Open (To Bus 18 - Normal)
SH-1	E0160	DCPDPSH01A/02	C	DCCFRS1ABN	Fuse FUDCPDPSH01A/2N Fails Open (To Bus 18 - Normal)
SH-1	E0270	BUS17UV	P 125 VDC POWER	UVLCDTLB2A	BUS 17 UNDERVOLTAGE CONTROL LOGIC BOARD #2 GENERATES A SPURIOUS SIGNAL
SH-1	E0270	BUS17UV	P 125 VDC POWER	UVREK1729B	RELAY 29-B IN BUS 17 UNDERVOLTAGE CIRCUIT TRANSFERS TO ENERGIZED
SH-1	E0270	BUS17UV	P 125 VDC POWER	UVREKBX117	BUS 17 UNDERVOLTAGE RELAY 27BX1/17 TRANSFERS TO ENERGIZED
SH-1	E0270	BUS17UV	P 125 VDC POWER	UVLCDT217A	RELAY 27X2/17 DRIVER (HEAT SINK ASSEMBLY #1) GENERATES A SPURIOUS SIGNAL

Pages B-363 through B-392 are similar and not included to reduce paper volume.

LOCATION CHARACTERISTICS TABLE

FIRE AREA: SH

SH-2	L0763	52/SWP1A	C 125 VDC CONTROL	ACCBN1829C	AC BREAKER 52/SWP1A (BUS18/29C) FAILS TO OPEN
SH-2	L0763	52/SWP1A	C 125 VDC CONTROL	SWMPFSW01A	Service Water Pump PSW01A Fails To Run For The Required Mission Time
SH-2	L0764	52/SWP1C	C 125 VDC CONTROL	ACCBN1829D	AC BREAKER 52/SWP1C (BUS18/29D) FAILS TO OPEN
SH-2	L0764	52/SWP1C	C 125 VDC CONTROL	SWMPFSW01C	Service Water Pump PSW01C Fails To Run For The Required Mission Time
SH-2	L0767	52/MCC1G1	C 125 VDC POWER	ACCBN1830C	AC BREAKER 52/MCC1G1 (BUS18/30C) FAILS TO OPEN
SH-2	L0769	52/18	C 125 VDC CONTROL	DCCFRS18FN	Fuse FUDCPDPSH01B/6N Fails Open (To Bus 18 - Emergency)
SH-2	L0769	52/18	C 125 VDC CONTROL	ACCBR00018	480 VAC Bus 18 Feeder Circuit Breaker 52/18 (BUS18/31B) Transfers open
SH-2	L0769	52/18	C 125 VDC CONTROL	ACCBD1831B	AC BREAKER 52/18 (BUS18/31B) FAILS TO OPERATE
SH-2	L0778	52/17SS	CONTROL	ACT1FSST17	Fault On 4160 / 480 VAC Bus 17 supply Transformer PXSHSS017
SH-2	L0779	52/18SS	CONTROL	ACT1FSST18	Fault On 4160 / 480 VAC Bus 18 supply Transformer PXSHSS018
SH-2	L0781	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
SH-2	L0783	KDG01A	C 125 VDC CONTROL	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN
SH-2	L0785	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN
SH-2	L0787	KDG01B	C 125 VDC CONTROL	DGDGF0001B	DIESEL GENERATOR KDG01B FAILS TO RUN

7. SPATIAL INTERACTIONS ANALYSIS WALKDOWN NOTES:

FIRE ZONE	WALKDOWN NOTES
SH-1	Cable trays (photo B3). 4/2/98 WD Incoming cables all come through east wall. There is an auto water deluge system. There are no significant fire sources, but there are a few fans with hot water heating coils. They would be very unlikely to be able to start a fire in the cables. 5 detectors noted. Small pumps (sump and hypochlorite) in nearby room, but very little intervening combustibles. Also has 6" welded, rod hung natural gas line coming in from outside, and going up to boiler on floor above.
SH-2	4 SW pumps, 8' apart (photos B1, B2). 1 diesel fire pump with 200 gallon diesel fuel tank, 1 auxiliary boiler, 1 M-D fire pump about 20' from diesel fire pump, Bus 18 about 20' behind SW pumps (photo B2). 4/2/98 WD Closed head sprinkler system high up over SW pumps. Fuel oil tank and DG fire pump are in diked area, with outside sump. Bus 17 and 18 have spray shields on openings. Natural gas line from below to house heating boiler. Mod is being made to anchor boiler to prevent seismic interactions.
SH-2	2 circulating water pumps, 2 propane heaters, 3 travelling screens. 4/2/98 WD Not really separate from screen house east, but no significant intervening combustibles. Salamander portable heaters not anchored, but have 6' of flex conduit for natural gas supply. Fixed natural gas piping appears well supported. Not a problem for SW pumps or safety equipment.

LOCATION CHARACTERISTICS TABLE

FIRE AREA: TB

1. FIRE ZONES IN THIS FIRE AREA:

FIRE ZONE	ELEV (FT.)	FIRE ZONE DESCRIPTION	BUILDING	FLOOR AREA (SQ. FT.)
TB-1FP	253' 6"	TURBINE BUILDING BASEMENT LEVEL FEEDPUMP ROOM	TB	2060
TB-1	253' 6"	TURBINE BUILDING BASEMENT LEVEL	TB	30370
TB-2	271'	TURBINE BUILDING MEZZANINE LEVEL	TB	32055
TB-3	289' 6"	TURBINE BUILDING OPERATING LEVEL	TB	32065

2. FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	COMBUSTIBLE LOADING (BTU)	FIRE SEVERITY (HRS)
TB-1FP	17,891	13.4 min.
TB-1	64,548	48.4 min.
TB-2	6,590	4.9 min.
TB-3	16,500	12.4 min.

3. FIRE PROTECTION FEATURES IN THIS FIRE AREA:

FIRE ZONE	FIRE DETECTION FEATURES	FIRE SUPPRESSION FEATURES
TB-1FP		
TB-1		
TB-2		
TB-3		

4. FIRE ZONE(S) ADJACENT TO THE FIRE ZONE(S) IN THIS FIRE AREA:

FIRE ZONE	ADJACENT FIRE ZONE	PATHWAY	PATHWAY RATING (HOUR)
TB-1FP	TB-1	WALL/DOOR	
TB-1FP	SB-1	WALL	3
TB-1	EDG1A-1	WALL/DOOR	3
TB-1	EDG1B-1	WALL/DOOR	3
TB-1	H2	WALL	3
TB-1	TO	WALL/DOOR	3
TB-1	AHR	WALL	2
TB-1	BR1A	WALL	2
TB-1	BR1B	WALL	2
TB-1	CT	WALL	3
TB-1	IBN-1	WALL/DOOR	3
TB-1	SB-1	WALL/DOOR	3
TB-2	SB-2	WALL/DOOR	3
TB-2	RR	WALL	2
TB-2	TSC-1N	WALL/DOOR	3
TB-2	TSC-1M	WALL	3
TB-2	TSC-1S	WALL	3
TB-2	IBN-2	WALL/DOOR	3
TB-3	CR-3	WALL/DOOR	
TB-3	IBN-3	WALL/DOOR	3

5. POTENTIAL KEY EQUIPMENT AND THEIR ASSOCIATED BASIC EVENT(S) IMPACTED BY FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	EQUIPMENT AFFECTED	BASIC EVENT	BASIC EVENT DESCRIPTION
TB-1	4613	SWMVC04613	Service Water Header Isolation MOV 4613 Fails To Close On Demand
TB-1	52/CP1A	Cond 1A	Condensate 1A
TB-1	52/CP1B	Cond 1B	Condensate 1B
TB-1	52/CP1C	Cond 1C	Condensate 1C
TB-1	52/CTP	AFMPFPCD04	Condensate Transfer Pump PCD04 fails to run
TB-1	52/IAC1A	IAAMF_C02A	INSTRUMENT AIR COMPRESSOR A (CIA02A) FAILS TO RUN
TB-1	52/IAC1B	IAAMF_C02B	INSTRUMENT AIR COMPRESSOR B (CIA02B) FAILS TO RUN
TB-1	52/IAC1C	IAAMF_C02C	AIR COMPRESSOR CIA02C FAILS TO RUN

LOCATION CHARACTERISTICS TABLE

FIRE AREA: TB

TB-1	52/SAC	IAAMFCSA02	SERVICE AIR AIR COMPRESSOR CSA02 FAILS TO RUN
TB-1	ACPDPTB02	ACB4FPTB02	Local Fault On 120 VAC Power Distribution Panel ACPDPTB02
TB-1	CSA03	IAAMACSA03	AIR COMPRESSOR CSA03 FAILS TO START
TB-1	DCPDPTB01B	DCBDFTBPNL	Turbine Building DC Distribution Panel (DCPDPTB01B) Local Fault
TB-1	TAOP	DCCSRT1BNX	Disconnect Switch DCPDPTB01B/13 Transfers Open (To TDAFW Pump Oil Pump)
TB-1FP	52/FWP1A	MFMPFFW1A	MFW Pump A fails to run
TB-1FP	52/FWP1B	MFMPFFW1B	MFW Pump B fails to run
TB-2	3976	MFW 3976	Main Feedwater
TB-2	3977	MFW 3977	Main Feedwater
TB-2	4269	MFW 4269	Loss of Main Feedwater
TB-2	4270	MFW 4270	Loss of Main Feedwater
TB-2	52/11A	ACCBD5211A	4160 VAC Circuit Breaker 52/11A (BUS11A/10) Fails To Open on Demand
TB-2	52/11B	ACCBD5211B	4160 VAC Bus 11B Feeder Circuit Breaker 52/11B (BUS11B/22) Fails to Open
TB-2	52/13SS	ACT1FSST13	Fault On 4160 / 480 VAC bus 13 supply Transformer PXTBSS013
TB-2	52/15SS	ACT1FSST15	Fault On 4160 / 480 VAC Bus 15 supply Transformer PXTBSS015
TB-2	52/BTA-A	ACCBD2BTAA	4160 VAC Bus 11A / Bus 12A Tie Breaker 52/BTA-A (BUS11A/11) Fails to Close
TB-2	52/BTB-B	ACCBD2BTBB	4160 VAC Bus 11B Bus 12B Tie Breaker 52/BTB-B (BUS11B/21) Fails To Close
TB-2	52/MCCA	ACCBRMCC1A	480 VAC MCCA Feeder Circuit Breaker 52/MCCA (BUS13/08B) Transfers Open
TB-2	52/MCCB	ACCBRMCC1B	480 VAC MCCB Feeder Circuit Breaker 52/MCCB (BUS15/04A) Transfers Open
TB-2	83/13	DCREBBUS13	RELAY 83E/13 (BUS 13 DC THROWOVER) FAILS TO DEENERGIZE
TB-2	83/15	DCREBBUS15	RELAY 83E/15 (BUS 15 DC THROWOVER) FAILS TO DEENERGIZE
TB-2	ACPDPTB07	ACB4FPTB07	Local Fault On 120 VAC Power Distribution Panel ACPDPTB07
TB-2	AKA02B	ACCBRMB07H	AC CIRCUIT BREAKER MCCB/7H TRANSFERS OPEN (TO BAT RM HEATER AKA2B)
TB-2	BUS11A/11	UVCFRA112N	DC FUSE FUBUS11A/11UV2N FAILS
TB-2	BUS11AUV	UVRUB1/11A	BUS 11A UNDERVOLTAGE RELAY 27-1/11A FAILS TO DEENERGIZE ON DEMAND
TB-2	BUS11AUV	UVCFRA111P	DC FUSE FUBUS11A/11UV1P FAILS
TB-2	BUS11AUV	UVRUB2/11A	BUS 11A UNDERVOLTAGE RELAY 27-2/11A FAILS TO DEENERGIZE ON DEMAND
TB-2	BUS11AUV	UVRUEX111A	BUS 11A UNDERVOLTAGE AUXILIARY RELAY 27X1/11A FAILS TO ENERGIZE ON DEMAND
TB-2	BUS11AUV	UVRUEX211A	BUS 11A UNDERVOLTAGE AUXILIARY RELAY 27X2/11A FAILS TO ENERGIZE ON DEMAND
TB-2	BUS11BUV	UVRUB2/11B	BUS 11B UNDERVOLTAGE RELAY 27-2/11B FAILS TO DEENERGIZE ON DEMAND
TB-2	BUS11BUV	UVRUB1/11B	BUS 11B UNDERVOLTAGE RELAY 27-1/11B FAILS TO DEENERGIZE ON DEMAND
TB-2	BUS11BUV	UVCFRB211P	DC FUSE FUBUS11B/21UV1P FAILS
TB-2	BUS11BUV	UVRUEX111B	BUS 11B UNDERVOLTAGE AUXILIARY RELAY 27X1/11B FAILS TO ENERGIZE ON DEMAND
TB-2	BUS11BUV	UVRUEX211B	BUS 11B UNDERVOLTAGE AUXILIARY RELAY 27X2/11B FAILS TO ENERGIZE ON DEMAND
TB-2	MFPXA AUX RELAYS	ACCTNFWPA1	MFW PUMP 1A BREAKER AUX CONTACT 11-12 FAILS TO CLOSE ON PUMP TRIP
TB-2	MFPXB AUX RELAYS	ACCTNFWPA2	MFW PUMP 1A BREAKER AUX CONTACT 19-20 FAILS TO CLOSE
TB-3	TURB TRIP AUX RELAYS	MSPSD34AST	PRESSURE SWITCH 63-4/AST FAILS TO RESPOND
TB-3	TURB TRIP AUX RELAYS	MSPSD33AST	PRESSURE SWITCH 63-3/AST FAILS TO RESPOND
TB-3	TURB TRIP AUX RELAYS	MSPSD35AST	PRESSURE SWITCH 63-5/AST FAILS TO RESPOND

6. POTENTIAL RACEWAYS (CONDUITS AND CABLE TRAYS) AND THEIR ASSOCIATED EQUIPMENT/BASIC EVENT(S) IMPACTED BY FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	RACEWAY AFFECTED	EQUIPMENT AFFECTED	CABLE FUNCTION	BASIC EVENT AFFECTED	BASIC EVENT DESCRIPTION
TB-1	C0273	3977	P 480 VAC POWER	MFW 3977	Main Feedwater
TB-1	C0274	3977	C 125 VDC CONTROL	MFW 3977	Main Feedwater
TB-1	C0275	3977	C 125 VDC CONTROL	MFW 3977	Main Feedwater
TB-1	C0471	52/CTP	P 480 VAC POWER	AFMPFPCD04	Condensate Transfer Pump PCD04 fails to run
TB-1	C0500	CVTA2	P 480 VAC POWER	IBT6FCVT1B	Instrument Bus D (IBPDPCBDY) Constant Voltage Transformer CVTA2 Fails
TB-1	C0500	IBPDPCBDY	P 480 VAC POWER	IBB4FBUS1D	120 VAC Instrument Bus D (IBPDPCBDY) Bus Faults
TB-1	C0504	3976	P 480 VAC POWER	MFW 3976	Main Feedwater
TB-1	C0506	3976	C 125 VDC CONTROL	MFW 3976	Main Feedwater
TB-1	C0895	4613	P 480 VAC POWER	SWMVC04613	Service Water Header Isolation MOV 4613 Fails To Close On Demand

Pages B-396 through B-404 are similar and not included to reduce paper volume.

LOCATION CHARACTERISTICS TABLE

FIRE AREA: TB

TB-2	R0770	4270	C 125 VDC CONTROL	MFW 4270	Loss of Main Feedwater
TB-2	R0771	4270	C 125 VDC CONTROL	MFW 4270	Loss of Main Feedwater
TB-2	R0782	4269	C 125 VDC POWER	MFW 4269	Loss of Main Feedwater
TB-2	R0782	4270	C 125 VDC POWER	MFW 4270	Loss of Main Feedwater
TB-2	R0783	4269	C 125 VDC POWER	MFW 4269	Loss of Main Feedwater
TB-2	R0832	PT-485	I RPS CHANNEL 2 (WHITE)	PT-485	PRESSURE TRANSMITTER TURBINE 1ST STAGE
TB-2	R0852	PT-486	I ANALOG SIGNAL	PT-486	PRESSURE TRANSMITTER TURBINE 1ST STAGE
TB-3	G0084A	3544	C 125 VDC CONTROL	MSSZC03544	Main Steam Stop Valve Limit Switch 33/3544 Fails To Close On Demand
TB-3	G0084A'	62SV	C 125 VDC CONTROL	MSRTD062SV	Turbine Stop Valves Timer Relay 62SV Fails On Demand
TB-3	G0091A	3545	C 125 VDC CONTROL	MSSZC03545	Main Steam Stop Valve Limit Switch 33/3545 Fails To Close On Demand

7. SPATIAL INTERACTIONS ANALYSIS WALKDOWN NOTES:

FIRE ZONE	WALKDOWN NOTES
TB-1FP	Feedwater pumps, each with its own oil tank (Photo B4). 4/2/98 WD Enclosed area. Lube oil on FW pump is sealed.
TB-1	3 IA compressors, service air compressor, IA dryers, all near east wall. 3 condensate pumps just northeast of main condenser B. 4/2/98 WD H2 line from H2 storage travels to generaltor area, but is not close to critical safety equipment. Critical cables also travel S to N along Eastern part of building.
TB-1	Several small pumps including vacuum priming pumps, MCC 1A. 4/2/98 WD Turbine lube oil area (center-west)has fire water system, and is diked. Portable IA compressor outside North side of bldg, with wheels blocked and long flex line.
TB-1	3 condensate booster pumps about 12' apart. 4/2/98 WD H2 seal oil unit in enclosure with 1 hr walls, and roll down fire doors, and fire water system. SE corner has cables for main buses on floor above. TSC to battery A and B manual throwover switch is by stairwell in SE corner.
TB-1	S-G blowdown flash tank and pump. 4/2/98 WD H2 in cylinders is low concentration for calibration, only one restraining chain per cylinder.
TB-2	Condensate heaters. 4/2/98 WD H2 cylinders and H2 hazard area by generator area. No significant safety equipment around.
TB-2	EH system (pumps and reservoir). 4/2/98 WD turbine lube oil area has fire water protection.
TB-2	Bus 11, bus 12, bus 13, bus 15, MCC 1B. 4/2/98 WD Incoming offsite power is enclosed in steel "box conduit" for explosion protection.
TB-2	Main steam header.Feedwater regulating valves near south wall. 4/2/98 WD Fire water protection for lube oil inside guard pipe (rod hung--seems OK).
TB-3	Generator and exciter.
TB-3	HP turbine, 2 LP turbines.

LOCATION CHARACTERISTICS TABLE

FIRE AREA: TO

1. FIRE ZONES IN THIS FIRE AREA:

FIRE ZONE	ELEV (FT.)	FIRE ZONE DESCRIPTION	BUILDING	FLOOR AREA (SQ. FT.)
TO	253' 6"	TURBINE OIL STORAGE ROOM	TO	1760

2. FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

FIRE ZONE	COMBUSTIBLE LOADING (BTU)	FIRE SEVERITY (HRS)
TO	1,886,364	23.6 hrs.

3. FIRE PROTECTION FEATURES IN THIS FIRE AREA:

FIRE ZONE	FIRE DETECTION FEATURES	FIRE SUPPRESSION FEATURES
TO		

4. FIRE ZONE(S) ADJACENT TO THE FIRE ZONE(S) IN THIS FIRE AREA:

FIRE ZONE	ADJACENT FIRE ZONE	PATHWAY	PATHWAY RATING (HOUR)
TO	EDG1A-1	WALL	3
TO	TB-1	WALL/DOOR	3

5. POTENTIAL KEY EQUIPMENT AND THEIR ASSOCIATED BASIC EVENT(S) IMPACTED BY FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

6. POTENTIAL RACEWAYS (CONDUITS AND CABLE TRAYS) AND THEIR ASSOCIATED EQUIPMENT/BASIC EVENT(S) IMPACTED BY FIRE/SMOKE HAZARDS IN THIS FIRE AREA:

7. SPATIAL INTERACTIONS ANALYSIS WALKDOWN NOTES:

FIRE ZONE	WALKDOWN NOTES
TO	At northeast wall of turbine building, between diesel building and hydrogen storage area. Turbine lube oil storage tank. 4/2/98 WD did not walkdown. 3 hr fire rating. Fully sprinklered.

E. PROPAGATION PATHWAY CREDIBILITY ASSESSMENT

The spatial interactions analysis conservatively assumes that the occurrence frequency of both the localized scenario and propagation scenario(s) developed from a fire zone are equal to the fire occurrence frequency apportioned to that fire zone. Furthermore, the localized scenarios assume that any fire occurring within a fire zone will damage all components and raceways within that fire zone. These are obviously conservative assumptions because the fire occurrence frequency apportioned to a fire zone accounts for all fires initiated by the fire sources within the fire zone. Thus, the sum of the occurrence frequencies of the localized and propagation scenarios developed for a fire zone should be equal to the fire occurrence frequency apportioned to that fire zone. Also, only a very small fraction of fires initiated in a given location will have energy significant enough to damage all components and raceways within the location without being detected or controlled before the damage occurs.

For propagation scenarios, if one assumes that any fire occurring within a fire zone can propagate in all directions to the adjacent fire zones, there can be an enormous, unmanageable number of propagation scenarios developed. Since not all fire propagation pathways are credible, the spatial interactions analysis considers only propagation scenarios that involve credible propagation pathways.

The fire zone adjacency matrix was first developed to identify possible propagation pathways (see the Location Characteristics Tables, Appendix A). Screening criteria were developed to qualitatively screen the credibility of potential propagation pathways. Propagation scenarios were then developed for pathways that satisfy the screening criteria. The scenario table lists the propagation scenarios developed for the initial fire zones.

This appendix presents the evaluation of the credibility of propagation pathways. The screening criteria are first described. Justifications to the screening criteria are then provided.

E.1 PROPAGATION CRITERIA

In the spatial interactions analysis, a propagation pathway was assumed to be credible only if one of the following criteria were satisfied:

1. There is a permanent opening between the fire zones, and there is no automatic suppression system in the initial fire zone or in the adjacent fire zone.

2. The fire duration of the combustible contents in the initial fire zone is greater than 75% of the rating of the fire barrier (e.g., door, wall, etc.) separating the initial fire zone and its adjacent fire zones, and there is no automatic fire suppression system.

The first criterion is obviously conservative because it does not consider the actual amount of combustible inventory, the location of the fire source, the presence of automatic fire suppression system, and the separation distance between the fire source and combustibles in the adjacent location(s).

The second criterion takes into consideration the failure of fire barriers; e.g., fire door being left open. The fire duration and barrier ratings for each fire zone are taken from Reference E-1 and are summarized in the Location Characteristics Tables.

E.2 COMBUSTIBLE INVENTORY AND FIRE BARRIER FAILURE RATE

The combustible inventory denotes the maximum allowable combustible loading within a fire zone. In reality, the actual inventory may be less than the maximum allowable amount. The second criterion suggests that if the combustible inventory fire severity is less than 75% of the barrier rating, then there will not be a propagation pathway between fire zones. In order to have a fire propagation pathway if the fire duration is less than 75% of the barrier, the barrier must fail due to random failure (fail before the rated time on demand).

The generic industry failure rate for fire barriers is approximately 10^{-3} per year. There are approximately 81 rated fire doors and 2,540 fire seals at the Ginna site (see Appendix F). To date, there have been no failures of Fire Doors, Fire Dampers or Penetration Seals that have not been promptly detected during plant tours. Compensatory and corrective actions have been prompt and appropriate for the circumstance.

The accessible fire zones are visited by plant personnel frequently and the plant personnel are trained to operate the fire door correctly. It is very unlikely that a fire door would be left open and uncorrected for an extended period of time. Using an average mean exposure time of a fire door of 4 hours that a door is left open, and an average failure rate of 1.0E-03 per door-yr, the unavailability of a fire door is estimated to be less than 5.0E-07. Thus, fire propagation via fire barriers due to random failures is insignificant.

E.3 FIRE BARRIER RATING AND FIRE SUPPRESSION SYSTEM

The second criterion suggests that, if the fire duration of the combustible contents in the initial fire zone is less than 75% of the rating of the barrier (e.g., door, wall, etc.) separating the initial fire zone and its adjacent fire zones, fire propagation from the initial fire zone to its adjacent fire zones is not credible. This assumption is valid for the same reason presented in Section E.2.

If the fire duration of the combustible contents in the initial fire zone is greater than 75% of the rating of the fire barrier (e.g., door, wall, etc.) separating the initial fire zone and its adjacent fire zones and there is an automatic fire suppression system at either side of the barrier, fire propagation between the initial fire zone and its adjacent fire zones is also not credible.

For locations where the combustible loading fire severity is greater than 75% of the barrier rating (or the total rating), the presence of an automatic fire suppression (and plant personnel) would detect the initiation of any fire within the barrier's rated time (for most locations, it is at least 1 hour). The actuation of the automatic fire suppression system (although it may not suppress the fire) would alarm the operators such that manual suppression efforts and recovery actions can be initiated in a timely manner. Thus, the chance that a fire with sufficient energy to damage multiple cable trains (or components) is left undetected (directly or indirectly via other instruments) and uncontrolled for a period longer than the barrier rating (typically, longer than an hour) is incredible. Therefore, the second criterion is valid for propagation pathway screening during the spatial interactions analysis.

E.4 LEVEL OF PROPAGATION PATHS

The analysis considered fire propagation between locations for more than one level. (Level 1 propagation involves one initial fire zone and fire zone(s) directly adjacent to it through a credible propagation pathway. A level two fire propagation involves one initial fire zone, the fire zone(s) directly adjacent to it, and the fire zone(s) that are adjacent to the level one fire zone(s). No scenarios were identified that could be considered two-level propagation scenarios.

In order for a fire to initiate at the initial fire zone and propagate to level two fire zones, the fire will have to propagate through two fire barriers. The time required to burn through two fire barriers will be at least 2 hours (assuming each barrier is at least one hour-rated). The mean generic fire suppression time for most fires is 40 minutes (estimated by Sandia). A survey of past fire drills at Ginna is shown in Table E-1. This indicates that the longest total duration of a drill was less than 50 minutes. It is reasonable then, to assume that the longest response time at Ginna (regardless of the location) is less than 50 minutes.* Therefore, it is expected that the fire brigade will start fire-fighting efforts at the initial fire zone and the Level 1 locations, and response to the Level 2 locations to start cooling the pathways between Level 1 and Level 2 locations. Thus, the probability of a fire allowed to propagated to Level 2 fire zones is negligible. As a result, all propagation scenarios involving Level 2 propagation or higher were also screened from the analysis.

E.5 EVALUATION OF PATHWAY CREDIBILITY

Table E-2 presented in this Appendix summarizes the results of the propagation pathway credibility evaluation and contains 12 columns:

1. **Fire Zone.** This column lists the fire zones that survived the preliminary screening.

2. **Fire Severity (Hours).** This column denotes the fire severity (in terms of fire duration) of the fire zone. This information is taken from the Fire Hazard Analysis.

3. **Primary Suppression Type.** This column denotes whether an automatic fire suppression system exists in the initial fire zone. This information is taken from the Fire Hazard Analysis.

* Drill is considered to be terminated when the fire is extinguished and the crew is ready to fight another fire.

4. **Suppression Actuation Method.** This column indicates whether the fire suppression system actuation is automatic or manual.

5. **Adjacent Fire Zone.** This column lists the fire zone adjacent to the initial fire zone.

6. **Barrier.** This column gives information about the type of structure that separates the adjacent fire zones.

7. **Barrier Rating.** This column describes the barrier rating of the pathway separating the initial fire zone and its adjacent fire zone. This information is taken from the Fire Hazard Analysis.

8. **Permanent Opening.** This column denotes whether there is a permanent opening between the initial fire zone and its adjacent fire zone. This information is taken from the Fire Hazard Analysis, plant drawings and walkdown notes.

9. **Fire Duration ≥ Rating*0.75.** This column evaluates whether the fire severity (listed in Column 2) is less than or equal to 75% of the barrier rating (listed in Column 5).

10. **Auto FSS Exists.** This column states whether there is automatic fire suppression system in either the initial fire zone or the adjacent fire zone.

11. **Criterion 1.** This column evaluates whether screening criterion 1 (see Section E.1) is satisfied.

12. **Criterion 2.** This column evaluates whether screening criterion 2 (see Section E.1) is satisfied.

13. **Localized Fire.** This column evaluates whether there is a credible propagation pathway between the initial fire zone and its adjacent fire zone. The column shows "YES" if either Column 11 or 12 contains a "TRUE".

14. **Notes.** This column contains additional notes about the propagation pathway.

E.6 REFERENCES

1. Ginna Station Fire Combustible Loading Analysis, DA-ME-98-004, Revision 0, April 3, 1998

Table E-1

Ginna Fire Drills

No.	Date	Location	Type*	Time of Alarm	Time Drill Completed	Duration Minutes	Weaknesses	Other Notes
1	27-Jul-97	EDG1A	P	18:14	18:21	7	None	
2	14-Jun-97	TY-??	P	10:40	11:27	47	Communication difficult with radios	
3	12-Jun-97	TB-1	S	17:47	18:02	15	Communications, Captain did not have turnout gear on	Main Feedwater pump room
4	3-Jun-97	IBN-0	S	17:34	17:52	18	Communication difficult due to poor transmission, did not shut door to Main Feed pump room	Main Feed pump room supply/storage area
5	24-May-97	IBN-0	S	10:06	10:21	15	Communications, Turnout gear usage 'rusty'	Main Feedwater pump room
6	19-May-97	IBN-0	P	17:37	17:48	11	None	
7	14-May-97	IBN-0	P	19:05	19:17	12	SCBAs make communications a problem	East of MDAFWPs
8	9-May-97	IBN-0	S	21:05	21:19	14	Hose reel rewinding	
9	19-Mar-97	TSC-IS	S	21:36	21:48	12	None	Diesel room
10	14-Mar-97	TSC-IS	S	1:28	1:39	11	Proper checking of adjacent rooms for fire spreading and damage	Diesel room

Table E-1

Ginna Fire Drills (Continued)

No.	Date	Location	Type*	Time of Alarm	Time Drill Completed	Duration Minutes	Weaknesses	Other Notes
11	9-Mar-97	TSC-IS	P	11:32	11:43	11	Captain should stay father away from fire	Diesel room
12	22-Feb-97	TSC-IS	S	8:52	9:05	13	Captain too close to scene without gear	Diesel room
13	21-Feb-97	TSC-IS	S	3:37	3:49	12	Radio communication problem	Diesel room
14	15-Feb-97	TSC-IS	P	10:42	10:58	16	None	Diesel room
15	1-Feb-97	TSC-IS	S	9:36	9:49	13	Captain didn't stand clear of area	Diesel room
16	10-Jan-97	SB-1	S	1:33	1:42	9	None	
17	22-Dec-96	SB-1	S	20:40	20:48	8	None	
18	19-Dec-96	SB-1	S	4:40	4:48	8	Captain slow to shut overhead door	Personal lockers
19	15-Dec-96	SB-1	S	18:49	19:06	17	Should have run hose line, PCN submitted for communications	
20	8-Dec-96	SB-1	S	13:05	13:24	19	Captain too involved; communications need to be better	
21	2-Dec-96	SB-1	S	16:13	16:29	16	Could have ventilated a little sooner	
22	26-Nov-96	SB-1	S	16:43	16:53	10	Took too much time to open personnel locker	Personal lockers

Table E-1

Ginna Fire Drills (Continued)

No.	Date	Location	Type*	Time of Alarm	Time Drill Completed	Duration Minutes	Weaknesses	Other Notes
23	29-Sep-96	SH-2	S	12:57	13:04	7	None	"D" Service water pump
24	26-Sep-96	SH-2	S	3:54	4:08	14	None	"D" Service water pump
25	25-Sep-96	SH-2	S	17:16	17:26	10	None	
26	14-Sep-96	SH-2	S	17:49	17:58	9	None	SW Pump Area
27	13-Sep-96	SH-2	P	3:36	3:45	9	None	"C" Service water pump
28	25-Jul-96	EDG1A	S	8:57	9:10	13	Brigade did not bring enough equipment to scene	
* P Preannounced S Surprise								

Table E-2

Fire Propogation Table for Ginna Nuclear Power Plant

Fire Zone	Fire Severity (Hours)	Primary Suppression Type	Suppression Actuation Method	Adjacent Fire Zone	Barrier	Barrier Rating (Hours)	Permanent Opening	Fire Duration > 0.75 * Rating	Auto FSS Exists	Criterion 1	Criterion 2	Localized Fire	Notes
ABB	0.75	Preaction sprinklers	Auto	CHG	Wall/Open	3	TRUE	FALSE	TRUE	FALSE	FALSE	TRUE	
ABB	0.75	Preaction sprinklers	Auto	IBS-0	Wall		FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	1
ABB	0.75	Preaction sprinklers	Auto	RC-1	Wall	3	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
ABM	0.75	Preaction sprinklers	Auto	IBS-1	Wall	3	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
ABM	0.75	Preaction sprinklers	Auto	RC-2	Wall	3	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
ABM	0.75	Preaction sprinklers	Auto	SB-1	Wall	3	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
ABO	0.75	None	N/A	IBS-2	Wall	3	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
ABO	0.75	None	N/A	N2	Wall	3	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
ABO	0.75	None	N/A	RC-3	Wall	3	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
ABO	0.75	None	N/A	SAF	Wall	3	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
ABO	0.75	None	N/A	SB-2	Wall	3	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	

Notes:

7. The analysis assumes that a fire cannot propagate through concrete walls or steel hatches.
8. Fire barrier is a block wall and locked door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
9. Fire barrier is a block wall and a door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
10. No additional impacts due to propagation of fire.
11. Charging pump room is almost completely enclosed by concrete walls. The main combustible in the charging room is oil and the concrete curbs around each pump are designed to contain any spilled oil. Propagation out of the charging pump room is assumed to be incredible.
12. The nearest combustible material is the lube oil for the main turbine lube oil cooler which is protected by an automatic fire sprinkler system, and is physically separated from the feed pump room door. Fire propagation is assumed to be incredible.

Table E-2

Fire Propogation Table for Ginna Nuclear Power Plant (Continued)

Fire Zone	Fire Severity (Hours)	Primary Suppression Type	Suppression Actuation Method	Adjacent Fire Zone	Barrier	Barrier Rating (Hours)	Permanent Opening	Fire Duration > 0.75 * Rating	Auto FSS Exists	Criterion 1	Criterion 2	Localized Fire	Notes
IBN-1	1.50	Preaction sprinklers	Auto	CT	Wall	3	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
IBN-1	1.50	Preaction sprinklers	Auto	IBS-1	Wall/Door	0	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	
IBN-1	1.50	Preaction sprinklers	Auto	RC-2	Wall	3	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
IBN-1	1.50	Preaction sprinklers	Auto	SB-1	Wall/Door	3	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
IBN-1	1.50	Preaction sprinklers	Auto	SB-1HS	Wall/Door	3	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
IBN-1	1.50	Preaction sprinklers	Auto	TB-1	Wall/Door	3	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
IBN-2	0.75	Preaction sprinklers	Auto	IBS-2	Wall/Door	0	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	
IBN-2	0.75	Preaction sprinklers	Auto	RC-3	Wall	3	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
IBN-2	0.75	Preaction sprinklers	Auto	SB-2	Wall	3	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	

Notes:

1. The analysis assumes that a fire cannot propagate through concrete walls or steel hatches.
2. Fire barrier is a block wall and locked door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
3. Fire barrier is a block wall and a door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
4. No additional impacts due to propagation of fire.
5. Charging pump room is almost completely enclosed by concrete walls. The main combustible in the charging room is oil and the concrete curbs around each pump are designed to contain any spilled oil. Propagation out of the charging pump room is assumed to be incredible.
6. The nearest combustible material is the lube oil for the main turbine lube oil cooler which is protected by an automatic fire sprinkler system, and is physically separated from the feed pump room door. Fire propagation is assumed to be incredible.

Table E-2

Fire Propogation Table for Ginna Nuclear Power Plant (Continued)

Fire Zone	Fire Severity (Hours)	Primary Suppression Type	Suppression Actuation Method	Adjacent Fire Zone	Barrier	Barrier Rating (Hours)	Permanent Opening	Fire Duration > 0.75 * Rating	Auto FSS Exists	Criterion 1	Criterion 2	Localized Fire	Notes
IBN-2	0.75	Preaction sprinklers	Auto	TB-2	Wall	3	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
IBN-3	0.75	Preaction sprinklers	Auto	IBS-3	Wall/Door	0	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	
IBN-3	0.75	Preaction sprinklers	Auto	TB-3	Wall	3	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
IBN-4	0.75	Preaction sprinklers	Auto	TB-3	Wall	3	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
IBS-1	0.75	None	N/A	ABM	Wall	3	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
IBS-1	0.75	None	N/A	IBN-1	Wall/Door	0	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	2
IBS-1	0.75	None	N/A	RC-2	Wall	3	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
IBS-1	0.75	None	N/A	SB-1HS	Wall/Door	3	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
IBS-1	0.75	None	N/A	SB-1WT	Wall	3	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
IBS-2	0.75	None	N/A	ABO	Wall	3	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
IBS-2	0.75	None	N/A	IBN-2	Wall/Door	0	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	2
IBS-2	0.75	None	N/A	RC-3	Wall	3	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	

Notes:

1. The analysis assumes that a fire cannot propagate through concrete walls or steel hatches.
2. Fire barrier is a block wall and locked door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
3. Fire barrier is a block wall and a door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
4. No additional impacts due to propagation of fire.
5. Charging pump room is almost completely enclosed by concrete walls. The main combustible in the charging room is oil and the concrete curbs around each pump are designed to contain any spilled oil. Propagation out of the charging pump room is assumed to be incredible.
6. The nearest combustible material is the lube oil for the main turbine lube oil cooler which is protected by an automatic fire sprinkler system, and is physically separated from the feed pump room door. Fire propagation is assumed to be incredible.

Table E-2

Fire Propogation Table for Ginna Nuclear Power Plant (Continued)

Fire Zone	Fire Severity (Hours)	Primary Suppression Type	Suppression Actuation Method	Adjacent Fire Zone	Barrier	Barrier Rating (Hours)	Permanent Opening	Fire Duration > 0.75 * Rating	Auto FSS Exists	Criterion 1	Criterion 2	Localized Fire	Notes
IBS-2	0.75	None	N/A	SB-2	Wall	3	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
IBS-3	0.75	None	N/A	IBN-3	Wall/Door	0	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	3
IBS-3	0.75	None	N/A	RC-3	Wall	3	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
N2	0.00	None	N/A	ABO	Wall	3	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
AVT	0.75			TB-1	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TSC-1M	0.75			TB-2	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TSC-1M	0.75			TSC-1N	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TSC-1M	0.75			TSC-1S	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TSC-1N	0.75			TB-2	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TSC-1N	0.75			TSC-1M	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TSC-1S	0.75			RR	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TSC-1S	0.75			TB-2	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TSC-1S	0.75			TSC-1M	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	
BR1A	0.75	None	N/A	AHR	Wall	2	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
BR1A	0.75	None	N/A	BR1B	Wall/Door	2	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	

Notes:

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2. Fire barrier is a block wall and locked door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
3. Fire barrier is a block wall and a door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
4. No additional impacts due to propagation of fire.
5. Charging pump room is almost completely enclosed by concrete walls. The main combustible in the charging room is oil and the concrete curbs around each pump are designed to contain any spilled oil. Propagation out of the charging pump room is assumed to be incredible.
6. The nearest combustible material is the lube oil for the main turbine lube oil cooler which is protected by an automatic fire sprinkler system, and is physically separated from the feed pump room door. Fire propagation is assumed to be incredible.

Table E-2

Fire Propogation Table for Ginna Nuclear Power Plant (Continued)

Fire Zone	Fire Severity (Hours)	Primary Suppression Type	Suppression Actuation Method	Adjacent Fire Zone	Barrier	Barrier Rating (Hours)	Permanent Opening	Fire Duration > 0.75 * Rating	Auto FSS Exists	Criterion 1	Criterion 2	Localized Fire	Notes
BR1A	0.75	None	N/A	TB-1	Wall	2	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
BR1B	0.75	None	N/A	BR1A	Wall/Door	2	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
BR1B	0.75	None	N/A	TB-1	Wall	2	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
BR1B-CV				BR1B	Concrete floor							TRUE	1
AHR	1.50	Auto Water Spray	Auto	BR1A	Wall	2	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
AHR	1.50	Auto Water Spray	Auto	CT	Smoke Barrier	0	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	
AHR	1.50	Auto Water Spray	Auto	TB-1	Wall	2	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
BRRM	1.50	None	N/A	RR	Wall/Door	2	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
CR-3	0.75	None	N/A	TB-3	Wall/Door	0	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	4
RR	3.00	Auto Halon Systems,Manual Sprinkler	Auto,Manual	BRRM	Wall/Door	2	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	

Notes:

1. The analysis assumes that a fire cannot propagate through concrete walls or steel hatches.
2. Fire barrier is a block wall and locked door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
3. Fire barrier is a block wall and a door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
4. No additional impacts due to propagation of fire.
5. Charging pump room is almost completely enclosed by concrete walls. The main combustible in the charging room is oil and the concrete curbs around each pump are designed to contain any spilled oil. Propagation out of the charging pump room is assumed to be incredible.
6. The nearest combustible material is the lube oil for the main turbine lube oil cooler which is protected by an automatic fire sprinkler system, and is physically separated from the feed pump room door. Fire propagation is assumed to be incredible.

Table E-2

Fire Propogation Table for Ginna Nuclear Power Plant (Continued)

Fire Zone	Fire Severity (Hours)	Primary Suppression Type	Suppression Actuation Method	Adjacent Fire Zone	Barrier	Barrier Rating (Hours)	Permanent Opening	Fire Duration > 0.75 * Rating	Auto FSS Exists	Criterion 1	Criterion 2	Localized Fire	Notes
RR	3.00	Auto Halon Systems,Manual Sprinkler	Auto,Manual	RRA	Wall	0	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	
RR	3.00	Auto Halon Systems,Manual Sprinkler	Auto,Manual	TB-2	Wall	2	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	
RR	3.00	Auto Halon Systems,Manual Sprinkler	Auto,Manual	TSC-1S	Wall	3	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	
RRA	0.00	Manual CO2	Manual	RR	Wall	0	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
CHG	0.75			ABB	Wall/Open	3	TRUE	FALSE		TRUE	FALSE	FALSE	5
CT	3.75	Auto Deluge	Auto	AHR	Smoke Barrier	0	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	
CT	3.75	Auto Deluge	Auto	IBN-1	Wall	3	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	
CT	3.75	Auto Deluge	Auto	TB-1	Wall	3	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	
EDG1A-1	0.75			EDG1B-1	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	

Notes:

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2. Fire barrier is a block wall and locked door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
3. Fire barrier is a block wall and a door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
4. No additional impacts due to propagation of fire.
5. Charging pump room is almost completely enclosed by concrete walls. The main combustible in the charging room is oil and the concrete curbs around each pump are designed to contain any spilled oil. Propagation out of the charging pump room is assumed to be incredible.
6. The nearest combustible material is the lube oil for the main turbine lube oil cooler which is protected by an automatic fire sprinkler system, and is physically separated from the feed pump room door. Fire propagation is assumed to be incredible.

Table E-2

Fire Propogation Table for Ginna Nuclear Power Plant (Continued)

Fire Zone	Fire Severity (Hours)	Primary Suppression Type	Suppression Actuation Method	Adjacent Fire Zone	Barrier	Barrier Rating (Hours)	Permanent Opening	Fire Duration > 0.75 * Rating	Auto FSS Exists	Criterion 1	Criterion 2	Localized Fire	Notes
EDG1A-0				EDG1A-1	Steel Hatch		FALSE					TRUE	1
EDG1A-1	0.75			TB-1	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	
EDG1A-1	0.75			TO-1	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
EDG1B-1	1.50	Auto Water Spray	Auto	EDG1A-1	Wall	3	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
EDG1B-0				EDG1B-1	Steel Hatch							TRUE	1
EDG1B-0				EDG1A-X	Wall		TRUE					TRUE	1
EDG1B-1	1.50	Auto Water Spray	Auto	TB-1	Wall/Door	3	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
H2	0.75			TB-1	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
H2	0.75			TO-1	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
RC-1	0.75			ABB	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
RC-1	0.75			IBN-0	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	

Notes:

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2. Fire barrier is a block wall and locked door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
3. Fire barrier is a block wall and a door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
4. No additional impacts due to propagation of fire.
5. Charging pump room is almost completely enclosed by concrete walls. The main combustible in the charging room is oil and the concrete curbs around each pump are designed to contain any spilled oil. Propagation out of the charging pump room is assumed to be incredible.
6. The nearest combustible material is the lube oil for the main turbine lube oil cooler which is protected by an automatic fire sprinkler system, and is physically separated from the feed pump room door. Fire propagation is assumed to be incredible.

Table E-2

Fire Propogation Table for Ginna Nuclear Power Plant (Continued)

Fire Zone	Fire Severity (Hours)	Primary Suppression Type	Suppression Actuation Method	Adjacent Fire Zone	Barrier	Barrier Rating (Hours)	Permanent Opening	Fire Duration > 0.75 * Rating	Auto FSS Exists	Criterion 1	Criterion 2	Localized Fire	Notes
RC-1	0.75			IBS-0	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
RC-2	0.75			ABM	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
RC-2	0.75			IBN-1	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
RC-2	0.75			IBS-1	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
RC-3	0.75			ABO	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
RC-3	0.75			IBN-2	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
RC-3	0.75			IBS-2	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
SAF	0.75			ABO	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
SB-1	0.75	Dry chemical, CO2, Water	Manual	ABM	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
SB-1	0.75	Dry chemical, CO2, Water	Manual	IBN-1	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	
SB-1	0.75	Dry chemical, CO2, Water	Manual	IBS-1	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
SB-1	0.75	Dry chemical, CO2, Water	Manual	SB-1HS	Wall/Door	0	FALSE	TRUE		FALSE	TRUE	FALSE	4

Notes:

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2. Fire barrier is a block wall and locked door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
3. Fire barrier is a block wall and a door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
4. No additional impacts due to propagation of fire.
5. Charging pump room is almost completely enclosed by concrete walls. The main combustible in the charging room is oil and the concrete curbs around each pump are designed to contain any spilled oil. Propagation out of the charging pump room is assumed to be incredible.
6. The nearest combustible material is the lube oil for the main turbine lube oil cooler which is protected by an automatic fire sprinkler system, and is physically separated from the feed pump room door. Fire propagation is assumed to be incredible.

Table E-2

Fire Propogation Table for Ginna Nuclear Power Plant (Continued)

Fire Zone	Fire Severity (Hours)	Primary Suppression Type	Suppression Actuation Method	Adjacent Fire Zone	Barrier	Barrier Rating (Hours)	Permanent Opening	Fire Duration > 0.75 * Rating	Auto FSS Exists	Criterion 1	Criterion 2	Localized Fire	Notes
SB-1	0.75	Dry chemical, CO2, Water	Manual	SB-1WT	Wall/Door	0	FALSE	TRUE		FALSE	TRUE	FALSE	4
SB-1	0.75	Dry chemical, CO2, Water	Manual	TB-1	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	
SB-1	0.75	Dry chemical, CO2, Water	Manual	TB-1FP	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
SB-1HS	0.75	Dry chemical, CO2	Manual	IBN-1	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	
SB-1HS	0.75	Dry chemical, CO2	Manual	IBS-1	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
SB-1HS	0.75	Dry chemical, CO2	Manual	SB-1	Wall/Door	0	FALSE	TRUE		FALSE	TRUE	FALSE	4
SB-1WT	0.75	Dry chemical	Manual	SB-1	Open	0	FALSE	TRUE		FALSE	TRUE	FALSE	4
SB-2	1.50	Dry chemical, CO2, Water	Manual	IBN-2	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	
SB-2	1.50	Dry chemical, CO2, Water	Manual	IBS-2	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	

Notes:

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2. Fire barrier is a block wall and locked door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
3. Fire barrier is a block wall and a door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
4. No additional impacts due to propagation of fire.
5. Charging pump room is almost completely enclosed by concrete walls. The main combustible in the charging room is oil and the concrete curbs around each pump are designed to contain any spilled oil. Propagation out of the charging pump room is assumed to be incredible.
6. The nearest combustible material is the lube oil for the main turbine lube oil cooler which is protected by an automatic fire sprinkler system, and is physically separated from the feed pump room door. Fire propagation is assumed to be incredible.

Table E-2

Fire Propogation Table for Ginna Nuclear Power Plant (Continued)

Fire Zone	Fire Severity (Hours)	Primary Suppression Type	Suppression Actuation Method	Adjacent Fire Zone	Barrier	Barrier Rating (Hours)	Permanent Opening	Fire Duration > 0.75 * Rating	Auto FSS Exists	Criterion 1	Criterion 2	Localized Fire	Notes
SB-2	1.50	Dry chemical, CO2, Water	Manual	TB-2	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	
SH-1	0.75	Auto Sprinklers	Auto	SH-2	Stairwell	0	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	
TB-1	1.50			AHR	Wall	2	FALSE	FALSE		FALSE	FALSE	TRUE	
TB-1	1.50			AVT	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TB-1	1.50			BR1A	Wall	2	FALSE	FALSE		FALSE	FALSE	TRUE	
TB-1	1.50			BR1B	Wall	2	FALSE	FALSE		FALSE	FALSE	TRUE	
TB-1	1.50			CT	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TB-1	1.50			EDG1A-1	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TB-1	1.50			EDG1B-1	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TB-1	1.50			H2	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TB-1	1.50			IBN-1	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TB-1	1.50			SB-1	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TB-1	1.50			TO-1	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	

Notes:

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2. Fire barrier is a block wall and locked door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
3. Fire barrier is a block wall and a door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
4. No additional impacts due to propagation of fire.
5. Charging pump room is almost completely enclosed by concrete walls. The main combustible in the charging room is oil and the concrete curbs around each pump are designed to contain any spilled oil. Propagation out of the charging pump room is assumed to be incredible.
6. The nearest combustible material is the lube oil for the main turbine lube oil cooler which is protected by an automatic fire sprinkler system, and is physically separated from the feed pump room door. Fire propagation is assumed to be incredible.

Table E-2

Fire Propogation Table for Ginna Nuclear Power Plant (Continued)

Fire Zone	Fire Severity (Hours)	Primary Suppression Type	Suppression Actuation Method	Adjacent Fire Zone	Barrier	Barrier Rating (Hours)	Permanent Opening	Fire Duration > 0.75 * Rating	Auto FSS Exists	Criterion 1	Criterion 2	Localized Fire	Notes
TB-1	1.50	Partial coverage over lube oil cooler		TB-1FP	Wall/Door	0	FALSE	TRUE		FALSE	TRUE	FALSE	6
TB-1FP	0.75	Dry chemical, CO2	Manual	SB-1	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TB-1FP	0.75	Dry chemical, CO2	Manual	TB-1	Wall/Door	0	FALSE	TRUE		FALSE	TRUE	FALSE	6
TB-2	0.75			IBN-2	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TB-2	0.75			RR	Wall	2	FALSE	FALSE		FALSE	FALSE	TRUE	
TB-2	0.75			SB-2	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TB-2	0.75			TSC-1M	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TB-2	0.75			TSC-1N	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TB-2	0.75			TSC-1S	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TB-3	0.75	Auto Water Spray	Auto	CR-3	Wall/Door	0	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	
TB-3	0.75			IBN-3	Wall/Door	3	FALSE	FALSE		FALSE	FALSE	TRUE	

Notes:

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2. Fire barrier is a block wall and locked door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
3. Fire barrier is a block wall and a door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
4. No additional impacts due to propagation of fire.
5. Charging pump room is almost completely enclosed by concrete walls. The main combustible in the charging room is oil and the concrete curbs around each pump are designed to contain any spilled oil. Propagation out of the charging pump room is assumed to be incredible.
6. The nearest combustible material is the lube oil for the main turbine lube oil cooler which is protected by an automatic fire sprinkler system, and is physically separated from the feed pump room door. Fire propagation is assumed to be incredible.

Table E-2

Fire Propogation Table for Ginna Nuclear Power Plant (Continued)

Fire Zone	Fire Severity (Hours)	Primary Suppression Type	Suppression Actuation Method	Adjacent Fire Zone	Barrier	Barrier Rating (Hours)	Permanent Opening	Fire Duration > 0.75 * Rating	Auto FSS Exists	Criterion 1	Criterion 2	Localized Fire	Notes
TO	23.60	Preaction Sprinklers	Auto	EDG1A-1	Wall	3	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	
TO	23.60	Preaction Sprinklers	Auto	H2	Wall	3	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	
TO	23.60	Preaction Sprinklers	Auto	TB-1	Wall/Door	3	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	
TY-E		Auto Water Spray	Auto	RR	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TY-E		Auto Water Spray	Auto	TY-W	Wall	0	FALSE	FALSE		FALSE	FALSE	TRUE	
TY-W		Auto Water Spray	Auto	RR	Wall	3	FALSE	FALSE		FALSE	FALSE	TRUE	
TY-W		Auto Water Spray	Auto	TY-E	Wall	0	FALSE	FALSE		FALSE	FALSE	TRUE	

Notes:

1. The analysis assumes that a fire cannot propagate through concrete walls or steel hatches.
2. Fire barrier is a block wall and locked door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
3. Fire barrier is a block wall and a door that is not fire rated. However, propagation is assumed to be incredible due to barrier and physical separation of the combustibles from the barrier.
4. No additional impacts due to propagation of fire.
5. Charging pump room is almost completely enclosed by concrete walls. The main combustible in the charging room is oil and the concrete curbs around each pump are designed to contain any spilled oil. Propagation out of the charging pump room is assumed to be incredible.
6. The nearest combustible material is the lube oil for the main turbine lube oil cooler which is protected by an automatic fire sprinkler system, and is physically separated from the feed pump room door. Fire propagation is assumed to be incredible.

Table E-2, Supplement

Fire Propagation Table for Ginna Nuclear Plant -- Vertically Adjacent Fire Zones

Fire Zone	Fire Severity (Hrs)	Primary Suppression Type	Suppression Actuation Method	Adjacent Fire Zone	Barrier	Barrier Rating (Hrs)	Permanent Opening	Fire Duration >0.75• Rating	Auto FSS Exists	Criterion 1	Criterion 2	Localized Fire	Notes
ABB	0.75	Pre-action Sprinklers	Auto	ABM	Floor/ Ceiling	Unrated	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	A
ABM	0.75	Pre-action Sprinklers	Auto	ABB	Floor/ Ceiling	Unrated	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	A
				ABO	Floor/ Ceiling	3	TRUE	FALSE	TRUE	FALSE	FALSE	TRUE	A
				CHG	Floor/ Ceiling	3	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	
ABO	0.75	None	N/A	ABM	Floor/ Ceiling	3	TRUE	FALSE	FALSE	TRUE	FALSE	FALSE	B
AHR	1.50	Auto Water Spray	Auto	BRRM RR	Floor/ Ceiling	Zone-Specific	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	C
AVT	0.75	None	N/A	TSC-1M TSC-1N TSC-1S	Floor/ Ceiling	Unrated	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	Y
BR1A	0.75	None	N/A	RR	Floor/ Ceiling	2	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
BR1B	0.75	None	N/A	RR	Floor/ Ceiling	2	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
				BR1B-CV	Floor/ Ceiling	Unrated	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	D,E

Fire Zone	Fire Severity (Hrs)	Primary Suppression Type	Suppression Actuation Method	Adjacent Fire Zone	Barrier	Barrier Rating (Hrs)	Permanent Opening	Fire Duration >0.75• Rating	Auto FSS Exists	Criterion 1	Criterion 2	Localized Fire	Notes
BR1B-CV				BR1B	Floor/ Ceiling	Unrated	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	D,E
BRRM	1.50	None	N/A	AHR	Floor/ Ceiling	Zone-Specific	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	C
				CR-3									
CHG	0.75			ABM	Floor/ Ceiling	3	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	
CR-3	0.75	None	N/A	BRRM	Floor/ Ceiling	Zone-Specific	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	C
				RR			TRUE			TRUE			C,F
EDG1A-0	0.75			EDG1A-1	Floor/ Ceiling	Unrated	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	O,Z
EDG1A-1	0.75			EDG1A-0	Floor/ Ceiling	Unrated	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	O,Z
				EDG1A-X			FALSE			FALSE			Z
EDG1A-X				EDG1A-1	Floor/ Ceiling	Unrated	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	Z
EDG1B-0	0.75			EDG1B-1	Floor/ Ceiling	Unrated	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	P,Z
EDG1B-1	1.50	Auto Water Spray	Auto	EDG1B-0	Floor/ Ceiling	Unrated	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	P,Z
IBN-0	0.00			IBN-1	Floor/ Ceiling	Unrated	TRUE	FALSE	FALSE	TRUE	FALSE	FALSE	G,H
IBN-1	1.50	Pre-action Sprinklers	Auto	IBN-0	Floor/ Ceiling	Unrated	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	G
				IBN-2									I
IBN-2	0.75	Pre-action Sprinklers	Auto	IBN-1	Floor/ Ceiling	Unrated	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	I
				IBN-3									J

Fire Zone	Fire Severity (Hrs)	Primary Suppression Type	Suppression Actuation Method	Adjacent Fire Zone	Barrier	Barrier Rating (Hrs)	Permanent Opening	Fire Duration >0.75• Rating	Auto FSS Exists	Criterion 1	Criterion 2	Localized Fire	Notes
IBN-3	0.75	Pre-action Sprinklers	Auto	IBN-2	Floor/ Ceiling	Unrated	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	J
				IBN-4									J,K
IBN-4	0.75	Pre-action Sprinklers	Auto	IBN-3	Floor/ Ceiling	Unrated	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	J,K
IBS-0	0.00			IBS-1	Floor/ Ceiling	Unrated	TRUE	FALSE	FALSE	TRUE	FALSE	FALSE	L,X
IBS-1	0.75	None	N/A	IBS-0	Floor/ Ceiling	Unrated	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	L,Z
				IBS-2									M,Z
IBS-2	0.75	None	N/A	IBS-1	Floor/ Ceiling	Unrated	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	M,Z
				IBS-3									N,Z
IBS-3	0.75	None	N/A	IBS-2	Floor/ Ceiling	Unrated	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	N,Z
RC-1	0.75			RC-2	None	N/A	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	r
RC-2	0.75			RC-1	None	N/A	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	r
				RC-3									
RC-3	0.75			RC-2	None	N/A	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	r
RR	3.00	Auto Halon Systems, Manual Sprinkler	Auto, Manual	AHR	Floor/ Ceiling	Zone-specific	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	C
				BR1A		2	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	
				BR1B									
				CR-3		Zone-specific	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	C,F

Fire Zone	Fire Severity (Hrs)	Primary Suppression Type	Suppression Actuation Method	Adjacent Fire Zone	Barrier	Barrier Rating (Hrs)	Permanent Opening	Fire Duration >0.75• Rating	Auto FSS Exists	Criterion 1	Criterion 2	Localized Fire	Notes
SB-1	0.75	Auto Water Spray, Dry Chemical, CO_2, Water	Auto, Manual	SB-2	Floor/ Ceiling	Unrated	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	Q
SB-1HS	0.75	Auto Water Spray, Dry Chemical, CO_2	Auto, Manual	SB-2	Floor/ Ceiling	Unrated	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	
SB-1WT (CST Area)	0.75	Auto Water Spray, Dry Chemical	Auto, Manual	SB-2 (CST Area)	None	N/A	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	R
SB-1WT (Non-CST Area)				SB-2 (Non-CST Area)	Floor/ Ceiling	Unrated	FALSE	TRUE	TRUE	FALSE	FALSE	TRUE	
SB-2	1.50	Auto Water Spray, Dry Chemical, CO_2, Water	Auto, Manual	SB-1	Floor/ Ceiling	Unrated	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	Q
				SB-1HS			FALSE						
SB-2 (CST Area)	1.50	Auto Water Spray, Dry Chemical, CO_2, Water	Auto, Manual	SB-1WT (CST Area)	None	N/A	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	R
SB-2 (Non-CST Area)				SB-1WT (Non-CST Area)	Floor/ Ceiling	Unrated	FALSE						

Fire Zone	Fire Severity (Hrs)	Primary Suppression Type	Suppression Actuation Method	Adjacent Fire Zone	Barrier	Barrier Rating (Hrs)	Permanent Opening	Fire Duration >0.75• Rating	Auto FSS Exists	Criterion 1	Criterion 2	Localized Fire	Notes
SH-1 (Circ W Area)	0.75			SH-2 (Circ W Area)	None	N/A	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	S
SH-1 (SW Area)		Auto Sprinklers	Auto	SH-2 (SW Area)	Floor/ Ceiling	Zone-specific	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	C,T
SH-2 (Circ W Area)	0.75			SH-1 (Circ W Area)	None	N/A	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	S
SH-2 (SW Area)		Auto Sprinklers	Auto	SH-1 (SW Area)	Floor/ Ceiling	Zone-specific	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	C,T
TB-1	1.50			TB-2	Floor/ Ceiling	Unrated	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	U,V,Γ
TB-1FP	0.75	Dry Chemical, CO_2	Manual	TB-2	Floor/ Ceiling	Unrated	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	Z
TB-2	0.75			TB-1	Floor/ Ceiling	Unrated	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	U,V,Γ
				TB-1FP			FALSE			FALSE			Z
				TB-3			TRUE			TRUE			U,W,Γ
TB-3	0.75			TB-2	Floor/ Ceiling	Unrated	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	U,W,Γ
TSC-1M	0.75			AVT	Floor/ Ceiling	Unrated	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	Y
TSC-1N	0.75			AVT	Floor/ Ceiling	Unrated	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	

Fire Zone	Fire Severity (Hrs)	Primary Suppression Type	Suppression Actuation Method	Adjacent Fire Zone	Barrier	Barrier Rating (Hrs)	Permanent Opening	Fire Duration >0.75• Rating	Auto FSS Exists	Criterion 1	Criterion 2	Localized Fire	Notes
TSC-1S	0.75			AVT	Floor/ Ceiling	Unrated	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	

NOTES

A. There are two stairways and a 120-ft^2 open hatch connecting zones ABB, ABM, and ABO. All three pathways are protected by close-spaced, closed-head sprinklers at the ceiling of zone ABM.
B. Although zone ABO has no automatic suppression system *per se*, the only pathways to zone ABM are protected (see Note A), so downward fire propagation is not deemed credible.
C. The fire resistance of the floor/ceiling has been analyzed under the Ginna Fire Protection Program as sufficient for the fire duration based on the zone-specific combustible loading.
D. The analysis assumes that a fire cannot propagate through concrete structures.
E. Zone BR1B-CV has very limited access to air flow, which would preclude any significant fire development inside the zone.
F. A stairway connecting zones CR-3 and RR is enclosed in a 2-hr, fire-rated vestibule with 2-hr, fire-rated doors at the zone RR level (there is also a non-fire-rated vestibule and door at the zone CR-3 level).
G. There is a stairway and two 3.1-ft^2 grating-covered manholes connecting zones IBN-0 and IBN-1.
H. Zone IBN-0 has no combustibles. Only a transient fire could occur, which is assumed to be of insufficient intensity or duration to propagate to zone IBN-1, especially since the latter is protected by pre-action sprinklers.
I. There is a stairway connecting zones IBN-1 and IBN-2.
J. There are two stairways connecting zones IBN-2, IBN-3, and IBN-4, one of which is enclosed in a non-fire rated vestibule with non-fire-rated doors.
K. There is a 92-ft^2 grating-covered equipment access hatch connecting zones IBN-3 and IBN-4.
L. There is a stairway and 3.1-ft^2 grating-covered manhole connecting zones IBS-0 and IBS-1. Combustibles and safety critical equipment are not located near the stairway or manhole.
M. There are two stairways connecting zones IBS-1 and IBS-2. Combustibles and safety critical equipment are not located near the stairways.
N. There is a stairway connecting zones IBS-2 and IBS-3. Combustibles and safety critical equipment are not located near the stairway.
O. There is a 7.1-ft^2 steel-plate-covered manhole connecting zones EDG1A-0 and EDG1A-1. This is sealed so as to prevent spread of the types of fires which could possibly propagate, i.e., oil spill fires and cable fires. The DG area is bermed to contain oil spills, while cables are not located near the hatch.
P. There is a 7.1-ft^2 steel-plate-covered manhole connecting zones EDG1B-0 and EDG1B-1. This is sealed so as to prevent spread of the types of fires which could possibly propagate, i.e., oil spill fires and cable fires. The DG area is bermed to contain oil spills, while cables are not located near the hatch.
Q. There are two stairways connecting zones SB-1 and SB-2, each of which is enclosed in a vestibule with a 1.5-hr, fire-rated door.
R. An open grating connects the CST Areas of zones SB1-WT and SB-2.
S. Open spaces connect the Circ W Areas of zones SH-1 and SH-2.

T. There is a stairway connecting the SW Areas of zones SH-1 and [illegible]
U. There are four stairways and an elevator shaft connecting zones TB-1, TB-2, and TB-3. One of the stairways is enclosed in a vestibule with 1.5-hr, fire-rated doors. The elevator shaft is enclosed with non-fire-rated doors.
V. There are a 42.4-ft^2 grating-covered heater drain pump withdrawal hatch, 128-ft^2 grating-covered condensate pump withdrawal hatch, and 6390-ft^2 of open space and grating connecting zones TB-1 and TB-2.
W. There is a 940-ft^2 open access hatch connecting zones TB-2 and TB-3.
X. Zone IBS-0 has no combustibles. Only a transient fire could occur, which is assumed to be of insufficient intensity or duration to propagate to zone IBS-1.
Y. Zones AVT, TSC-1M, TSC-1N, and TSC-1S do not contain safety critical equipment.
Z. The concrete floor/ceiling is considered sufficient to prevent spread of the types of fires which could possibly propagate, i.e., oil spill fires and cable fires.
Γ. No additional impact due to propagation of fire.

ATTACHMENT B.2

EXTRACTS FROM APPENDICES C AND D TO THE 1998 SUBMITTAL

C. Component/Location Based Fire Ignition Frequency

A quantitative screening process is performed during the scenario analysis phase of the internal plant hazards analysis. The screening process applies numerical criteria to determine the relative risk significance of each hazard scenario. If it is determined that a scenario is insignificant compared with these numerical screening criteria, that scenario is removed from further consideration in the PSA models. Therefore, it is important that the hazard occurrence frequencies that are assessed during this step of the process satisfy the following objectives.

- The hazard scenario frequency must consistently account for generic industry data and any plant-specific experience for the type of hazard that is being evaluated in the type of location that is being modeled.

- The hazard scenario frequency must provide a conservative upper bound for the actual frequency of more detailed event scenarios that may eventually be developed for the location. In other words, the total scenario frequency may be consistently subdivided to more realistically represent any specific event scenario in the location, if it is necessary to develop more detailed models for the location.

The industry event data are combined with actual plant-specific experience through a two-stage Bayesian analysis that forms the basis for the hazard frequency assessment.

The generic data for the internal fire frequency assessment are collected from a variety of sources. For example, the PLG proprietary database for fire events provides the generic input for the assessment of fire event frequencies. This database contains summaries of more than 750 fire events that occurred at U.S. nuclear power plants through the end of 1993. These event summaries are derived from U.S. Nuclear Regulatory Commission (NRC) Licensee Event Report (LER) data, American Nuclear Insurer data, and plant-specific data that have been collected by PLG during its previous PSA studies. The generic fire event database for the Ginna analyses was limited to events that occurred between January 1, 1980, and December 31, 1992. The starting date for this database period accounts for substantial improvements in fire protection systems and personnel awareness that may affect the applicability of pre-1980 data for current analyses. The end date accounts for the fact that the PLG database contains a number of fire events that were reported in 1993, but it may not be complete for that year.

C.1 Fire Event Categories

Three general types of fire event categories were defined for these analyses. Two of these classifications may be characterized broadly as "location-type" categories and "equipment-type" categories. The third general classification applies to control room

fires. Generic and plant-specific fire events were assigned to these categories according to the type of location in which they occurred or the type of equipment that was affected by the fire.

C.1.1 Location Fire Categories

It is generally most reasonable to use location-type data for large areas that contain a variety of mechanical equipment. The composite fire event data account for the types of equipment (e.g., pump motors, valves, oil systems, etc.) that are typically found in these areas. The data also account generally for the types of operating, testing, and maintenance activities that occur around mechanical equipment, the possible presence of transient combustibles associated with these activities, and the general amount of personnel traffic in large open areas of the plant. The following four location-type classifications were used for the Ginna database.

- Containment – Other than RCP Fires. This category includes fires that occur inside the Containment, except for fires that are directly associated with the reactor coolant pumps or their oil systems.

This category excludes fires that occur in electrical switchgear, motor control centers, control cabinets, and cables inside the Containment. These fire events are classified separately in the database, and they are allocated to specific locations inside the Containment that contain these types of equipment. No high voltage switchgear or motor control centers are located inside the Containment.

- Auxiliary Building – Radwaste. This category includes fires that occur in Auxiliary Building and Intermediate Building areas that contain primarily solid, liquid, or gaseous radioactive waste handling systems. It also includes generic fire events that have occurred in similar equipment areas, even though the facilities are outside the plant auxiliary building.

This category excludes fires that occur in electrical switchgear, motor control centers, control cabinets, and cables in radioactive waste handling areas.

- Auxiliary Building – Other than Radwaste. This category includes fires that occur in Auxiliary Building and Intermediate Building areas that contain primarily safety-related mechanical equipment. This category excludes Auxiliary Building fire events that have occurred in areas that contain solid, liquid, or gaseous radioactive waste handling systems.

This category excludes fires that occur in electrical switchgear, motor control centers, control cabinets, and cables in the Auxiliary Building.

- Turbine Building – Other. This category includes fires that occur in the Turbine Building, except for fires that are directly associated with the main turbines, the turbine oil systems, the main generators, or the generator hydrogen systems.

The Ginna main feedwater pumps are motor-driven. Therefore, this category excludes generic fire events that have occurred in main feedwater pump turbine oil systems.

This category excludes fires that occur in electrical switchgear, motor control centers, control cabinets, and cables in the Turbine Building.

- Screenhouse. This category includes fires that occur in the screenhouse at Ginna. It includes generic fire events that have occurred in similar equipment as at Ginna, service water pumps and traveling screens, circulating water pumps, diesel-driven and motor-driven fire water pumps and auxiliary boilers, even though such equipment may not be with service water pumps. This category excludes fires that occur in electrical switchgear, motor control centers, control cabinets, and cables in areas around such equipment.

C.1.2 Equipment Fire Categories

It is generally most reasonable to use equipment-type data for the following types of locations.

1. Locations that contain only a single type of relatively unique mechanical component; e.g., diesel generators, ventilation units, motor-generators, etc.

2. Locations that contain equipment that represents a unique hazard source or that has unique operational considerations; e.g., reactor coolant pumps, main turbine-generator, etc.

3. Locations that contain electrical equipment, instrumentation and control cabinets, and cables

The following 16 equipment-type classifications were used for the Ginna database.

- Containment - Reactor Coolant Pumps. This category includes fires that are directly associated with the reactor coolant pumps or their oil systems.

- Turbine/Generator. This category includes fires that are directly associated with the main turbines, the turbine oil systems, the main generators, or the generator hydrogen systems.

- Diesel Generator Sets. This category includes fires that occur in emergency diesel generators. The category includes fires that affect the diesel engine; fires in lubrication, fuel, cooling, and control systems that are mounted on the engine skid or that are typically located in the diesel generator room; and fires that affect the generator or exciter.

This category excludes fires that occur in local control cabinets and fires that affect the diesel generator output circuit breaker. Control cabinet fires are included in the Logic Cabinet category to account for the types of equipment and control circuits that are typically located in these cabinets. Circuit breaker fires are included in one of the switchgear fire event categories, depending on the specific voltage.

- HVAC Chiller. This category includes fires that occur in ventilation system chiller units. The category includes fires that affect the compressor, expansion valves, lubrication systems, refrigeration equipment, and local controls that are typically mounted on the chiller package or skid.

- HVAC Fan. This category includes fires that occur in ventilation system fans. No distinction is made to account for the size of the fan or the specific type of drive; e.g., direct drive, belts, fluid coupling, etc.

- Motor-Generator Sets. This category includes fires that occur in motor-generator sets, rotating inverters, and similar types of electro-mechanical converters. The category includes fires that affect the motor, generator, voltage regulator, lubrication equipment, cooling equipment, and local controls that are typically mounted on the unit.

- Battery Charger / Inverter. This category includes fires that occur in battery chargers and static inverters. No distinction is made to account for the AC voltage, the DC voltage, or the specific design of the unit. The category includes fires that affect the converter circuits, input circuit breakers, output circuit breakers, power monitoring and control circuits, and other components that are typically mounted inside the battery charger or inverter cabinet.

- Battery. This category includes fires that occur in emergency power system batteries. No distinction is made to account for the specific type of battery or its voltage.

- Transformer - High Voltage. This category includes fires that occur in high voltage offsite power transformers. These transformers provide connections from the in-plant buses to the switchyard or to other offsite power supplies. They are typically located outside the plant buildings. Examples include main power transformers, auxiliary power transformers, startup transformers, etc. No distinction is made to account for the specific primary and secondary voltages or the transformer design; e.g., oil-cooled, gas-cooled, air-cooled, etc.

- Transformer - Low Voltage. This category includes fires that occur in intermediate voltage station service transformers. These transformers provide connections from the high voltage buses (e.g., 4.16kV) to the low voltage buses (e.g., 480V) in the plant electric power systems. They are typically located inside the plant buildings. No distinction is made to account for the specific primary and secondary voltages or the transformer design.

- Transformer - Instrument Power. This category includes fires that occur in large control power transformers and regulated voltage transformers; e.g., SOLA transformers. No distinction is made to account for the specific primary and secondary voltages or the transformer design.

This category excludes fires that occur in low voltage transformers (e.g., 220V and below) for power, control, and monitoring circuits that are typically located inside switchgear cubicles, instrumentation power supplies, control cabinets, etc. Fires that affect these types of transformers are included in the respective categories for switchgear, motor control centers, logic cabinets, etc., depending on the location of the fire event.

- Switchgear - Above 480V. This category includes fires that occur in high voltage switchgear (e.g., 4.16kV) that is located inside the plant buildings. No distinction is made between safety-related and non-safety electrical systems. This category is designated "Above 480V" for this analysis to account for the actual voltages at Ginna. However, in practice, the category includes fires that occur in any switchgear with a nominal voltage rating that is higher than approximately 800V. The category includes fires that occur in the switchgear buswork, circuit breakers, instrumentation, control, and protection circuits that are typically mounted inside the switchgear cubicles.

This category excludes high voltage switchgear fires that occur in the plant switchyard or in other offsite electrical facilities because the environment, personnel traffic, testing and maintenance programs, housekeeping controls, etc. may be much different for these facilities, compared with the in-plant electrical systems.

- Switchgear - 480V and Below. This category includes fires that occur in intermediate voltage switchgear (e.g., 480V) that is located inside the plant buildings. No distinction is made between safety-related and non-safety electrical systems. This category is designated "480V and Below" for this analysis to account for the actual voltages at Ginna. However, in practice, the category includes fires that occur in any switchgear with a nominal voltage rating that is less than approximately 800V. The category includes fires that occur in the switchgear buswork, circuit breakers, instrumentation, control, and protection circuits that are typically mounted inside the switchgear cubicles.

This category excludes fires that occur in motor control centers, vital AC instrument power buses, low voltage AC distribution panels (e.g., 220V and below), and DC buses. This distinction accounts for the lower power ratings of these panels and differences in the designs, duty cycles, and operating characteristics of the associated circuit breakers.

- Motor Control Center. This category includes fires that occur in motor control centers. For this analysis, the category also includes fires that occur in vital AC instrument power buses, low voltage AC distribution panels (e.g., 220V and below), and DC buses.

- Logic Cabinet. This category includes fires that occur in instrumentation, control, and protection cabinets. No distinction is made to account for the specific types of circuits that are contained in the cabinet (e.g., relays, solid state electronics, etc.), the location of the cabinet (except as noted below), or whether the circuits are safety-related or non-safety.

This category excludes cabinet fires that occur in main, auxiliary, or emergency control rooms. These cabinet fires are included in the Control Room category. This distinction is made to account for differences in the normal occupancy and administrative controls that may apply for control room cabinets, compared with cabinets in other plant locations.

- Cable. This category includes fires that damage electrical cables. No distinction is made to separately account for fires that affect instrumentation, control, or power cables. Fire events are included in this category if the cables or their terminations were the source of fire ignition or if cable damage was the primary impact from an exposure fire; e.g., welding sparks that ignite cable insulation in an open tray. Fire events are excluded from this category if cable damage was consequential to a fire that is assigned to another equipment category; e.g., pump motor fires, switchgear fires, cabinet fires, main generator hydrogen fires, etc.

C.1.3 Control Room Fires

Because of its unique features, continuous occupancy, and strict administrative controls, a separate category is defined for fires that occur in main, auxiliary, or emergency control rooms. This category includes all fires that occur in plant control rooms, regardless of the cause or specific type of panel that is affected.

C.2 Classification of Generic Event Data

The first step of the fire frequency assessment involves a thorough review of the industry experience data to develop a "specialized generic database" for Ginna. This database accounts for design features of the plant that is being evaluated, the scope of the PSA models, and characteristics of the specific hazard scenarios that have been defined for the analysis.

The PLG database contains a total of 484 fire events during the 13-year period from 1980 through 1992. These events were screened first to select only those events that apply to the Ginna plant design, the types of locations that are included in the PSA fire analyses, and the scope of the PSA models. This screening was based on observations made by the spatial interactions analyst during the plant walkdowns and on the analyst's understanding of Ginna operating procedures and practices. The following general considerations were used to determine which events from the industry data do not apply for this analysis.

- The Ginna plant has been operating for several years. Therefore, a fire event was removed from the generic database if the event occurred during plant construction or during pre-commercial startup testing activities.

- Table C-1 lists the Ginna plant locations that were retained after qualitative examination during the spatial interactions analyses. A fire event was removed from the database if the event occurred in a location that is not relevant to the Ginna analyses or if the event was uniquely

associated with a type of component that is not installed at Ginna. Examples of the location screening criterion include fires in office areas, warehouses, machine shops, cooling towers, switchyard facilities (except for relevant transformers), other fires outside of the plant protected area, etc.

- Event reports are included in the PLG generic database to satisfy several possible applications. The criteria for adding a particular event to the database are usually much broader than the criteria that apply for a particular plant-specific analysis. For example, some events in the database are included for studies that examine precursor events, studies that confirm analytical models for fire ignition and growth, etc. An event was removed from the database for this study if the event description clearly indicates that no actual fire was present, and no automatic or manual extinguishing actions were required. Examples of these types of events include overheated pump bearings, small amounts of smoke from oil films or foreign material on hot piping or other surfaces (with no indication of pooling or ignition), electrical faults and short circuits that do not ignite any material, etc.

- An event was removed from the database if the cause for the event was associated with a plant design feature that does not apply to Ginna. An example of this type of event includes fires that have occurred in the main condenser offgas systems for some boiling water reactors.

- A few events were screened out according to miscellaneous criteria such as reported degradation or cracking of cable insulation, duplicate event reports, etc.

A total of 230 events remained in the database after this first level of screening. These events were judged to be relevant to the Ginna plant design, the locations and types of equipment that were identified in the spatial interactions analyses, and the specific scope of the fire analyses. These events were next classified into the 22 fire event categories that are described in Section C.1.

There are a few plant-specific design features and PSA modeling issues that must be considered during the categorization of the events. The most important of these considerations are summarized below.

- Equipment for the Ginna boric acid recycle systems and radioactive waste processing systems is distributed throughout several areas of the Auxiliary Building. These systems are more clearly separated from safety-related equipment areas in many newer U.S. plants. Fire events that occur in boric acid recycle systems and radioactive waste processing systems are retained in the Ginna database because these events may occur in locations that also contain PSA equipment. However, these events are classified separately to account for the actual distribution of this equipment among the Ginna Auxiliary Building locations.

- The Ginna plant has motor-driven main feedwater pumps. Fire events that occur in the Electro-Hydraulic oil systems for turbine-driven main

feedwater pumps are not relevant for the Ginna main feedwater related fire analyses.

- Diesel-driven and motor-driven fire pump related events and events related to auxiliary boilers have been assigned to the screen house category.

In practice, different hazard frequencies may apply for a particular plant location during power operation and during shutdown. There are many reasons for this difference. Experience has shown that the causes for some events may be closely associated with equipment operating conditions or with personnel activities that apply uniquely to a specific plant operating mode. For example, hydrogen fires that are caused by electrical faults in the main generator are very unlikely when the plant is shut down. Fires that are caused by welding and cutting work inside the Containment are very unlikely when the plant is operating at power. Fires that are caused by electrical faults in normally energized switchgear may occur at any time. However, switchgear fires that are caused by personnel errors during periodic testing, inspection, or maintenance activities may be most likely during shutdown.

To develop a comprehensive database that applies consistently for the Ginna model, each generic event must also be examined to determine whether its cause was uniquely associated with a specific plant operating mode. Thus, each event is assigned to one of the following categories.

- Power Operation Only (P). The causes for these events are uniquely associated with equipment operating conditions or personnel activities that apply primarily during plant power operation.

- Anytime (A). The causes for these events may occur at any time, regardless of the plant operating mode.

The event classifications are based on the normal equipment operating conditions, testing and inspection programs, and maintenance practices at Ginna. For example, if an equipment fire occurred during shutdown at Plant X, but it is concluded that the same cause applies during all operating modes at Ginna, the event is assigned to the Anytime (A) category.

The product from this step of the frequency assessment process is a specialized generic database. This database contains only the hazard event summaries that are relevant for the plant that is being modeled, for the specific operating conditions that are being evaluated. This database is presented in Table C-2. The table summarizes the 230 fire events that were retained in the Ginna specialized generic database and their final classifications. The actual plant identities and occurrence dates have been omitted to protect the proprietary nature of this information. However, consistent plant designation codes are used to provide an indication of the observed plant-to-plant variability in the generic experience.

C.3 Treatment of Unidentified Plant Events

Each nuclear power plant site contains one to several reactor units. For this analysis, it is assumed that the frequency of internal hazards may vary considerably from site-to-site, but not from unit-to-unit at a particular site. An exception to this assumption may be made for sites at which there are known to be significant differences between the units. This assumption is based on the belief that much of the observed variability in hazard occurrence rates may be caused by differences in plant design, operating and maintenance practices, and plant management policies.

A two-stage Bayesian analysis is performed to combine the industry data with actual experience from the plant that is being studied. The first stage of this analysis develops a generic frequency distribution for each hazard that consistently accounts for the observed site-to-site variability in the industry experience data. The second stage updates this generic frequency to account specifically for the actual historical experience at Ginna.

In order to account for the observed site-to-site variability in the industry experience data properly, it is necessary to have detailed information about the specific site at which each event has occurred. For example, site X has had N1 fire events of Type A in X1 years; site Y has had N2 fire events of Type A in Y1 years; etc. Unfortunately, some of the industry data sources do not identify the specific sites at which these events have occurred. A small number of events in the PLG database are related to plants that are not identified. Based on their descriptions, these event summaries document valid fires that have occurred at some plants and not duplicates of events at "identified plants".

At first, it may seem most conservative to assign an unidentified event either to the "worst plant" or to the "best plant" from the generic population. In this context, the "worst plant" is the plant that has had the largest number of occurrences in the smallest number of years, and the "best plant" is the plant that has had no other occurrences in the largest number of years. However, this may actually introduce undesired optimism when the second stage of the Bayesian update is performed. For example, suppose that the plant being evaluated (e.g., Ginna) has had no fires in a particular event category. The second stage of the updating process will then numerically discount the generic evidence from any plant that has a relatively high frequency of fires. The amount of numerical reduction depends on the quantity of plant-specific data and the difference between the plant-specific and generic experience. Thus, in this case, assignment of the unidentified event to the "worst plant" will actually give that event less weight in the final results from the second stage update, compared with assignment of the event to the "best plant" or the "average plant". In practice, it has been determined that it is usually most conservative to assign each unidentified event to a plant that meets the following criteria.

- The plant has had no other events in the category that is being evaluated.
- The total plant operating years are approximately equal to the average of the generic plant population.

This process was used for assignment of all unidentified plant events during the Ginna updates.

C.4 Development of Frequencies for Power Operation

The numerical results from a PSA are typically presented as an occurrence frequency for the undesired event. Care must be used during the hazard frequency analyses to ensure that the initiating frequency for each event scenario is quantified consistently with other events that are analyzed in the PSA models, whether it is a frequency per calendar year or a frequency per year of power operation.

Generic events for these analyses are classified into the two operational categories; i.e., Power Operation Only (P), and Anytime (A). The total initiating event frequency for the Ginna model should account for all events that can occur only during power operation, plus a fraction of the events that can occur at any time. The appropriate weighting fractions for the Anytime events are determined by the Ginna average plant availability factor.

Suppose that the following data are available for a particular type of event at generic Plant X.

Category	Number of Events	Experience (mode years)
Power Only (P)	1	8
Shutdown Only (S)	4	2
Anytime (A)	2	8 + 2 = 10

To develop a frequency that is consistent with the format of the overall PSA results, the appropriate initiating event frequency for the Ginna models is determined by the answer to the following question:

During the 10 years of experience at Plant X, how many events have occurred during power operation?

The answer to this question is the sum of the sum of the events that have occurred during power (category P) and the fraction of the events from category A that would occur during power

$$1 + (8/10) * 2 = 2.6 \text{ events}$$

The corresponding initiating event frequency is:

$$2.6 / 8 = 0.31 \text{ events per year of power operation}$$

The following steps were used to quantify the fire event frequencies:

1. For each category (location or component), fire frequencies were developed for the generic population of nuclear sites. The frequencies were developed for the two groups, Power Only (P), and Anytime (A). These two frequencies were defined per calendar year. An average availability factor (a) of 0.7 was used to define a total generic fire frequency for each component or location category according to the expression:

$$P / [N * a] + A / N$$

   Where N is the number of calendar years for the data.

2. Perform the first stage of the Bayesian update with the generic plant data from Step 1.

3. For Ginna, count the total number of events that have actually occurred during plant power operation. The number of years corresponding to this time was multiplied by the average Ginna availability factor of 0.8.

4. Perform the second stage of the Bayesian update with the generic prior distribution from Step 2 and the plant-specific data from Step 3. Use the results from this step as the Ginna fire events frequencies.

C.5 Plant-Specific Fire Event Data and Frequencies

Plant-specific fire event data for the Ginna study were compiled from the Ginna Internal Fire Brigade reports. All reports from 1979 through mid 1997 (18.5 years) were examined. The events were screened to determine which events apply to the fire event categories and plant locations being considered for the fire analysis. For example, the fires that occurred in the office areas, workshops, locations outside the plant protected area are not relevant for these analyses.

Events were also screened out if the reports document only smoke from overheated pump bearings or other mechanical equipment, small quantities of smoke from foreign materials on hot surfaces, or other events with no indication of flames or evidence of fire damage. This is the same criterion used to screen the generic fire events database. However, these types of events were retained in the database if the reports document actuation of automatic suppression systems or manual extinguishing actions.

Table C-3 summarizes the 14 fire events that were retained in the plant-specific database for power conditions. The table also lists the relevant Ginna category for each event.

Initiating event frequencies for each fire category were quantified through the two-stage Bayesian updating process. The total Ginna operating experience used is 14.8 power operation years. Step 3 of the Ginna fire event frequency quantification process

developed plant-specific evidence for each fire event category, based on the events listed in Table C-3 and the 14.8-year operating time. This evidence was then input to the second stage of the Bayesian updates to quantify the final initiating event frequency for each fire category according to Step 4 of the process. Table C-4 lists the plant-specific evidence, the generic mean frequency from Step 2, and the final updated frequency distribution from Step 4 for each fire event category.

Only relevant pages from C-13 through C-60 are included to reduce paper volume.

Table C-2

Generic Fire Events Applicable to the Ginna Station Fire PRA (Continued)

ID	Site-Unit	Operation Mode	Incident Date	Fire Location	Cause	Fire Initiators (Equipment)	Fire Initiators (Fuel)	Event Description	Category	Applicability
65	HN		5/16/87	Reactor Building	Electrical Failure	Camera		An underwater TV camera was placed into a plastic bag while the lights were still hot and ignited bag and insulation.	Aux Bldg - Other	A
66	HN	Power Operation	11/15/90	Reactor Building	Welding & Cutting	Torch	Construction Material	During welding, sparks fell and ignited dry-up rags.	Aux Bldg - Other	A
67	HN		10/28/91		Personnel Error	Fan	Insulation	While an electrician was troubleshooting a problem with a cooling fan for power supply (1C11-PSY6), the fan shorted to the frame. This caused visible smoke and flame. The fire was quickly extinguished with a portable Halon extinguisher.	Low Power Cabinet	A
68	HN	Power Operation	6/11/92	Turbine Building	Spontaneous Combustion	Unknown	Oil	Extensive report available. Large issue is what was the ignition source.	Turbine Bldg. - Other	A
69	HO	Cold Shutdown	4/15/80	Reactor Building ?	Electrical Failure	Circuit Breaker		The RCS Bus/Generator "A", 2C71S001A, experienced a logic power failure, causing a reactor half scram on the "A" channel. The "A" channel was placed in the trip condition per Tech. Specs. The redundant "B" RPS was operable. The cause was an open circuit o	Low Power Cabinet	P
70	HO		11/26/80	Diesel Generator	Component Failure	Diesel Generator	Oil	Cylinder in the emergency diesel generator failed under testing. The heat ignited the fuel oil. The generator was removed from service and the fire extinguished.	Diesel Generator	A

Notes
Applicability: A - Anytime / P - During Power Only

Table C-2

Generic Fire Events Applicable to the Ginna Station Fire PRA (Continued)

ID	Site-Unit	Operation Mode	Incident Date	Fire Location	Cause	Fire Initiators (Equipment)	Fire Initiators (Fuel)	Event Description	Category	Applicability
71	HO		2/1/81	Diesel Generator Building	Personnnel Error ?	Diesel Generator	Insulation	The insulation on the diesel generator was oil soaked. It ignited when the generator was started.	Diesel Generator	A
72	HO		7/22/83	Turbine Building	Component Failure	Feed Pump Turbine	Oil	Oil had leaked into the insulation around the turbine. The heat from the turbine apparently ignited the oil.	Turbine Bldg. - Turbine/Generator	P
73	HO		10/26/83	Diesel Generator Room	Defective Procedure	Diesel Generator	Oil	Maintenance had replaced oil filter and left some oil on the ground which caught fire later. CO2 extinguished.	Diesel Generator	A
74	HO		9/19/84	Diesel Generator Building	Component Failure	Turbocharger	Oil	During the running of a diesel generator, oil was noticed to be leaking from the turbocharger. The oil was near the exhaust manifold. The oil ignited, but was extinguished.	Diesel Generator	A
75	HO		4/23/90	Turbine Building	Personnel Error		Waste	Cigarette was thrown into trash drum which then ignited. Extinguished with water from a drinking fountain.	Turbine Bldg. - Other	A
76	HO		8/29/90	Diesel Generator Building	Component Failure	Turbocharger	Solvent	Leak of Glycol antifreeze from a small coolant jacket for a turbocharger. The coolant dropped onto the hot exhaust manifold. Suppressed with CO2.	Diesel Generator	A
77	HO		5/16/91	Control Room	Electrical Failure	Relay		Piece of damaged phone jack fell on relay causing it to short.	Control Room	A

Notes
Applicability: A - Anytime / P - During Power Only

Table C-2

Generic Fire Events Applicable to the Ginna Station Fire PRA (Continued)

ID	Site-Unit	Operation Mode	Incident Date	Fire Location	Cause	Fire Initiators (Equipment)	Fire Initiators (Fuel)	Event Description	Category	Applicability
111	KQ	Power Operation	4/13/86	Tranformer Yard	Electrical Failure	Transformer		On 4/13/86 at 1107 with unit 2 at 72% power and Unit 3 shutdown, containment isolations occurred on both Units when the No. 3 Startup Source was deenergized. The No. 3 Startup Source was deenergized when the 3435 breaker opened because a fire involving t	Transformer - Hi Voltage	A
112	RK	Refueling Outage	5/5/80	Trubine Building	Electrical Failure, Component Failure	Generator		Fire involving generator exciter cubicle located in the DGB. Discovered while conducting 24-hour performance test.	Diesel Generator	A
113	RK	Power Operation	2/24/81	Reactor Building	Personnel Error		Insulation	A fire occurred in the reactor building. The fire was ignited by welding sparks falling on foam rubber that a contractor had placed to prevent pipes from contacting temporary thermal shielding installed for the welding operation. The fire burned for app	Aux Bldg - Other	A
114	RK	Power Operation (95% Power)	6/15/81	Reactor Building	Welding and Cutting	Torch	Construction Materials (Foam Rubber)	A Class 'A' Fire (Foam Rubber) occurred above the Yardway rack on the 51 ft level in the reactor Building. The fire was ignited by welding sparks falling on the foam rubber that a contractor had emplaced. The fire burned for ~ 2 minutes before it was iden	Aux Bldg - Other	A

Notes
Applicability: A - Anytime / P - During Power Only

Table C-3

Fire Events at Ginna Station Fire Applicable to the Fire PRA

No.	Operation Mode	Incident Date	Fire Location	Cause	Event Summary	Event Category
1	Power Operation	5/5/92	Aux. Bldg. Top floor North East Corner	Temporary heat trace connection wires exposed to plastic danger flag in immediate vicinity of exposed wires caught fire and spread to the insulation	At 21:45, operator discovered fire in insulation in Aux. Bldg. Top floor North East corner. The fire was extinguished with CO2 by 21:47.	Aux Bldg - Other
2	Power Operation (100%)	2/23/81	Relay Room	Welding Overhead	Smoldering rag in Relay Room. Removed to Exterior of Building. Room Aired Out.	Logic and Low Power Cabinet
3	Power Operation (100%)	2/25/83	Relay Room	Transformer Fire	First alarm received on S-08 (Relay Room) in the control room. Personnel responded to find smoke in the relay room and fire on backup transformer for the plant computer. The second alarm and auto actuation occurred shortly after. All personnel exited t	Logic and Low Power Cabinet
4	Power Operation	7/31/91		Electrical Failure	An electrical fault in an ESF undervoltage cabinet resulted in burned insulation.	Logic and Low Power Cabinet
5	Power Operation	12/29/80	MCC A Breaker Cubicle		Fire in the MCC A Breaker Cubicle	MCC
6	Power Operation	9/22/88	MCC B Position 1M		"B" EH pump tripped. Smell of smoke noticed at MCC B. Fire called off. Operator opened breaker and opened door and removed fuses. Fire secured.	MCC

Table C-3

Fire Events at Ginna Station Fire Applicable to the Fire PRA (Continued)

No.	Operation Mode	Incident Date	Fire Location	Cause	Event Summary	Event Category
7	Power Operation	2/18/97	"B" MG Set	Failed bearing in "B" MG set.	Fire alarm sounded at 01:45, and fire brigade responded. Fire was out at 01:50, the cause was a failed bearing in the "B" MG set	Motor Generator Set
8	Power Operation	12/25/96	Screenhouse around SW pump area	Short circuit in "C" SWP breaker	Operator heard fire alarm, and found light smoke at "C" Service Water pump breaker cubicle. There was a short circuit in the "C" SW pump that caused a fire in the breaker.	Swtichgear - 480V and Below
9	Power Operation (100%)	4/11/79	Main Transformer	Electrical Short	At approximately 10:45 a.m. on April 11, 1979, a fire call was announced at the main control board, it was the main transformer. The fire Brigade responded, the sprinkler system cut in, and also the Ontario Fire Department responded (with two trucks and	Transformer above 4.16kV
10	Power Operation	1/7/81	Main Feed Pump Room		Smoking fire water storage tank booster pump motor.	Turbine Building - Other
11	Power Operation	8/4/87	Turbine Plant Sample Rack	Dirty, clogged fan causing it to burn up.	Operator discovered smoke coming from turbine sample rack upon opening cabinet. A 15 lb CO2 extinguisher was used to put out the fire. After fire was out, the fire source was found to be the cooling fan in the base of the cabinet.	Turbine Building - Other
12	Power Operation	8/27/87	Turbine Building Intermediate level	Dirty Motor	Security guard found secondary sample sink chiller pump motor burning up and reported the fire. Fire brigade responded and secured power to the pump. Smoke began to dissipate.	Turbine Building - Other

Table C-3

Fire Events at Ginna Station Fire Applicable to the Fire PRA (Continued)

No.	Operation Mode	Incident Date	Fire Location	Cause	Event Summary	Event Category
13	Power Operation	4/6/91	Turbine Building basement outside main feed pump room	Faulty welder's lead or overloaded welding machine	At 15:23 control room was reported that a fire had been extinguished. A welder's lead insulation had started to burn. The welder had used a 5 lb. CO2 extinguisher to extinguish the fire.	Turbine Building - Other
14	Power Operation	5/2/91	Turbine Building	Faulty solenoid on the crane or overloaded crane.	Fire was reported to the control room. Fire brigade responded, power was secured to turbine building crane. Fire went out.	Turbine Building - Other

Table C-4

Generic and Ginna-Specific Fire Frequencies by Location/Equipment

No.	Description	No. of Events	Power-Years	Posterior			
				Mean	5th%ile	Median	95th%ile
1	Aux Bldg - Other Fire Frequency - Anytime - Prior			1.61E-02	1.28E-03	9.57E-03	5.20E-02
2	Aux Bldg - Other Fire Frequency - Power Only - Prior			3.02E-03	1.69E-04	1.51E-03	1.16E-02
3	Aux. Bldg. - Other Fire Frequency - Power - Prior			2.03E-02	2.97E-03	1.45E-02	5.40E-02
4	Aux. Bldg. - Other Fire Frequency - Power	1	14.8	2.78E-02	5.78E-03	1.94E-02	7.88E-02
5	Aux Bldg - Rad Waste Fire Frequency - Anytime - Prior			3.14E-03	2.18E-04	1.47E-03	1.20E-02
6	Aux Bldg - Rad Waste Fire Frequency - Power Only - Prior			2.25E-03	2.51E-04	1.32E-03	7.16E-03
7	Aux Bldg. - Rad Waste Fire Frequency - Power - Prior			6.42E-03	1.01E-03	3.92E-03	1.88E-02
8	Aux Bldg. - Rad Waste Fire Frequency - Power	0	14.8	5.60E-03	9.86E-04	3.67E-03	1.61E-02
9	Battery Fire Frequency - Anytime - Prior			1.19E-03	3.69E-05	4.10E-04	4.41E-03
10	Battery Fire Frequency - Power Only - Prior			6.23E-04	3.22E-05	2.07E-04	2.18E-03
11	Battery Fire Frequency - Power - Prior			2.08E-03	1.98E-04	1.01E-03	6.84E-03
12	Battery Fire Frequency - Power	0	14.8	1.92E-03	1.97E-04	9.80E-04	6.33E-03
13	Battery Charger/Inverter Fire Frequency - Anytime - Prior			5.89E-03	2.71E-04	2.71E-03	2.21E-02
14	Battery Charger/Inverter Fire Frequency - Power Only - Prior			6.77E-03	5.60E-04	3.82E-03	2.85E-02

Table C-4

Generic and Ginna-Specific Fire Frequencies by Location/Equipment (Continued)

No.	Description	No. of Events	Power-Years	Posterior			
				Mean	5th%ile	Median	95th%ile
15	Battery Charger/Inverter Fire Frequency - Power - Prior			1.55E-02	2.35E-03	1.03E-02	4.74E-02
16	Battery Charger/Inverter Fire Frequency - Power	0	14.8	1.28E-02	2.16E-03	8.79E-03	3.78E-02
17	Cable Fire Frequency - Anytime - Prior			5.56E-03	1.47E-04	1.97E-03	2.07E-02
18	Cable Fire Frequency - Power Only - Prior			2.46E-03	1.53E-04	1.25E-03	7.68E-03
19	Cable Fire Frequency - Power - Prior			9.22E-03	9.80E-04	4.78E-03	2.64E-02
20	Cable Fire Frequency - Power	0	14.8	7.02E-03	9.52E-04	4.27E-03	2.11E-02
21	Control Room Fire Frequency - Anytime - Prior			3.04E-03	1.02E-04	1.21E-03	1.20E-02
22	Control Room Fire Frequency - Power Only - Prior			2.07E-03	5.82E-05	7.96E-04	8.06E-03
23	Control Room Fire Frequency - Power - Prior			6.03E-03	5.82E-04	3.49E-03	2.05E-02
24	Control Room Fire Frequency - Power	0	14.8	5.12E-03	5.40E-04	3.34E-03	1.61E-02
25	Containment - Other Fire Frequency - Anytime - Prior			8.02E-03	1.19E-03	5.17E-03	2.27E-02
26	Containment - Other Fire Frequency - Power Only - Prior			7.23E-03	1.23E-03	4.97E-03	1.91E-02
27	Containment - Other Fire Frequency - Power - Prior			1.84E-02	4.69E-03	1.44E-02	4.33E-02
28	Containment - Other Fire Frequency - Power	0	14.8	1.58E-02	4.47E-03	1.30E-02	3.53E-02
29	Containment - RCP Fire Frequency - Anytime - Prior			8.03E-03	1.17E-03	5.07E-03	2.31E-02

Table C-4

Generic and Ginna-Specific Fire Frequencies by Location/Equipment (Continued)

No.	Description	No. of Events	Power-Years	Posterior			
				Mean	5th%ile	Median	95th%ile
30	Containment - RCP Fire Frequency - Power Only - Prior			8.06E-03	1.19E-03	5.17E-03	2.28E-02
31	Containment - RCP Fire Frequency - Power - Prior			1.95E-02	4.88E-03	1.47E-02	4.80E-02
32	Containment - RCP Fire Frequency - Power	0	14.8	1.63E-02	4.71E-03	1.33E-02	3.70E-02
33	Diesel Generator Fire Frequency - Anytime - Prior			3.50E-02	2.06E-03	1.94E-02	1.39E-01
34	Diesel Generator Fire Frequency - Power Only - Prior			1.11E-02	1.09E-03	5.89E-03	3.73E-02
35	Diesel Generator Fire Frequency - Power - Prior			5.05E-02	8.17E-03	3.49E-02	1.60E-01
36	Diesel Generator Fire Frequency - Power	0	14.8	3.19E-02	6.58E-03	2.43E-02	8.28E-02
37	HVAC/Chiller Fire Frequency - Anytime - Prior			2.55E-03	1.19E-04	1.36E-03	9.45E-03
38	HVAC/Chiller Fire Frequency - Power Only - Prior			4.63E-04	1.23E-05	1.48E-04	1.77E-03
39	HVAC/Chiller Fire Frequency - Power - Prior			3.21E-03	2.65E-04	1.69E-03	1.22E-02
40	HVAC/Chiller Fire Frequency - Power	0	14.8	3.04E-03	2.59E-04	1.64E-03	1.19E-02
41	HVAC/Fans Fire Frequency - Anytime - Prior			1.77E-03	5.41E-05	7.38E-04	7.18E-03
42	HVAC/Fans Fire Frequency - Power Only - Prior			4.63E-04	1.23E-05	1.48E-04	1.77E-03
43	HVAC/Fans Fire Frequency - Power - Prior			2.42E-03	1.92E-04	1.43E-03	8.27E-03
44	HVAC/Fans Fire Frequency - Power	0	14.8	2.31E-03	1.85E-04	1.38E-03	7.78E-03
45	Low Power Cabinet Fire Frequency - Anytime - Prior			2.43E-02	7.40E-04	1.10E-02	1.06E-01

Table C-4

Generic and Ginna-Specific Fire Frequencies by Location/Equipment (Continued)

No.	Description	No. of Events	Power-Years	Posterior			
				Mean	5th%ile	Median	95th%ile
46	Low Power Cabinet Fire Frequency - Power Only - Prior			5.52E-03	1.57E-04	1.80E-03	2.13E-02
47	Low Power Cabinet Fire Frequency - Power - Prior			3.22E-02	2.60E-03	1.73E-02	1.04E-01
48	Low Power Cabinet Fire Frequency - Power	3	14.8	1.13E-01	3.04E-02	9.28E-02	1.94E-01
49	MCC Fire Frequency - Anytime - Prior			8.36E-03	2.29E-04	3.08E-03	2.59E-02
50	MCC Fire Frequency - Power Only - Prior			2.81E-03	1.42E-04	1.34E-03	1.01E-02
51	MCC Fire Frequency - Power - Prior			1.21E-02	1.16E-03	6.24E-03	3.95E-02
52	MCC Fire Frequency - Power	2	14.8	4.78E-02	7.10E-03	3.57E-02	1.28E-01
53	Motor Generator Set Fire Frequency - Anytime - Prior			2.75E-03	1.19E-04	1.29E-03	1.24E-02
54	Motor Generator Set Fire Frequency - Power Only - Prior			4.45E-04	1.25E-05	1.35E-04	1.72E-03
55	Motor Generator Set Fire Frequency - Power - Prior			3.38E-03	2.61E-04	1.62E-03	1.21E-02
56	Motor Generator Set Fire Frequency - Power	1	14.8	8.60E-03	9.14E-04	5.82E-03	2.31E-02
57	Screen House Fire Frequency - Anytime - Prior			6.75E-03	3.78E-04	3.16E-03	2.34E-02
58	Screen House Fire Frequency - Power Only - Prior			1.86E-03	1.40E-04	9.93E-04	5.99E-03
59	Screen House Fire Frequency - Power - Prior			9.38E-03	1.19E-03	5.58E-03	2.82E-02
60	Screen House Fire Frequency - Power	0	14.8	7.66E-03	1.14E-03	5.11E-03	2.24E-02

Table C-4

Generic and Ginna-Specific Fire Frequencies by Location/Equipment (Continued)

No.	Description	No. of Events	Power-Years	Posterior			
				Mean	5th%ile	Median	95th%ile
61	Switchgear - Above 480v Fire Frequency - Anytime - Prior			1.38E-02	4.84E-04	4.92E-03	4.85E-02
62	Switchgear - Above 480v Fire Frequency - Power Only - Prior			3.11E-03	1.42E-04	1.41E-03	1.23E-02
63	Switchgear - Above 480v Fire Frequency - Power - Prior			1.79E-02	1.69E-03	8.76E-03	5.71E-02
64	Switchgear - Above 480v Fire Frequency - Power	0	14.8	1.17E-02	1.57E-03	7.76E-03	3.51E-02
65	Switchgear - 480v & Below Fire Frequency - Anytime - Prior			1.21E-02	2.48E-04	3.41E-03	4.41E-02
66	Switchgear - 480v & Below Fire Frequency - Power Only -			3.24E-03	1.40E-04	1.43E-03	1.29E-02
67	Switchgear - 480v & Below Fire Frequency - Power - Prior			1.68E-02	1.33E-03	7.70E-03	5.52E-02
68	Switchgear - 480v & Below Fire Frequency - Power	1	14.8	2.66E-02	3.49E-03	1.69E-02	7.86E-02
69	Turbine Bldg - Other Fire Frequency - Anytime - Prior			7.88E-03	3.76E-04	3.19E-03	3.05E-02
70	Turbine Bldg - Other Fire Frequency - Power Only - Prior			1.16E-02	7.30E-04	6.53E-03	3.83E-02
71	Turbine Bldg - Other Fire Frequency - Power - Prior			2.47E-02	3.47E-03	1.61E-02	7.81E-02
72	Turbine Bldg - Other Fire Frequency - Power	5	14.8	1.45E-01	6.05E-02	1.50E-01	2.19E-01

Table C-4

Generic and Ginna-Specific Fire Frequencies by Location/Equipment (Continued)

No.	Description	No. of Events	Power-Years	Posterior			
				Mean	5th%ile	Median	95th%ile
73	Turbine Bldg - Turbine/Generator Fire Frequency - Anytime - Prior			3.68E-03	5.06E-04	2.10E-03	1.16E-02
74	Turbine Bldg - Turbine/Generator Fire Frequency - Power Only - Prior			2.08E-02	1.90E-03	1.35E-02	6.70E-02
75	Turbine Bldg - Turbine/Generator Fire Frequency - Power - Prior			3.31E-02	5.24E-03	2.25E-02	9.31E-02
76	Turbine Bldg - Turbine/Generator Fire Frequency - Power	0	14.8	2.35E-02	4.49E-03	1.87E-02	5.96E-02
77	Transformer - Hi Voltage Fire Frequency - Anytime - Prior			1.83E-02	1.67E-03	1.28E-02	5.34E-02
78	Transformer - Hi Voltage Fire Frequency - Power Only - Prior			3.04E-03	3.85E-04	1.64E-03	9.21E-03
79	Transformer - Hi Voltage Fire Frequency - Power - Prior			2.26E-02	4.10E-03	1.62E-02	5.93E-02
80	Transformer - Hi Voltage Fire Frequency - Power	1	14.8	2.98E-02	6.87E-03	2.27E-02	7.67E-02
81	Transformer - Instrument Fire Frequency - Anytime - Prior			6.12E-03	3.01E-04	2.05E-03	2.04E-02
82	Transformer - Instrument Fire Frequency - Power Only - Prior			3.03E-03	3.86E-04	1.64E-03	9.06E-03
83	Transformer - Instrument Fire Frequency - Power - Prior			1.05E-02	1.56E-03	5.77E-03	2.99E-02
84	Transformer - Instrument Fire Frequency - Power	0	14.8	8.04E-03	1.49E-03	5.43E-03	2.33E-02

Table C-4

Generic and Ginna-Specific Fire Frequencies by Location/Equipment (Continued)

No.	Description	No. of Events	Power-Years	Posterior			
				Mean	5th%ile	Median	95th%ile
85	Transformer - Lo Voltage Fire Frequency - Anytime - Prior			4.33E-03	3.57E-04	2.00E-03	1.54E-02
86	Transformer - Lo Voltage Fire Frequency - Power Only - Prior			3.04E-03	3.85E-04	1.64E-03	9.21E-03
87	Transformer - Lo Voltage Fire Frequency - Power - Prior			8.60E-03	1.66E-03	5.53E-03	2.32E-02
88	Transformer - Lo Voltage Fire Frequency - Power	0	14.8	7.29E-03	1.60E-03	5.15E-03	2.03E-02

D. Fire Frequency Apportionment

Location-based scenarios developed for a fire zone in the spatial interactions analysis phase of the analysis describe all possible fire events that can occur in the fire zone and conservatively assume that each fire event can damage all components within the fire zone. Thus, all fire initiators within a fire zone must be accounted for. Since more than one component type that can initiate a fire may be found in a fire zone, the fire initiation for a fire zone must account for the composite nature of the fire hazards. The primary fire initiation frequency for each fire zone was then assumed to be the sum of the component-based ignition frequency of the components found in the fire zone, except for those locations whose total fire frequencies are determined through data analysis.

D.1 Frequency Apportionment of a Category of Components

The component-based fire frequencies obtained for the fire occurrence frequency of each component category must be apportioned to different plant locations to correctly reflect the variety of the component categories and the actual inventory of the components, in situ fuel sources, and the personnel activities at the fire zone.

The primary objective of the fire frequency apportionment was to develop a reasonable estimate for the hazard frequency that consistently accounts for the actual configuration of equipment in each location. For example, the plant-specific mean fire occurrence frequency for the component category "battery-related fires" is assessed to be 1.92E-03 per year. This frequency stands for the estimated fire frequency from all battery-contributed fire events throughout the entire unit. To utilize this frequency, it must be systematically apportioned to different plant areas that contain batteries. [Note that the term "battery" is referred to banks of battery cells similar to those commonly found in a battery room. Fires related to small-sized backup batteries frequently found in control cabinets (e.g., control cabinet fires) are included as cabinet-related fire events instead of battery-related fire events.]

One method is to count all batteries in the plant and to apportion the fire frequency of battery component category to these areas proportionally. Another method is to assign a relative weighing factor to locations with battery banks. A weighing factor would be developed for each component type in each plant location of interest. The factor, which is based on inventory count, observations of the plant walkdown team, and the judgment of the plant personnel and analysts, is the relative fraction of the quantity of a particular component type in a location to the total quantity of such components found in the plant. The LCTs (Appendix B) present a cross-reference table between the fire zones and the population of the fire initiating components in the plant. For the countable equipment (e.g., pump), the entries would be the component count of the equipment type. For human error-related events, the entries are an activity level assigned through observations during walkdowns. For cable-related events, the entries are the estimated weighting factor of cable occupancy.

D.2 Development of Frequencies for Locations with Multiple Hazard Sources

In some locations, it is necessary to combine data for various types of hazards to develop the best possible frequency estimate for a particular scenario. These cases often apply to locations that contain combinations of mechanical equipment, electrical equipment, control cabinets, cables, etc. These combinations may result from a specific design feature of the plant that is being evaluated, or they may be a byproduct of the manner in which the fire frequencies have been defined. For example (not Ginna), an air compressor may be located in an open corner of a large cable spreading room. The air compressor may not be important for the PSA models. The estimated frequency for fire events in this location must account for the composite nature of the fire hazards, that is cables as well as the compressor. It is unreasonable to develop a fire occurrence frequency that is based only on "cable spreading room" fire events, even though the PSA impacts are derived only from failures of the cables.

These situations are addressed by developing a composite hazard frequency that accounts for the types of equipment and the relative density of equipment in each location. For example, a composite fire frequency would be developed for the cable spreading room by adding a fraction of the "turbine building air compressor" fire event frequency data to the "cable spreading room" fire event frequency data. The fractions are often based on general observations from the plant walkdown and the personal experience and judgment of the fire analysis experts. In the specific case of Ginna, an equipment location database is also available.

D.3 Allocation of Fire Event Categories to Ginna Plant Locations

This step of the spatial interactions analysis allocates the 22 fire event categories among the 47 Ginna plant locations (generic information was used for the diesel/generator fuel tank area in the yard). These allocations are derived from notes and information collected during the plant walkdowns, the cable routing database (Reference D.1) and the fire response plan drawings (Reference D.2). In some cases, the assigned percentages are very approximate. However, they provide a method to consistently allocate the fire event frequency data among the plant locations in a manner that accounts for the types, quantities, and distribution of equipment among these areas. Three general considerations were used as the bases for these allocations.

- Specific types of equipment in the location
- Relative amount of each equipment type, compared with all other locations
- Relative size of the location, compared with all other similar locations

The third consideration was used primarily for large, open areas in the Containment, Auxiliary Building, and Turbine Building.

The following simple example illustrates the basic elements of this allocation process. Suppose that Plant X contains only three locations. The spatial interactions walkdown has documented the following equipment inventories in each location.

Location 1: 2 pumps, 1 motor control center, 25% of the cables.

Location 2: two 480V buses, 4 motor control centers, 45% of the cables.

Location 3: 3 pumps, 30% of the cables.

Thus, Plant X contains a total of 5 pumps, 5 motor control centers, two 480V buses, and cables. The percentage of cables in each location is generally based on the walkdown analyst's notes and approximate estimates. (For the Ginna Station, the amount of cable in the fire zones was available from Reference D.3). The following table summarizes how this information is used to allocate the relevant fire event categories among these locations.

Event Category for Plant X	Location 1	Location 2	Location 3	Total
Auxiliary Building - Other	0.40		0.60	1.00
Switchgear - 480V and Below		1.00		1.00
Motor Control Center	0.20	0.80		1.00
Cable	0.25	0.45	0.30	1.00

In this example, the *Auxiliary Building - Other* allocations are based only on the total inventory of similarly sized pumps in each location. However, the analyst may subjectively adjust these percentages if Location 1 also contains a storage area, if Location 2 has substantially higher personnel traffic, etc.

Based on these allocations, the total fire frequency for Location 1 is the sum of 40% of the *Auxiliary Building - Other* fire frequency, plus 20% of the *Motor Control Center* fire frequency, plus 25% of the *Cable* fire frequency. This process accounts for the specific types and quantities of equipment in each location. The resulting composite fire frequencies are appropriately weighted combinations that account for the plant-specific distribution of equipment and numerical differences in the fire event frequencies for each type of equipment.

To arrive at a finalized count of equipment at any location, the total equipment at the plant was apportioned amongst the locations. Exercises similar to the above were conducted for the mechanical equipment, MCCs, and logic cabinets. As far as possible, References D.1 and D.2 were used to determine the components in the fire zones and supplemented by the walkdown observations. Larger components were given a twice the weight of the smaller components. The fractions used and the basis for the fractions (equipment count) for each fire zone and each type of equipment is shown in the Table D-1.

In addition to the actual equipment and material count, adjustment is made for fires caused by human errors. For example, the H_2 storage room and the turbine oil storage rooms have no mechanical equipment, no MCCs or cables. However, they do contain combustible material that may ignite due to human error. To account for these types of events, we consult the generic fire database. The auxiliary building fires in the generic database total 16 out of which, 5 were caused due to human error. Therefore, 5/16ths of

the fire total frequency in the auxiliary building was assigned as human error related fires. This frequency was again apportioned among the fire zones in the auxiliary building. The bases for these fractions, once again, depend on the observations during plant walkdown, noticing activity levels in different locations of the building. Added to this is the analyst's judgment about how much other activity is involved during normal plant operation with actions such as maintenance and testing of equipment.

The fire frequencies for each of the 47 Ginna locations were developed using the described apportioning techniques. The final fire frequency for each location is shown in Table D-2

D.4 References

1. *Ginna Station Cable Routing Database*, Microsoft Access Database, CABLETRK.MDB, June 1998.

2. Ginna Station Fire Response Drawings, Nos. 33013-2540 through 33013-2581.

3. Ginna Station Fire Combustible Loading Analysis, DA-ME-98-004, Revision 0, April 3, 1998.

Table D-1

Fire Frequency Allowcation for the Ginna Station

No.	Fire Zone	Auxiliary Building Rad-Waste	Auxiliary Building Other	Battery	Battery Charger/Inverter	D/G	Cable	Main turbine/Generator	Turbine Building Other	Screen House	MCC	Logic and Protection Cabinets	Switchgear High	Switchgear Low	Motor/Generator Set	HVAC Fans	HVAC Chillers	Transformer High	Transformer Low	Transformer Instrument	Control Room	Containment RCP	Containment Other	Cable BTUs
1	ABB	0.33	0.27				0.021				0.13	0.07				0.08								59,973,430
2	ABM	0.33	0.05				0.065				0.13	0.02		0.17		0.02			0.17					186,149,728
3	ABO	0.33	0.15				0.015				0.19	0.02		0.17		0.06			0.17					44,224,300
4	IBN-1		0.12				0.092					0.06			1.00	0.01	1.00							284,591,107
5	IBN-2		0.01				0.018					0.01				0.01								52,918,221
6	IBN-3		0.01				0.018									0.03								52,918,221
7	IBN-4		0.00				0.018																	52,918,221
8	IBS-1		0.02				0.018					0.02				0.02								52,918,221
9	IBS-2		0.02				0.018					0.02												52,918,221
10	IBS-3		0.01				0.018									0.10								52,918,221
11	CHG		0.19				0.003																	9,565,940
12	SAF		0.04				0.001					0.02												2,624,785
13	SB-1		0.05				0.003									0.01								7,530,112
14	SB-1HS		0.02				0.003																	7,530,112
15	SB-1WT		0.01				0.003				0.06					0.01								7,530,112
16	SB-2		0.04				0.003									0.07								7,530,112
17	AHR						0.037									0.05								105,292,375
18	BR1A			0.33	0.33		0.004													0.25				12,830,415
19	BR1B			0.33	0.33		0.007													0.25				19,205,007
20	BRB-CV						0.000																	30,000
21	BRRM						0.000					0.03												30,000
22	CR						0.000														1.00			
23	CT						0.193																	552,857,247
24	EDG1A-0						0.013																	38,832,850
25	EDG1A-1					0.40					0.06					0.02								
26	EDG1B-0						0.013																	36,589,415
27	EDG1B-1					0.40					0.06					0.02								
28	EDG1A-X						0.000																	30,000
29	RC-1						0.008									0.02							0.33	22,662,783
30	RC-2						0.012									0.05						1.00	0.33	33,994,174
31	RC-3						0.012																0.33	33,994,174
32	RR						0.149				0.06	0.68				0.02				0.25				425,563,319
33	RRA						0.015					0.02												42,556,332
34	SH-1						0.008																	22,479,502
35	SH-2						0.006			1.00	0.06	0.03		0.33		0.01			0.33					18,994,733
36	TB-1FP						0.008		0.09							0.01								24,160,542
37	TB-1						0.105		0.52		0.06					0.07								301,264,562
38	TB-2						0.070		0.13		0.06		1.00	0.33		0.13			0.33					200,980,832
39	TB-3						0.000	1.00	0.05															96,195
40	TO								0.02															
41	AVT						0.008		0.16		0.13					0.08								22,590,335
42	H2								0.02															
43	TSC-1M						0.003									0.02								7,530,112
44	TSC-1N						0.003									0.05								7,530,112
45	TSC-1S			0.33	0.33	0.20	0.003													0.25				7,530,112
46	TY-E						0.003											0.50						7,530,112
47	TY-W						0.003											0.50						7,530,112
	Total	1.00	1.00	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.00	1.0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2,865,244,414

Table D-2

Frequency Allocation for Ginna

No.	Fire Zone	Auxiliary Building Rad-Waste	Auxiliary Building Other	Battery	Battery Charger/ Inverter	D/G	Cable	Main turbine/ Generator	Turbine Building Other	Screen House	MCC	Logic and Protection Cabinets	Switchgear High	Switchgear Low	Motor/ Generator Set	HVAC Fans	HVAC Chillers	Transformer High	Transformer Low	Transformer Instrument	Control Room	Containment RCP	Containment Other	Total
		5.60E-03	2.78E-02	1.92E-03	1.28E-02	3.19E-02	7.02E-03	2.35E-02	1.45E-01	7.66E-03	4.78E-02	1.13E-01	1.17E-02	2.66E-02	8.60E-03	2.31E-03	3.04E-03	2.98E-02	7.29E-03	8.04E-03	5.12E-03	1.63E-02	1.58E-02	
1	ABB	1.87E-03	7.57E-03				1.47E-04				5.98E-03	7.83E-03				1.88E-04								2.36E-02
2	ABM	1.87E-03	1.37E-03				4.56E-04				5.98E-03	2.24E-03		4.43E-03		5.37E-05			1.22E-03					1.76E-02
3	ABO	1.87E-03	4.03E-03				1.08E-04				8.96E-03	2.24E-03		4.43E-03		1.34E-04			1.22E-03					2.30E-02
4	IBN-1		3.25E-03				6.48E-04					6.71E-03			8.60E-03	2.69E-05	3.04E-03							2.23E-02
5	IBN-2		2.61E-04				1.30E-04					1.12E-03				2.69E-05								1.54E-03
6	IBN-3		1.74E-04				1.30E-04									8.06E-05								3.84E-04
7	IBN-4		8.69E-05				1.30E-04																	2.17E-04
8	IBS-1		5.96E-04				1.30E-04					2.24E-03				5.37E-05								3.02E-03
9	IBS-2		5.21E-04				1.30E-04					2.24E-03												2.89E-03
10	IBS-3		1.74E-04				1.30E-04									2.42E-04								5.45E-04
11	CHG		5.39E-03				2.34E-05																	5.41E-03
12	SAF		1.17E-03				6.43E-06					2.24E-03												3.41E-03
13	SB-1		1.30E-03				1.84E-05									2.69E-05								1.35E-03
14	SB-1HS		5.21E-04				1.84E-05																	5.40E-04
15	SB-1WT		3.48E-04				1.84E-05				2.99E-03					2.69E-05								3.38E-03
16	SB-2		1.04E-03				1.84E-05									1.61E-04								1.22E-03
17	AHR						2.58E-04									1.07E-04								3.65E-04
18	BR1A			6.40E-04	4.27E-03		3.14E-05													2.01E-03				6.95E-03
19	BR1B			6.40E-04	4.27E-03		4.71E-05													2.01E-03				6.96E-03
20	BR1B-CV						7.35E-08																	7.35E-08
21	BRRM						7.35E-08					3.36E-03												3.36E-03
22	CR																				5.12E-03			5.12E-03
23	CT						1.35E-03																	1.35E-03
24	EDG1A-0						9.47E-05																	9.47E-05
25	EDG1A-1					1.28E-02					2.99E-03					5.37E-05								1.58E-02
26	EDG1B-0						8.96E-05																	8.96E-05
27	EDG1B-1					1.28E-02					2.99E-03					5.37E-05								1.58E-02
28	EDG1A-X						7.35E-08																	7.35E-08
29	RC-1						5.55E-05									5.37E-05							5.27E-03	5.38E-03
30	RC-2						8.33E-05									1.07E-04						1.63E-02	5.27E-03	2.18E-02
31	RC-3						8.33E-05																5.27E-03	5.35E-03
32	RR						1.04E-03				2.99E-03	7.72E-02				5.37E-05				2.01E-03				8.33E-02
33	RRA						1.04E-04					2.24E-03												2.34E-03
34	SH-1						5.51E-05																	5.51E-05
35	SH-2						4.18E-05			7.66E-03	2.99E-03	3.36E-03		8.87E-03		2.69E-05			2.43E-03					2.54E-02
36	TB-1FP						5.92E-05		1.30E-02							2.69E-05								1.31E-02
37	TB-1						7.38E-04		7.56E-02		2.99E-03					1.61E-04								7.95E-02
38	TB-2						4.92E-04		2.20E-02		2.99E-03		1.17E-02	8.87E-03		2.95E-04			2.43E-03					4.88E-02
39	TB-3						2.36E-07	2.35E-02	6.80E-03															3.03E-02
40	TO								2.27E-03															2.27E-03
41	AVT						5.53E-05		2.31E-02		5.98E-03					1.88E-04								2.93E-02
42	H2								2.27E-03															2.27E-03
43	TSC-1M						1.84E-05									5.37E-05								7.22E-05
44	TSC-1N						1.84E-05									1.07E-04								1.26E-04
45	TSC-1S			6.40E-04	4.27E-03	8.38E-03	1.84E-05													2.01E-03				1.33E-02
46	TY-E						1.84E-05											1.49E-02						1.49E-02
47	TY-W						1.84E-05											1.49E-02						1.49E-02
	Total	5.60E-03	2.78E-02	1.92E-03	1.28E-02	3.19E-02	7.02E-03	2.35E-02	1.45E-01	7.66E-03	4.78E-02	1.13E-01	1.17E-02	2.66E-02	8.60E-03	2.31E-03	3.04E-03	2.98E-02	7.29E-03	8.04E-03	5.12E-03	1.63E-02	1.58E-02	
		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	

Notes:

1. Rad waste equally distributed over the three floors of the aux building

2. 3 out of 16 events in aux building-other category (generic database) involve charging pumps

3. 5 out of 16 events in aux building-other category (generic database) involve human error initiated fires.

4. Mechanical equipment count of the three levels in the aux building, intermediate building, service building, and standby aux feedwater pump room (except fans)

   ABB 5 small and 11 large pumps or other components

   ABM 2 small compressors

   ABO 7 small and 2 large pumps or other components

   IBN-1 5 small and 3 large pumps or other components

   IBN-2 no mechanical components

   IBN-3 no mechanical components

   IBN-4 no mechanical components

   IBS-1 1 small pump

   IBS-2 no mechanical components

   IBS-3 no mechanical components

   SAF 2 large pumps

5. 2.5 of the 8 events in the turbine building-other (generic database) involve human error initiated fires.

6. Mechanical equipment (except fans) count and human error is assigned as follows:

   H2 · no mechanical equipment, 5% of human error frequency

   TO no mechanical equipment, 5% of human error frequency

   TB-1FP 1 small and 2 large pumps and 10% of human error frequency

TB-1 14 small and 10 large pumps and 40% of human error frequency

TB-2 9 small pumps and 20% of human error frequency

TB-3 no mechanical equipment, 20% of human error frequency

7. A count of the HVAC fans (total 87) is as follows:

ABB-1	7
ABM-2	2
ABO-3	5
AHR	4
AVT	7
CR	1
EDG1A-1	2
EDG1B-1	2
IBN-1	1
IBN-2	1
IBN-3	3
IBS-1	2
IBS-3	9
RC-1	2
RC-2	4
RR	2
SB-1	1
SB-1WT	1
SB-2	6
SH-2	1
TB-1	6
TB-1FP	1

TB-2	11
TSC-1M	2
TSC-1N	4

8. A count of the low power cabinets (total 116) is as follows:

ABB-1	10
ABM-2	6
ABO-3	3
AHR	3
BR1A	1
BR1B	1
BRRM	1
IBN-1	5
IBN-2	1
IBS-1	2
IBS-2	2
RR	68
RRA	2
SAF	5
SH-2	4
SH-1	2

ATTACHMENT B.3

EXTRACTS FROM SECTION 9.6 (INTERNAL FIRE RESULTS) AND 11.6 (SUMMARY AND CONCLUSION) OF THE GINNA PSA

LOCATION CHARACTERISTICS TABLE

FIRE AREA: TB

9.0 LEVEL 1 RESULTS

9.6 Internal Fire Results

Similar to the internal events PSA, the internal fire results were assessed with respect to sensitivities and importance measures. The results are summarized below.

9.6.1 Internal Fire Results

The total core damage frequency (CDF) due to internal fire is 3.3E-5/yr. The listing of the top 50 (and ties) of the final cutsets is shown in Table 9-14 (note -- these account for 43% of the CDF due to internal fire). A summary of the fire scenarios contributing at least 5.0% to the fire CDF is provided below.

9.6.1.1 Control Room Fires

Among the final cut sets, the largest contribution to the fire CDF (19.8%) comes from ignition of a fire in the Control Room's main control board and any two electrical cabinets that subsequently requires Control Room evacuation due to a significant loss of instrumentation and control (FI0CR3-1 and FACR-MCB). Thirty-five cabinets are installed in the Control Room in addition to the main control board cabinets. The total ignition frequency for a fire in the Control Room of 5.1E-3/yr (Ref. 164) was apportioned such that $1/50^{th}$ of the frequency was assigned for the ignition of any one cabinet and $15/50^{ths}$ of the frequency was assigned for the ignition of the main control board cabinets, based on the relative sizes of each. The ignition frequency is therefore (15/50 + 2/50)*(5.1E-3/yr) = 1.7E-3/yr. This is considered to be a transient which does not result in conditions for Safety Injection (SI) (AAAATRANSIN), nor does it cause a station blackout (NOSBO). Since there is no automatic suppression in the Control Room (FSAASUPPXX), only manual suppression by the Fire Brigade is possible. This is assumed to fail with a probability of 0.03 (FSHFDCR-3-X). Each of the dominant cut sets leading to core damage includes one of the following:

a. Non-fire-induced failure of the Technical Support Center (TSC) Diesel Generator (DG) to start or run (DGDGATSCXX or DGDGFTSCXX);
b. Unavailability of the turbine-driven Auxiliary Feedwater (TDAFW) Pump due to: (1) its train being out for test and maintenance (AFTM0TDAFW), (2) failure to correctly restore its train to service after test and maintenance (AFHFLTDAFW), or (3) non-fire-induced failures of its components (AFMM0TDAFW);
c. Spurious opening of SG A Blowdown Isolation AOV 5738 due to hot shorting of its control cable (MSHSF05738) while the TDAFW train injection line to SG B is out of service for test and maintenance (AFTMTDAFWB);
d. Any of the following fire-induced human errors:
    1. Failure to locally open discharge MOV 3996 from and steam supply MOV 3505A to the TDAFW Pump, per the attachments to the ER-FIRE Procedures (FSHFDAFWXX);
    2. Failure to align TSC DC power supply to Battery B for the TDAFW pump, per the attachments to the ER-FIRE Procedures (FSHFDDCPWR);
    3. Failure to locally operate PORV 430, per the attachments to the ER-FIRE Procedures (FSHFDPORVS);

4. Failure to employ alternate AFW/Steam Generator (SG) instrumentation after Control Room indication has been lost (FSHFDCROM2);
5. Failure to find alternative cooldown paths (specifically the TDAFW steam lines) (FSHFDREC03), after non-fire-induced failure of nitrogen bottles to supply SG A Atmospheric Relief Valve (ARV) 3411 (MSMMN2BOTA).

9.6.1.2 Turbine Building Fires

The next largest contribution among the final cut sets to the fire CDF (14.7%) arises from ignition of fires in the Turbine Building, at specific locations on the Mezzanine and Basement Levels. These are discussed below.

a. The larger contribution (9.6%) from fires in the Turbine Building arises from ignition of a fire in Bus Cabinet 11A/12A or 11B/12B at the Mezzanine Level (FI0TB2-1 and FATB-2-2). The total ignition frequency for these cabinets is 1.2E-2/yr (Ref. 164). There is no automatic suppression, and manual suppression, even if successful, was assumed not to extinguish the fire within the affected cabinet in time to prevent accident progression (FSAASUPPOK). This is followed by a loss of AC Train A (ACTRAINA) as a direct result of the fire. These particular events lead to two sets of scenarios characterized by: (1) a transient without station blackout (NOSBO), but with a small LOCA (SLO); and (2) a transient with station blackout (SBO). Each set is discussed below.

    1. *Transients without Station Blackout, but with a Small LOCA.* In these scenarios, a small LOCA occurs after the loss of Main Feedwater (MFW) (as supplied by AC Buses 11 and 12) when PORV 430 fails to reseat after steam relief (RCRZT00430) and its motor-operated block valve (516) has no AC power. The dominant cut sets leading to core damage include coincident events among the following:

        i. Unavailability of RHR train B due to its being out of service for test or maintenance (RHTM00000B);
        ii. Non-fire-induced failure to open of MOV 738B to supply Component Cooling Water (CCW) to Residual Heat Removal (RHR) Heat Exchanger (HX) B (CCMM00738B);
        iii. Human mispositioning of CCW throttling isolation valve 780B on the outlet side of RHR HX B (CCHFL0780B).

    2. *Transients with Station Blackout.* In this scenario, the loss of all offsite power following the reactor trip (ACLOPRTALL) causes loss of AC Train B (ACTRAINB) when the fire forces an interlocked feeder breaker to Bus 16 to fail to open, thereby preventing DG B from connecting to Bus 16. With the assumed unavailability of the TDAFW train due to its being out for test and maintenance (AFTM0TDAFW), core damage results.

b. The smaller contribution (5.1%) from fires in the Turbine Building arises from ignition of a fire in the vicinity of the power supply cables to AC Buses 14, 16, 17, or 18 at the Basement Level (FI0TB1-1 and FATB-1-1). The total ignition frequency for combustibles in this location is 1.4E-3/yr (Ref. 164). This is considered to be a transient initiating event which does not result in conditions for SI (AAAATRANSIN), but involves a station blackout (SBO). Non-fire-induced failure of DG A to run (DGDGF0001A) occurs. (As above, the fire itself forces an interlocked feeder breaker to Bus 16 to fail to open, which prevents DG B from connecting to Bus 16.) Although automatic suppression is available (Suppression Systems S24 through S27), the one in the immediate vicinity of the fire is assumed to fail (FSAASUPPXX). This is assumed to fail power cables to the affected AC bus from DG B. Each of the dominant cut sets leading to core damage includes failure of one of the following automatic sprinkler systems, specifically the one in the immediate vicinity of the fire:

1. Spray S24 (Turbine Condenser Pit vicinity) (FSXXXTR768);
2. Spray S25 (Generator Hydrogen Seal vicinity) (FSXXXTR769);
3. Spray S26 (Turbine Island vicinity) (FSXXXTR770);
4. Spray S27 (Main Turbine Oil Reservoir vicinity) (FSXXXTR771).

9.6.1.3 Battery Room Fires

The next largest contribution among the final cut sets to the fire CDF (11.8%) arises from ignition of fires in Battery Rooms A and B (FIBR1A-3 and FABR1A; FIBR1B-3 and FIBR1B). Each room contains batteries, battery chargers, inverters, cables, and transformers. The total ignition frequency for each room is 6.9E-3/yr (Ref. 164), assuming fire can occur in any one of these combustibles. Since there is no automatic suppression in the Battery Rooms (FSAASUPPXX), only manual suppression by the Fire Brigade is possible. This is assumed to fail with a probability of 0.03 (FSHFDBR1A3 and FSHFDBR1B3). It is further assumed that the fire has spread beyond its initial source (probability = 0.1) prior to suppression (FSASPROP01). Each Battery Room is discussed separately below.

a. *Battery Room A.* Fire in this room, which contributes 6.8% to the fire CDF, is considered to be a transient which does not result in conditions for SI (AAAATRANSIN), nor does it cause a station blackout (NOSBO). Each of the dominant cut sets leading to core damage includes one of the following:

1. Non-fire-induced failure of the TSC DG to start or run (DGDGATSCXX or DGDGFTSCXX);
2. Unavailability of the TDAFW Pump due to: (1) its train being out for test and maintenance (AFTM0TDAFW), or (2) non-fire-induced failures of its components (AFMM0TDAFW);
3. Human failure to align TSC DC power supply to Battery B for the TDAFW pump, per the attachments to the ER-FIRE Procedures (FSHFDDCPWR).

b. *Battery Room B*. Fire in this room, which contributes 5.0% to the fire CDF, is considered to be a transient which induces a station blackout (SBO). The fire itself fails AC Train B. Each of the dominant cut sets leading to core damage includes one of the following which prevents AC Train A from being powered:

1. Unavailability of DG A due to test or maintenance (DGTM00001A);
2. Loss of AC Motor Control Center (MCC) H when feeder circuit breaker 52/MCCH transfers open due to a cable wrap failure (ACWPFMCC1H) that occurs once the fire duration reaches one hour (FSAAFIRE1H);
3. Loss of AC MCC H when disconnect switch DCPDPCB03A/03 transfers open due to a cable wrap failure (DCWPFC3ACX) that occurs once the fire duration reaches one hour (FSAAFIRE1H).

9.6.2 Internal Fire Sensitivity Analysis

As described in Section 9.3.1, sensitivity analyses were performed for eight types of basic events within the internal events PSA models (i.e., human errors, test and maintenance, common cause failures, initiating events, MOVs, AOVs, DGs, and pumps). Since the fire analysis used the same fault tree models and event trees as the internal events PSA, only the new basic events need to be assessed. Also, every cut set contains a similar fire initiating event (vs. the internal events PSA which addressed LOCAs, steam line breaks, reactor trips). As such, no sensitivity was performed on the fire initiators. Therefore, of the eight basic event types, only human errors were considered. However, another category, hot-short-induced failures, was also addressed. Both are discussed below.

9.6.2.1 Human Errors

Two sensitivity studies were performed with respect to human errors. First, all human errors were set to "false" (i.e., all were assumed to be performed successfully). As a result, the fire CDF decreased by 69% to a value of 1.0E-5/yr, indicating a large sensitivity of the accident sequences to human reliability failure rates. The decreases in the contributions from the dominant scenarios were as follows.

For the dominant Control Room fires (FI0CR3-1 and FACR-MCB), the contribution to fire CDF dropped by 99.2%. This indicates that these Control Room fire scenarios essentially are totally dependent on successful human intervention. This is evident from the description in Section 9.6.1.1. Nearly all Control Room fire scenarios are conditional upon failure of manual suppression (FSHFDCR-3-X).

For the dominant Turbine Building fires (FI0TB2-1 and FATB-2-2; FI0TB1-1 and FATB-1-1), the contribution to fire CDF dropped by 30.5%. Therefore, the dependence of these Turbine Building fire scenarios upon successful human intervention was much less pronounced that those for the Control Room, as one might expect. For the Turbine Building Mezzanine fires, recall from Section 9.6.1.2 that manual suppression, even if successful, was assumed not to extinguish the fire in time to prevent accident progression (FSAASUPPOK). For the Turbine Building Basement fires, only automatic suppression was available, and this was assumed to fail (FSAASUPPXX).

For the dominant Battery Room fires (FIBR1A-3 and FABR1A; FIBR1B-3 and FIBR1B), the contribution to fire CDF dropped by 87.2%, nearly as much as for the Control Room. As for the Control Room, most Battery Room fire scenarios (see Section 9.6.1.3) are conditional upon failure of manual suppression (FSHFDBRIA3 and FSHFDBR1B3) since no automatic suppression exists.

The second sensitivity study on human errors involved setting all human errors to "true," equivalent to assuming that humans always erred. The fire CDF increased by a factor of 1.48E+4 to a value of 0.494/year as a result. This indicates that successful human intervention is very important to prevent core damage from fires and that humans are considered to be highly reliable in performing the required actions.

9.6.2.2 Hot-Short-Induced Failures

The sensitivity of the fire CDF to spurious energization/de-energization of control and power cables due to hot shorting was also assessed in a manner similar to that for human errors. When all hot short failures were set to "false" (i.e., assuming no hot shorts occurred), the fire CDF decreased by only 6.0% to a value of 3.15E-5/yr. The effect on the dominant accident scenarios was similarly small. This indicates that hot-short-induced failures are a small contributor to the fire CDF. A review of Section 9.6.1 indicates only one contribution among the dominant scenarios, that arising from MSHSF05738 for the Control Room fires. When all hot short failures were set to "true," equivalent to assuming that they always occurred, the fire CDF increased by 61% to a value of 5.41E-5/yr. This relatively modest increase indicates, again, that hot shorts are a small contributor to the fire CDF, but that their conditional probability of occurrence (many assumed to be 0.1) is already fairly high.

9.6.2.3 Internal Fire Truncation Limit Evaluation

As a final sensitivity study, the truncation limit was evaluated with respect to its impact on the final results. This was performed by generating Figure 9-14 which shows the contribution of the cut sets in each "decade" (e.g., 1E-6/yr, 1E-7/yr, etc.) to the final fire CDF. Figure 9-14 indicates that the CDF contained in each decade initially rises, peaking at 1.11E-5/yr in the third decade (1E-7/yr to 1E-8/yr), then decreases rapidly over the last two decades. The cut sets whose frequencies are >1E-9/yr contribute over 93% to the final CDF. Also, as noted on the figure, over 76% of the total number of cut sets have frequencies in the last decade (1E-9/yr to 1E-10/yr); however, these contribute less than 7% to the final CDF. Consequently, further reduction of the truncation limit should not significantly impact the CDF estimation.

9.6.3 Importance Analysis

As described in Section 9.3.2, two types of importance measures were generated for most basic events contained in the final cutsets: (1) Fussell-Vesely (F-V), and (2) Risk Achievement Worth (RAW). These importance measures were combined as follows:

a. If the F-V value is ≥ 0.05 at the system level (≥ 0.005 at the component level) and the RAW ≥ 10 at the system level (≥ 2 at the component level), then the system or component will be identified as being "high" risk significant.

b. If the F-V value is ≥ 0.05 at the system level (≥ 0.005 at the component level) or the RAW ≥ 10 at the system level (≥ 2 at the component level), then the system or component will be identified as being "medium" risk significant.

c. If the F-V value is < 0.05 at the system level (< 0.005 at the component level) and the RAW < 10 at the system level (< 2 at the component level), then the system or component will be identified as being "low" risk significant.

The F-V and RAW importance measures were generated for fire initiating events, human errors, test and maintenance activities, fire modeling assumptions, and on a system and component basis. Each of these is described below in detail. Included within these discussions is a reference to a table and figure containing the specific F-V and RAW values. The table is self-explanatory; however, additional information with respect to the figure is necessary to ensure correct interpretation.

In order to provide a visual depiction of the risk profile associated with various events modeled within the Ginna Station PSA, the F-V and RAW importance measures were plotted against one another. In this manner, it can be easily identified which events are of higher risk than others. For example, all human error F-V and RAW values plotted are on Figure 9-16. A "cross-hair" was provided on the figure for F-V values equal to 0.005 (vertical line) and RAW values equal to 2 (horizontal line). Any event to the left of the F-V line or below the RAW line is not risk significant with respect to that specific importance measure. However, an event to the left of the F-V line but above the RAW line is risk significant with respect to RAW only. Similarly, an event to the right of the F-V line but below the RAW line is risk significant with respect to F-V only (e.g., FSHFDREC03). Events which are to the right of the F-V line and above the RAW line are risk significant with respect to both importance measures (e.g., FSHFDDCPWR).

In summary, an event in the upper left hand corner or lower right hand corner is of medium risk significance. An event in the upper right hand corner is of high risk significance while events in the lower left hand corner are of low risk significance. Further insights can also be obtained by which "corner" a given event is in as described below:

a. An event in the upper left hand corner is generally of high reliability; consequently, the event did not contribute significantly to the final CDF. However, if the component were to fail, the impact on the final CDF would be significant. Typically, this corner contains passive components, highly redundant systems, or events which are easily performed by operators.

b. An event in the lower right hand corner is typically of lower reliability than is justified by the fault tree model. That is, the event contributes to the final CDF; however, if the event were assumed to always fail, it is not expected to further affect the final results. Generally, this is due to the fact that the event's failure probability is already close to 1.0 such that increasing its value to 1.0 would not have much of an effect on the CDF. It should be noted that an event's failure probability may have been a conservative value selected by the PSA analyst due to limited data and is not necessarily reflective of the specific component history. If so, this is noted in the descriptive text below.

c. An event in the upper right hand corner contributes significantly to the final results and would significantly affect the CDF if it were assumed to always fail. Therefore, this event is very important with respect to the risk profile.

d. An event in the lower left hand corner does not contribute to the final result, and even if it were assumed to fail with a probability of 1.0, would not significantly impact the CDF.

9.6.3.1 Internal Fire Initiating Events

The importance measures for the internal fire initiating events are listed in Table 9-15 and displayed in Figure 9-15. The following three events are of high importance:

a. FI0CR3-1 Fire in Zone CR-3 (Control Room)
b. FIBR1A-3 Fire in Zone BR1A (Battery Room A)
c. FI0TB1-1 Fire in Zone TB1-1 (Turbine Building Basement)

Each contributed ≥ 5.0% to the fire CDF (F-V ≥ 0.05), as discussed in Section 9.6.1; and, if the initiator were assumed to be "true," it would raise the fire CDF by a factor ≥ 10 (RAW ≥ 10).

Two events are of medium importance based on an F-V value ≥ 0.05:

a. FI0TB2-1 Fire in Zone TB2-1 (Turbine Building Mezzanine)
b. FIBR1B-3 Fire in Zone BR1B (Battery Room B)

Both were discussed in Section 9.6.1.

Four events are of medium importance based on a RAW value ≥ 10:

a. FIDG1B10 Fire in Zone EDG1B-0 (DG Room B Cable Vault)
b. FI0CR3-3 Fire in Zone CR-3 (Control Room) (Fails Division A only)
c. FI00ABO1 Fire in Zone ABO (Auxiliary Building Operating Level)
d. FI00AHR1 Fire in Zone AHR (Air Handling Room)

While none of these contributes at least 5.0% to the fire CDF, each, if assumed to be "true," would increase the fire CDF by a factor of at least 10. These could be of concern if the combustible loadings, and therefore the fire ignition frequencies, in the zones were to increase, e.g., via presence of transient combustibles.

9.6.3.2 Human Errors

The importance measures for the human errors are listed in Table 9-16 and displayed in Figure 9-16. Excluded are the following two groups of "human errors:"

a. Latent human errors associated with test and maintenance activities, which have been included with the test and maintenance activities in Section 9.6.3.3.

b. Failures to manually suppress fires, which have been included with the modeling assumptions in Section 9.6.4.4.

For the human errors included in this section, the following 11 events are of high importance:

a.	FSHFDCROM2	Failure to employ alternate AFW/SG instrumentation after Control Room indication has been lost
b.	FSHFDDCPWR	Failure to align TSC DC power supply to Battery B for the TDAFW pump, per the attachments to the ER-FIRE Procedures
c.	AFHFDSAFWX	Failure to correctly align Standby AFW (SAFW)
d.	FSHFDPORVS	Failure to locally operate PORV 430, per the attachments to the ER-FIRE Procedures
e.	AFHFDCITYW	Failure to use city fire water for SAFW, per Procedure ER-AFW.1
f.	FSHFDAFWXX	Failure to locally open discharge MOV 3996 from and steam supply MOV 3505A to the TDAFW Pump, per the attachments to the ER-FIRE Procedures
g.	AFHFDALTTD	Failure to provide cooling to the TDAFW pump lube oil from the diesel-driven Fire Service Water (SW) pump
h.	FSHFDCROM1	Failure to use alternate instrumentation for natural circulation when Control Room indication is lost
i.	RCHFDRHRSB	Failure to rapidly depressurize the primary system to the level for initiating RHR, or failure to use AFW in the long term
j.	AFHFDBLOWD	Failure to isolate SG blowdown locally
k.	SWHFDSTART	Failure to start a SW pump.

Each contributed ≥ 0.5% to the fire CDF (F-V ≥ 0.005); <u>and</u>, if the event were assumed to be "true," it would raise the fire CDF by a factor ≥ 2 (RAW ≥ 2). Four actions ([a], [b], [d], and [f]) were discussed in Section 9.6.1. Four of the other human errors appear in ([e] and [g]) or near ([c] in #52 and [i] in #57) the top 50 cut sets. Of the remaining three human errors, FSHFDCROM1 appears in cut sets containing several different initiators; SWHFDSTART appears in cut sets where the initiator is a fire in the West Transformer Yard; and AFHFDBLOWD appears in cut sets similar to those discussed in Section 9.6.1.1 resulting from Control Room fire initiator FI0CR3-1, where an SG blowdown isolation AOV spuriously opens due to a hot short (in this case, AOV 5737 instead of AOV 5738). Finally, all actions but [d] and [k] are directly tied to AFW or SAFW.

All human errors of medium importance arose solely due to an F-V value ≥ 0.005. None had RAW values ≥ 2 (other than the ones of high importance). The six human errors of medium importance are as follows:

a.	RCHFDPLOCA	Failure to close the block valve corresponding to an open PORV within three minutes
b.	FSHFDREC03	Failure to find alternative cooldown paths (specifically the TDAFW steam lines) (discussed in Section 9.6.1.1)
c.	DGHFDCITYW	Failure to connect city water to DG cooling per Procedure ER-DG (appearing in the top 50 cut sets)

d.	CVHFDSUCTN	Failure to locally open the suction line from the Reactor Water Storage Tank (RWST) to the charging pumps upon loss of Instrument Air (IA) (appearing in the top 50 cut sets)
e.	HVHFDSAFWB	Failure to recover cooling to the SAFW Room for long-term protection of the SAFW pumps (appearing in cut sets containing the initiator FIDG1B10, discussed in Section 9.6.3.1)
f.	FSHFDDGAXY	Failure to strip Bus 18 loads and locally close the breaker for DG A, per the attachments to the ER-FIRE Procedures (appearing in cut set #61 containing initiator FIBR1B-3, discussed in Section 9.6.1.3).

9.6.3.3 Test and Maintenance Activities

The importance measures for the unavailabilities due to test and maintenance activities are listed in Table 9-17 and displayed in Figure 9-17. Note that these include latent human errors associated with test and maintenance activities, as discussed in Section 9.6.3.2. The following eight events are of high importance:

a.	AFTM0TDAFW	Unavailability of the TDAFW Pump due to its train being out for test and maintenance
b.	RHTM00000B	Unavailability of RHR train B due to its being out of service for test or maintenance
c.	AFTMMAFSGB	Unavailability of motor-driven AFW Train B to SG B due to its being out of service for test or maintenance
d.	AFHFLTDAFW	Failure to correctly restore the TDAFW pump train to service after test and maintenance
e.	DGTM00001A	Unavailability of DG A due to test or maintenance.
f.	CCHFL0780B	Human mispositioning of CCW throttling isolation valve 780B on the outlet side of RHR HX B
g.	AFHFL0AFWB	Failure to restore AFW Motor-Driven Pump Train B to service after test and maintenance
h.	AFHFLSAFWB	Failure to restore SAFW Pump Train D to service after test and maintenance.

Each contributed ≥ 0.5% to the fire CDF (F-V ≥ 0.005); <u>and</u>, if the event were assumed to be "true," it would raise the fire CDF by a factor ≥ 2 (RAW ≥ 2). Five of the events ([a], [b], [d], [e], and [f]) were discussed in Section 9.6.1. AFTMMAFSGB appears in the cut sets among the top 50 which result from a fire in the Auxiliary Building Basement. These cut sets also contain the event AFMM0TDAFW, discussed in Section 9.6.1.1, and represent similar types of scenarios. AFHFL0AFWB and AFHFLSAFWB appear in cut sets containing different initiators. These cut sets also contain either of the events AFMM0TDAFW or AFTM0TDAFW, discussed in Section 9.6.1.1, and represent similar types of scenarios.

All unavailabilities due to test and maintenance activities of medium importance arose solely due to an F-V value ≥ 0.005. None had RAW values ≥ 2 (other than the ones of high importance). The seven of medium importance are as follows:

a.	AFTMTDAFWB	Unavailability of the TDAFW train injection line to SG B due to it being out of service for test and maintenance (discussed in Section 9.6.1.1)
b.	CVTMCHPMPA	Unavailability of Charging Pump A due to test and maintenance
c.	AFTMTDAFWA	Unavailability of the TDAFW train injection line to SG A due to it being out of service for test and maintenance (appearing in cut sets containing FI0TB2-1, discussed in Section 9.6.1.2)
d.	DGTM00001B	Unavailability of DG B due to test or maintenance (appearing in cut sets containing several different initiators)
e.	AFTMSAFSGB	Unavailability of SAFW Train D injection line to SG B due to it being out of service for test and maintenance (appearing with its sister event AFTMSAFSGA in cut sets containing several different initiators)
f.	AFTMSAFSGA	Unavailability of SAFW Train C injection line to SG A due to it being out of service for test and maintenance (appearing with its sister event AFTMSAFSGB in cut sets containing several different initiators)
g.	AFTMMAFSGA	Unavailability of motor-driven AFW Train A to SG A due to its being out of service for test or maintenance (appearing in cut sets containing the initiator FI0BR1B-3, discussed in Section 9.6.1.3).

Observe that RHTM00000B and DGTM00001A are of high importance, while their counterparts RHTM0000A and DGTM00001B are of low and medium importance, respectively. The differences arise from the difference between initiating events. For fires in the West Transformer Yard (FI00TYW1), there is a direct loss of offsite power. If DG B is unavailable (including its being out of service for test and maintenance, DGTM00001B), core damage results if RHR Train A is also unavailable (including its being out of service for test and maintenance, RHTM00000A). Likewise, if DG A is unavailable (including its being out of service for test and maintenance, DGTM00001A), core damage results if RHR Train B is also unavailable (including its being out of service for test and maintenance, RHTM00000B). Thus, equal contributions to the fire CDF arise from the four events due to fire in the West Transformer Yard. However, contributions from RHTM0000B and DGTM00001A also arise from fires on the Turbine Building Mezzanine Level (FI0TB2-1) and fires in Battery Room B (FI0BR1B-3), respectively due to the consequences of these fires (see Section 9.6.1). Since both of these fire initiators are of high importance (see Section 9.6.3.1), the contributions to the fire CDF from RHTM0000B and DGTM00001A are increased over those from their counterparts RHTM0000A and DGTM00001B. Thus, their importances become high.

9.6.3.4 Modeling Assumptions

The importance measures for the modeling assumptions are listed in Table 9-18 and displayed in Figure 9-18. Note that these include failures to manually suppress fires, as discussed in Section 9.6.3.2. None of the modeling assumptions are of high importance. There are eight of medium importance, solely due to an F-V value ≥ 0.05. None had RAW values ≥ 10. The eight modeling assumptions of medium importance are as follows:

a.	FSHFDCR-3-X	Failure of the Fire Brigade to manual suppress a Control Room fire
b.	FACR-MCB	Tag representing equipment assumed failed by ignition of a fire in the Control Room's main control board and any two electrical cabinets that subsequently requires Control Room evacuation due to a significant loss of instrumentation and control
c.	FSASPROP01	Tag representing assumption that fire spread beyond its initial source prior to suppression
d.	FADIVA	Tag representing equipment assumed failed by loss of AC Electric Power Division A due to fire
e.	FATB-2-2	Tag representing equipment assumed failed by ignition of a fire in Bus Cabinet 11A/12A or 11B/12B at the Turbine Building Mezzanine Level
f.	FSHFDBR1A3	Failure of the Fire Brigade to manual suppress a fire in Battery Room A
g.	FABR1A	Tag representing equipment assumed to be failed by ignition of a fire in Battery Rooms A
h.	FALOSP-R	Tag representing equipment assumed to be failed by a recoverable loss of offsite power due to a fire.

All of the above are discussed in Section 9.6.1 except for [d] and [h]. The tagging event FADIVA appears in cut sets containing several different initiators and appears in the top 50 cut sets. The tagging event FALOSP-R appears in cut sets resulting from a fire in the West Transformer Yard (FI00TYW1), which has been discussed in the previous section.

9.6.3.5 Systems

The importance measures for the systems are listed in Table 9-19 and displayed in Figure 9-19. The following nine systems are of high importance:

a.	FSW	Fire Service Water
b.	AC	AC Power
c.	AFW	Auxiliary Feedwater
d.	CCW	Component Cooling Water
e.	DG	Diesel Generator
f.	SAFW	Standby AFW
g.	RC	Reactor Coolant
h.	RHR	Residual Heat Removal
i.	SW	Service Water

Each contributed ≥ 5.0% to the fire CDF (F-V ≥ 0.05); and, if the all the events associated with they system were assumed to be "true," it would raise the fire CDF by a factor ≥ 10 (RAW ≥ 10). A review of Section 9.6.1 indicates that initiators, tags, flags, and events associated with all nine of these systems except SAFW and SW are directly mentioned among the dominant scenarios. Similar items from the SAFW and SW systems appear in (SAFW) or near (SW, in cut set #53) the top 50 cut sets, as well as being discussed in Sections 9.6.3.2 and 9.6.3.3. The front-line systems FSW, AFW, SAFW, RC, and RHR serve either to mitigate the fire or reduce the likelihood of resulting core damage. The support systems AC, CCW, DG, and SW provide required functions, such as electric power or component cooling, to these and other critical front-line systems.

All systems of medium importance arose solely due to a RAW value ≥ 10. None had F-V values ≥ 0.05 (other than the ones of high importance). The seven of medium importance are as follows:

a.	DC	125-VDC Power
b.	IB	120-VAC Instrument Bus
c.	HVAC	Heating, Ventilation, and Air-Conditioning
d.	ESFAS	Engineered Safeguards Features Actuation
e.	MS	Main Steam
f.	UV	Undervoltage
g.	CVCS	Chemical Volume and Control.

These are characteristically reliable and redundant systems, requiring minimal human action for their operation.

9.6.3.6 Components

The importance measures for the components are listed in Table 9-20 and displayed in Figure 9-20. The following 21 components are of high importance:

a.	AFMM0TDAFW	Non-fire-induced failure of the TDAFW pump
b.	DGDGFTSCXX	Non-fire-induced failure of the TSC DG to run
c.	RCRZT00430	Non-fire-induced failure of PORV 430 to reseat after steam relief
d.	AFMMSAFWPD	Non-fire-induced failure of SAFW Pump Train D
e.	SWCXXSUCTN.	Non-fire-induced total failure of common SW/FSW suction
f.	FSXXXTR803	Non-fire-induced failure of the Relay Room Halon Suppression System (S08)
g.	RCRZT0431C	Non-fire-induced failure of PORV 431C to reseat after steam relief
h.	AFCCAFWSTR	Non-fire-induced common cause failure (CCF) of all three AFW pumps to start
i.	FSDGAPFP01	Non-fire-induced failure of the diesel-driven FSW pump to start
j.	DGDGFASCXX	Non-fire-induced failure of the TSC DG to start
k.	DGMMASTART	Non-fire-induced failure of DG A to start due
l.	CCMM00738B	Non-fire-induced failure to open of MOV 738B to supply CCW to RHR HX B
m.	ACMMMCC01D	Non-fire-induced failure of MCC D

n.	AFMMSGBINJ	Non-fire-induced failure of AFW Train B injection line to SG B
o.	DGMMBRKR14	Non-fire-induced failure of DG A supply breaker to Bus 14 to close
p.	TLCCFBRKRF	Non-fire-induced failure to SCRAM due to electrical failure of the Reactor Trip Breakers (RTBs)
q.	AFMMMDFP1B	Non-fire-induced failure of motor-driven AFW Pump Train B
r.	RHMMAC01BA	Non-fire-induced failure of the RHR Pump B to start
s.	DGCC000RUN	Non-fire-induced CCF of both DGs to run
t.	TLCCFMATWS	Non-fire-induced failure to SCRAM due to mechanical failures
u.	DGCC0START	Non-fire-induced CCF of both DGs to start.

Each contributed ≥ 0.5% to the fire CDF (F-V ≥ 0.005); and, if the event were assumed to be "true," it would raise the fire CDF by a factor ≥ 2 (RAW ≥ 2). Several ([a], [b], [c], [j], and l]) were discussed in Section 9.6.1. All of the remaining, except the two related to SCRAM failures ([p] and [t]), are associated with systems of high importance as discussed in Section 9.6.3.5. TLCCFBRKRF and TLCCFMATWS are pertinent to ATWS scenarios, one of which appears as cut set #59, another as cut set #76. The ATWS events are caused by electrical and mechanical failures to trip the reactor following a loss of offsite power with fire-induced failures of the PORVs to provide necessary primary system relief.

Cutsets with Descriptions Report

@FIRE1 = 3.34E-05

#	Inputs	Description	Rate	Exposure	Probability
1	FI0CR3-1	Fire in Zone CR-3 (Scenario 1 and 2)		0.0	1.53E-06
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	DGDGFTSCXX	TSC Diesel Generator fails to run	1.25E-03	24.0	
	FACR-MCB	CR-MCB Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSHFDCR-3-X	Fire Brigade fail to manually suppress fire in Control Room		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
2	FI000RC3	Fire in Zone RC-3		0.0	1.33E-06
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	FARC-3	RC-3 Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	FSCORR0003	CORRECTION FACTOR FOR RECOVERY OF CONTROL ROOM INDICATION FOR CNMT FIRE		0.1	
	FSHFDCROM2	Ops fail to use alternate AFW / SG instrumentation when Control Room indication los		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
3	FI0CR3-1	Fire in Zone CR-3 (Scenario 1 and 2)		0.0	1.06E-06
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	AFTM0TDAFW	TDAFW Pump Train out-of-service for maintenance		0.0	
	FACR-MCB	CR-MGB Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSHFDCR-3-X	Fire Brigade fail to manually suppress fire in Control Room		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
4	FI0TB2-1	Fire in Zone TB-2 (Scenario 1 and 2)		0.0	7.26E-07
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	FATB-2-2	TB-2-2 Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
	RCMVD00516N	Motor-Operated Valve 516 Is Not Closed Due To PORV Leakage		1.0	
	RCRZT00430	PORV PCV-430 Fails To Reseat After Steam Relief	5.00E-03	1.0	
	RHTM00000B	TRAIN B OOS FOR MAINTENANCE		0.0	
	SLO	SMALL LOCA SEQUENCE TAGGING EVENT		1.0	
	TLSTRANS	TAGGING EVENT TO IDENTIFY TL_S_TRANS SEQUENCES		1.0	
5	FI0CR3-1	Fire in Zone CR-3 (Scenario 1 and 2)		0.0	6.47E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	AFMM0TDAFW	Failure of TDAFW pump train components		0.0	
	FACR-MCB	CR-MCB Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSHFDCR-3-X	Fire Brigade fail to manually suppress fire in Control Room		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	

#	Inputs	Description	Rate	Exposure	Probability
6	FIBR1A-3	Fire in Zone BR1A (Scenario 3 and 4)		0.0	6.21E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	DGDGFTSCXX	TSC Diesel Generator fails to run	1.25E-03	24.0	
	FABR1A	BR1A Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSASPROP01	Fire propagates beyond initial source		0.1	
	FSHFDBR1A3	Fire Brigade fail to manually suppress fire in Battery Zone BR1A-3		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
7	FI0CR3-1	Fire in Zone CR-3 (Scenario 1 and 2)		0.0	5.10E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	FACR-MCB	CR-MCB Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSHFDAFWXX	HCO fails to locally open MOV 3996 and MOV 3505A per Attach 3 of ER-FIRE		0.0	
	FSHFDCR-3-X	Fire Brigade fail to manually suppress fire in Control Room		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
8	FI0CR3-1	Fire in Zone CR-3 (Scenario 1 and 2)		0.0	5.10E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	FACR-MCB	CR-MCB Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSHFDCR-3-X	Fire Brigade fail to manually suppress fire in Control Room		0.0	
	FSHFDDCPWR	Failure to align TSC DC supply to Battery B for TDAFW pump per Attachment 8 of ER-F		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
9	FI0CR3-1	Fire in Zone CR-3 (Scenario 1 and 2)		0.0	5.10E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	FACR-MCB	CR-MCB Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSHFDCR-3-X	Fire Brigade fail to manually suppress fire in Control Room		0.0	
	FSHFDPORVS	Operators/I&C fail to perform ER-FIRE.1 Attachment 9 (PORV 430 local operation)		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
10	FI0TB1-5	Fire in Zone TB-2 (Scenario 5)		0.0	4.42E-07
	ACAZDLOSP1	Failure to Restore Offsite Power Within 1 Hour		0.4	
	ACLOPNOSI2	CORRECTION FACTOR FOR NO SI CONDITION		0.1	
	ACLOPRTALL	Loss of All Off-Site Power Following Reactor Trip		0.0	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	ACTRAINB	Failure of Train B (tagging event)		1.0	
	DGTM00001A	DIESEL GENERATOR KDG01A UNAVAILABLE DUE TO TESTING OR MAINTENANCE		0.0	
	FATB-1-3	TB-1-3 Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	SBO	STATION BLACKOUT SEQUENCE TAGGING EVENT		1.0	
11	FIBR1A-3	Fire in Zone BR1A (Scenario 3 and 4)		0.0	4.31E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	AFTM0TDAFW	TDAFW Pump Train out-of-service for maintenance		0.0	
	FABR1A	BR1A Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSASPROP01	Fire propagates beyond initial source		0.1	
	FSHFDBR1A3	Fire Brigade fail to manually suppress fire in Battery Zone BR1A-3		0.0	
	IBAABUSCMX	FLAG - Instrument Bus C on Normal Supply		1.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	

#	Inputs	Description	Rate	Exposure	Probability
12	FI0TB2-3	Fire in Zone TB-2 (Scenario 3)		0.0	3.31E-07
	ACAZDLOSP1	Failure to Restore Offsite Power Within 1 Hour		0.4	
	ACLOPNOSI2	CORRECTION FACTOR FOR NO SI CONDITION		0.1	
	ACLOPRTALL	Loss of All Off-Site Power Following Reactor Trip		0.0	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	ACTRAINB	Failure of Train B (tagging event)		1.0	
	AFTM0TDAFW	TDAFW Pump Train out-of-service for maintenance		0.0	
	FATB-2-3	TB-2-3 Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	SBO	STATION BLACKOUT SEQUENCE TAGGING EVENT		1.0	
13	FI0CR3-3	Fire in Zone CR-3 (Scenario 3)		0.0	3.06E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	DGDGFTSCXX	TSC Diesel Generator fails to run	1.25E-03	24.0	
	FACR-MCB	CR-MCB Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSASPROP01	Fire propagates beyond initial source		0.1	
	FSHFDCR-3-X	Fire Brigade fail to manually suppress fire in Control Room		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
14	FI0TB2-1	Fire in Zone TB-2 (Scenario 1 and 2)		0.0	2.70E-07
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	CCMM00738B	MOV 738B FAILS TO OPEN		0.0	
	FATB-2-2	TB-2-2 Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
	RCMVD00516N	Motor-Operated Valve 516 Is Not Closed Due To PORV Leakage		1.0	
	RCRZT00430	PORV PCV-430 Fails To Reseat After Steam Relief	5.00E-03	1.0	
	SLO	SMALL LOCA SEQUENCE TAGGING EVENT		1.0	
	TLSTRANS	TAGGING EVENT TO IDENTIFY TL_S_TRANS SEQUENCES		1.0	
15	FIBR1A-3	Fire in Zone BR1A (Scenario 3 and 4)		0.0	2.63E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	AFMM0TDAFW	Failure of TDAFW pump train components		0.0	
	FABR1A	BR1A Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSASPROP01	Fire propagates beyond initial source		0.1	
	FSHFDBR1A3	Fire Brigade fail to manually suppress fire in Battery Zone BR1A-3		0.0	
	IBAABUSCMX	FLAG - Instrument Bus C on Normal Supply		1.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
16	FI0CR3-1	Fire in Zone CR-3 (Scenario 1 and 2)		0.0	2.55E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	FACR-MCB	CR-MCB Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSHFDCR-3-X	Fire Brigade fail to manually suppress fire in Control Room		0.0	
	FSHFDCROM2	Ops fail to use alternate AFW / SG instrumentation when Control Room indication los		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	

#	Inputs	Description	Rate	Exposure	Probability
17	FIOCR3-1	Fire in Zone CR-3 (Scenario 1 and 2)		0.0	2.49E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	DGDGATSCXX	TSC Diesel Generator fails to START	4.88E-03	1.0	
	FACR-MCB	CR-MCB Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSHFDCR-3-X	Fire Brigade fail to manually suppress fire in Control Room		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
18	FIOCR3-3	Fire in Zone CR-3 (Scenario 3)		0.0	2.12E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	AFTMOTDAFW	TDAFW Pump Train out-of-service for maintenance		0.0	
	FACR-MCB	CR-MCB Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSASPROP01	Fire propagates beyond initial source		0.1	
	FSHFDCR-3-X	Fire Brigade fail to manually suppress fire in Control Room		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
19	FIBR1A-3	Fire in Zone BR1A (Scenario 3 and 4)		0.0	2.07E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	FABR1A	BR1A Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSASPROP01	Fire propagates beyond initial source		0.1	
	FSHFDBR1A3	Fire Brigade fail to manually suppress fire in Battery Zone BR1A-3		0.0	
	FSHFDDCPWR	Failure to align TSC DC supply to Battery B for TDAFW pump per Attachment 8 of ER-F		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
20	FIOTB1-3	Fire in Zone TB-1 (Scenario 3 and 4)		0.0	1.93E-07
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	FADIVA	DIVA Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
	RCMVD00516N	Motor-Operated Valve 516 Is Not Closed Due To PORV Leakage		1.0	
	RCRZT00430	PORV PCV-430 Fails To Reseat After Steam Relief	5.00E-03	1.0	
	RHTM00000B	TRAIN B OOS FOR MAINTENANCE		0.0	
	SLO	SMALL LOCA SEQUENCE TAGGING EVENT		1.0	
	TLSTRANS	TAGGING EVENT TO IDENTIFY TL_S_TRANS SEQUENCES		1.0	
21	FIBR1B-3	Fire in Zone BR1A (Scenario 3 and 4)		0.0	1.84E-07
	ACAZDLOSP1	Failure to Restore Offsite Power Within 1 Hour		0.4	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	ACTRAINB	Failure of Train B (tagging event)		1.0	
	DGTM00001A	DIESEL GENERATOR KDG01A UNAVAILABLE DUE TO TESTING OR MAINTENANCE		0.0	
	FABR1B	BR1B Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSASPROP01	Fire propagates beyond initial source		0.1	
	FSHFDBR1B3	Fire Brigade fail to manually suppress fire in Battery Zone BR1B-3		0.0	
	SBO	STATION BLACKOUT SEQUENCE TAGGING EVENT		1.0	

#	Inputs	Description	Rate	Exposure	Probability
22	FI0TB2-3	Fire in Zone TB-2 (Scenario 3)		0.0	1.78E-07
	ACAZDLOSP1	Failure to Restore Offsite Power Within 1 Hour		0.4	
	ACLOPNOSI2	CORRECTION FACTOR FOR NO SI CONDITION		0.1	
	ACLOPRTALL	Loss of All Off-Site Power Following Reactor Trip		0.0	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	ACTRAINB	Failure of Train B (tagging event)		1.0	
	AFMM0TDAFW	Failure of TDAFW pump train components		0.0	
	FATB-2-3	TB-2-3 Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	SBO	STATION BLACKOUT SEQUENCE TAGGING EVENT		1.0	
	SBOCORR007	SBO CORRECTION FACTOR #7 - TDAFW RUN FAILURES DURING SBO ALLOW MORE TIME		0.9	
23	FI000RR3	Fire in Zone RR (Scenario 3)		0.1	1.77E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	DGDGFTSCXX	TSC Diesel Generator fails to run	1.25E-03	24.0	
	FARRX	RR Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSASPROP01	Fire propagates beyond initial source		0.1	
	FSHFDRROOM	Fire Brigade fail to manually extinguish fire in relay room		0.0	
	FSXXXTR803	Relay Room Halon System S08 Inoperable	1.00E-03	24.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
24	FI0TB1-5	Fire in Zone TB-2 (Scenario 5)		0.0	1.76E-07
	ACAZDLOSP1	Failure to Restore Offsite Power Within 1 Hour		0.4	
	ACLOPNOSI2	CORRECTION FACTOR FOR NO SI CONDITION		0.1	
	ACLOPRTALL	Loss of All Off-Site Power Following Reactor Trip		0.0	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	ACTRAINB	Failure of Train B (tagging event)		1.0	
	DGHFDCITYW	Operators fail to connect city water to DG cooling per ER-DG		0.0	
	FATB-1-3	TB-1-3 Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	SBO	STATION BLACKOUT SEQUENCE TAGGING EVENT		1.0	
	UVBUS17	UV on Bus 17 Tagging Event		1.0	
	UVBUS18	UV on Bus 18 Tagging Event		1.0	
25	FI0TB2-1	Fire in Zone TB-2 (Scenario 1 and 2)		0.0	1.74E-07
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	CCHFL0780B	CCW THROTTLING VALVE 780B MISPOSITIONED		0.0	
	FATB-2-2	TB-2-2 Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
	RCMVD00516N	Motor-Operated Valve 516 Is Not Closed Due To PORV Leakage		1.0	
	RCRZT00430	PORV PCV-430 Fails To Reseat After Steam Relief	5.00E-03	1.0	
	SLO	SMALL LOCA SEQUENCE TAGGING EVENT		1.0	
	TLSTRANS	TAGGING EVENT TO IDENTIFY TL_S_TRANS SEQUENCES		1.0	

#	Inputs	Description	Rate	Exposure	Probability
26	FIDG1B10	Fire in Zone EDG1B-0		0.0	1.71E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	AFHFDCITYW	Operators fail to use city fire water for SAFW per ER-AFW.1		0.0	
	AFTM0TDAFW	TDAFW Pump Train out-of-service for maintenance		0.0	
	FAEDG1B-0	EDG1B-0 Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
	UVBUS17	UV on Bus 17 Tagging Event		1.0	
	UVBUS18	UV on Bus 18 Tagging Event		1.0	
27	FIOCR3-1	Fire in Zone CR-3 (Scenario 1 and 2)		0.0	1.53E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	AFHFLTDAFW	Failure to restore TDAFW pump train to service post test/maintenance		0.0	
	FACR-MCB	CR-MCB Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSHFDCR-3-X	Fire Brigade fail to manually suppress fire in Control Room		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
28	FIOTB2-1	Fire in Zone TB-2 (Scenario 1 and 2)		0.0	1.48E-07
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	FATB-2-2	TB-2-2 Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
	RCMVD00516N	Motor-Operated Valve 516 Is Not Closed Due To PORV Leakage		1.0	
	RCRZT00430	PORV PCV-430 Fails To Reseat After Steam Relief	5.00E-03	1.0	
	RHMMAC01BA	RHR PUMP B (PAC01B) FAILS TO START		0.0	
	SLO	SMALL LOCA SEQUENCE TAGGING EVENT		1.0	
	TLSTRANS	TAGGING EVENT TO IDENTIFY TL_S_TRANS SEQUENCES		1.0	
29	FIOCR3-1	Fire in Zone CR-3 (Scenario 1 and 2)		0.0	1.46E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	FACR-MCB	CR-MCB Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSHFDCR-3-X	Fire Brigade fail to manually suppress fire in Control Room		0.0	
	FSHFDREC03	Failure to find alternative cooldown paths (TDAFW steam lines)		0.1	
	MSMMN2BOTA	NITROGEN BOTTLES FAIL TO SUPPLY ARV 3411		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
30	FIOTB1-5	Fire in Zone TB-2 (Scenario 5)		0.0	1.32E-07
	ACAZDLOSP1	Failure to Restore Offsite Power Within 1 Hour		0.4	
	ACLOPNOSI2	CORRECTION FACTOR FOR NO SI CONDITION		0.1	
	ACLOPRTALL	Loss of All Off-Site Power Following Reactor Trip		0.0	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	ACTRAINB	Failure of Train B (tagging event)		1.0	
	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN	1.25E-03	24.0	
	FATB-1-3	TB-1-3 Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	SBO	STATION BLACKOUT SEQUENCE TAGGING EVENT		1.0	
	SBOCORR006	SBO CORRECTION FACTOR #6 - DG RUN TIME FAILURES ALLOW > 1 HR TO RESTORE OFFSITE PWR		0.3	

#	Inputs	Description	Rate	Exposure	Probability
31	FIOCR3-3	Fire in Zone CR-3 (Scenario 3)		0.0	1.29E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	AFMMOTDAFW	Failure of TDAFW pump train components		0.0	
	FACR-MCB	CR-MCB Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSASPROP01	Fire propagates beyond initial source		0.1	
	FSHFDCR-3-X	Fire Brigade fail to manually suppress fire in Control Room		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
32	FI000RR3	Fire in Zone RR (Scenario 3)		0.1	1.23E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	AFTMOTDAFW	TDAFW Pump Train out-of-service for maintenance		0.0	
	FARRX	RR Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSASPROP01	Fire propagates beyond initial source		0.1	
	FSHFDRROOM	Fire Brigade fail to manually extinguish fire in relay room		0.0	
	FSXXXTR803	Relay Room Halon System S08 Inoperable	1.00E-03	24.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
33	FI00ABB1	Fire in Zone ABB (Scenario 1 and 2)		0.0	1.14E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	AFMMOTDAFW	Failure of TDAFW pump train components		0.0	
	AFMMSAFWPD	Failure of SAFW Pump 1D Train		0.0	
	AFTMMAFSGB	MOTOR DRIVEN AFW TRAIN B TO B S/G O.O.S DUE TO T/M		0.0	
	FADIVA	DIVA Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
34	FIOCR3-1	Fire in Zone CR-3 (Scenario 1 and 2)		0.0	1.13E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	AFTMTDAFWB	TDAFW Pump Train injection line to S/G B out-of-service for maintenance		0.0	
	FACR-MCB	CR-MCB Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSHFDCR-3-X	Fire Brigade fail to manually suppress fire in Control Room		0.0	
	MSHSF05738	Hot short causes AOV 5738 to fail to close		0.1	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
35	FI00AB01	Fire in Zone ABO (Scenario 1 and 2)		0.0	1.11E-07
	ACAZDLOSP1	Failure to Restore Offsite Power Within 1 Hour		0.4	
	ACCORR0003	CORRECTION FACTOR FOR RECOVERY OF HOT SHORT LOOP EVENTS		0.1	
	ACHSF00016	Hot short causes 480 VAC Bus 16 feeder circuit breaker 52/16 (BUS16/11B) to transfe		0.1pen	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	ACTRAINB	Failure of Train B (tagging event)		1.0	
	AFTMOTDAFW	TDAFW Pump Train out-of-service for maintenance		0.0	
	CCAACCPMPB	FLAG - CCW PUMP B IS ALIGNED TO RUN		0.5	
	FAABO	ABO Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	SBO	STATION BLACKOUT SEQUENCE TAGGING EVENT		1.0	
	SFAARPAC7B	FLAG - SFP Pump B Running		1.0	

#	Events	Description	Rate	Exposure	Probability
36	FIBR1B-3	Fire in Zone BR1A (Scenario 3 and 4)		0.0	1.10E-07
	ACAZDLOSP1	Failure to Restore Offsite Power Within 1 Hour		0.4	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	ACTRAINB	Failure of Train B (tagging event)		1.0	
	ACWPFMCC1H	Cable wrap failure causes 480 VAC MCCH feeder circuit breaker 52/MCCH (MCCC/05MM) transfer open		0.2	
	FABR1B	BR1B Tag		1.0	
	FSAAFIRE1H	FLAG - Special multiplier to indicate fire duration >1 hr (prob = 0.1)		0.1	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSASPROP01	Fire propagates beyond initial source		0.1	
	FSHFDBR1B3	Fire Brigade fail to manually suppress fire in Battery Zone BR1B-3		0.0	
	SBO	STATION BLACKOUT SEQUENCE TAGGING EVENT		1.0	
37	FIBR1B-3	Fire in Zone BR1A (Scenario 3 and 4)		0.0	1.10E-07
	ACAZDLOSP1	Failure to Restore Offsite Power Within 1 Hour		0.4	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	ACTRAINB	Failure of Train B (tagging event)		1.0	
	DCWPFC3ACX	Cable wrap failure causes disconnect switch DCPDPCB03A/03 to transfer open (to MCC		0.2	
	FABR1B	BR1B Tag		1.0	
	FSAAFIRE1H	FLAG - Special multiplier to indicate fire duration >1 hr (prob = 0.1)		0.1	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSASPROP01	Fire propagates beyond initial source		0.1	
	FSHFDBR1B3	Fire Brigade fail to manually suppress fire in Battery Zone BR1B-3		0.0	
	SBO	STATION BLACKOUT SEQUENCE TAGGING EVENT		1.0	
38	FIOSH2-1	Fire in Zone SH-2 (Scenario 1 and 2)		0.0	1.09E-07
	ACHSF00014	Hot short causes 480 VAC Bus 14 feeder circuit breaker 52/14 (BUS14/18B) to transfer open		0.1	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	FASH-2-R	SH-2-R Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
	RCMVD00516N	Motor-Operated Valve 516 Is Not Closed Due To PORV Leakage		1.0	
	RCRZT00430	PORV PCV-430 Fails To Reseat After Steam Relief	5.00E-03	1.0	
	RHTM00000B	TRAIN B OOS FOR MAINTENANCE		0.0	
	SLO	SMALL LOCA SEQUENCE TAGGING EVENT		1.0	
	TLSTRANS	TAGGING EVENT TO IDENTIFY TL_S_TRANS SEQUENCES		1.0	
39	FIOTB2-1	Fire in Zone TB-2 (Scenario 1 and 2)		0.0	1.07E-07
	ACAZDLOSP1	Failure to Restore Offsite Power Within 1 Hour		0.4	
	ACLOPNOSI2	CORRECTION FACTOR FOR NO SI CONDITION		0.1	
	ACLOPRTALL	Loss of All Off-Site Power Following Reactor Trip		0.0	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	ACTRAINB	Failure of Train B (tagging event)		1.0	
	AFTM0TDAFW	TDAFW Pump Train out-of-service for maintenance		0.0	
	FATB-2-2	TB-2-2 Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	SBO	STATION BLACKOUT SEQUENCE TAGGING EVENT		1.0	

#	Inputs	Description	Rate	Exposure	Probability
40	FI0TB2-3	Fire in Zone TB-2 (Scenario 3)		0.0	1.06E-07
	ACAZDLOSP1	Failure to Restore Offsite Power Within 1 Hour		0.4	
	ACLOPNOSI2	CORRECTION FACTOR FOR NO SI CONDITION		0.1	
	ACLOPRTALL	Loss of All Off-Site Power Following Reactor Trip		0.0	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	ACTRAINB	Failure of Train B (tagging event)		1.0	
	AFHFDALTTD	OPERATORS FAIL TO PROVIDE COOLING TO TDAFW LUBE OIL FROM DIESEL FIRE PUMP		0.0	
	FATB-2-3	TB-2-3 Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	SBO	STATION BLACKOUT SEQUENCE TAGGING EVENT		1.0	
	UVBUS17	UV on Bus 17 Tagging Event		1.0	
	UVBUS18	UV on Bus 18 Tagging Event		1.0	
41	FIDG1B10	Fire in Zone EDG1B-0		0.0	1.05E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	AFHFDCITYW	Operators fail to use city fire water for SAFW per ER-AFW.1		0.0	
	AFMM0TDAFW	Failure of TDAFW pump train components		0.0	
	FAEDG1B-0	EDG1B-0 Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
	UVBUS17	UV on Bus 17 Tagging Event		1.0	
	UVBUS18	UV on Bus 18 Tagging Event		1.0	
42	FI00ABB3	Fire in Zone ABB (Scenario 3 and 4)		0.0	1.03E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	CVAACHPMPB	FLAG - CHARGING PUMP B RUNNING		0.6	
	CVAACHPMPC	FLAG - CHARGING PUMP C RUNNING		0.6	
	CVTMCHPMPA	TEST OR MAINTENANCE RENDERS CHARGING PUMP A UNAVAILABLE		0.1	
	FAABB-3	ABB-3 Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSHFDAUXBB	Fire Brigade fail to manually extinguish fire in Aux Bldg Basement		0.0	
	FSXXXTR746	Sprinkler S01 Inoperable (Aux Bldg Basement Cable Trays - SI Pump)	1.00E-03	24.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
43	FI0CR3-3	Fire in Zone CR-3 (Scenario 3)		0.0	1.02E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	FACR-MCB	CR-MCB Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSASPROP01	Fire propagates beyond initial source		0.1	
	FSHFDAFWXX	HCO fails to locally open MOV 3996 and MOV 3505A per Attach 3 of ER-FIRE		0.0	
	FSHFDCR-3-X	Fire Brigade fail to manually suppress fire in Control Room		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
44	FI0CR3-3	Fire in Zone CR-3 (Scenario 3)		0.0	1.02E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	FACR-MCB	CR-MCB Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSASPROP01	Fire propagates beyond initial source		0.1	
	FSHFDCR-3-X	Fire Brigade fail to manually suppress fire in Control Room		0.0	
	FSHFDDCPWR	Failure to align TSC DC supply to Battery B for TDAFW pump per Attachment 8 of ER-F		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	

#	[illegible]s	Description	Rate	Exposure	Probability
45	FIOCR3-3	Fire in Zone CR-3 (Scenario 3)		0.0	1.02E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	FACR-MCB	CR-MCB Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSASPROP01	Fire propagates beyond initial source		0.1	
	FSHFDCR-3-X	Fire Brigade fail to manually suppress fire in Control Room		0.0	
	FSHFDPORVS	Operators/I&C fail to perform ER-FIRE.1 Attachment 9 (PORV 430 local operation)		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
46	FI00ABB3	Fire in Zone ABB (Scenario 3 and 4)		0.0	1.02E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	CVHFDSUCTN	Operators Fail to Manually Open Suction Line Upon Loss of IA		0.0	
	FAABB-3	ABB-3 Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSHFDAUXBB	Fire Brigade fail to manually extinguish fire in Aux Bldg Basement		0.0	
	FSXXXTR746	Sprinkler S01 Inoperable (Aux Bldg Basement Cable Trays - SI Pump)	1.00E-03	24.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
47	FIBR1A-3	Fire in Zone BR1A (Scenario 3 and 4)		0.0	1.01E-07
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	DGDGATSCXX	TSC Diesel Generator fails to START	4.88E-03	1.0	
	FABR1A	BR1A Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSASPROP01	Fire propagates beyond initial source		0.1	
	FSHFDBR1A3	Fire Brigade fail to manually suppress fire in Battery Zone BR1A-3		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
48	FIOTB1-1	Fire in Zone TB-1 (Scenario1 and 2)		0.0	8.95E-08
	ACAZDLOSP1	Failure to Restore Offsite Power Within 1 Hour		0.4	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	ACTRAINB	Failure of Train B (tagging event)		1.0	
	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN	1.25E-03	24.0	
	FATB-1-1	TB-1-1 Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSXXXTR768	Spray S24 Inoperable (Turbine Condenser Pit)	1.00E-03	24.0	
	SBO	STATION BLACKOUT SEQUENCE TAGGING EVENT		1.0	
	SBOCORR006	SBO CORRECTION FACTOR #6 - DG RUN TIME FAILURES ALLOW > 1 HR TO RESTORE OFFSITE PWR		0.3	
49	FIOTB1-1	Fire in Zone TB-1 (Scenario1 and 2)		0.0	8.95E-08
	ACAZDLOSP1	Failure to Restore Offsite Power Within 1 Hour		0.4	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	ACTRAINB	Failure of Train B (tagging event)		1.0	
	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN	1.25E-03	24.0	
	FATB-1-1	TB-1-1 Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSXXXTR769	Spray S25 Inoperable (Generator Hydrogen Seal)	1.00E-03	24.0	
	SBO	STATION BLACKOUT SEQUENCE TAGGING EVENT		1.0	
	SBOCORR006	SBO CORRECTION FACTOR #6 - DG RUN TIME FAILURES ALLOW > 1 HR TO RESTORE OFFSITE PWR		0.3	

#	Inputs	Description	Rate	Exposure	Probability
50	FI0TB1-1	Fire in Zone TB-1 (Scenario1 and 2)		0.0	8.95E-08
	ACAZDLOSP1	Failure to Restore Offsite Power Within 1 Hour		0.4	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	ACTRAINB	Failure of Train B (tagging event)		1.0	
	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN	1.25E-03	24.0	
	FATB-1-1	TB-1-1 Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSXXXTR770	Sprinkler S26 Inoperable (Turbine Island)	1.00E-03	24.0	
	SBO	STATION BLACKOUT SEQUENCE TAGGING EVENT		1.0	
	SBOCORR006	SBO CORRECTION FACTOR #6 - DG RUN TIME FAILURES ALLOW > 1 HR TO RESTORE OFFSITE PWR		0.3	
51	FI0TB1-1	Fire in Zone TB-1 (Scenario1 and 2)		0.0	8.95E-08
	ACAZDLOSP1	Failure to Restore Offsite Power Within 1 Hour		0.4	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	ACTRAINB	Failure of Train B (tagging event)		1.0	
	DGDGF0001A	DIESEL GENERATOR KDG01A FAILS TO RUN	1.25E-03	24.0	
	FATB-1-1	TB-1-1 Tag		1.0	
	FSAASUPPXX	FLAG - Fire Suppression fails		1.0	
	FSXXXTR771	Spray S27 Inoperable (Main Turbine Oil Reservoir)	1.00E-03	24.0	
	SBO	STATION BLACKOUT SEQUENCE TAGGING EVENT		1.0	
	SBOCORR006	SBO CORRECTION FACTOR #6 - DG RUN TIME FAILURES ALLOW > 1 HR TO RESTORE OFFSITE PWR		0.3	
52	FIDG1B10	Fire in Zone EDG1B-0		0.0	8.90E-08
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	AFHFDSAFWX	OPERATORS FAIL TO CORRECTLY ALIGN SAFW		0.0	
	AFTM0TDAFW	TDAFW Pump Train out-of-service for maintenance		0.0	
	FAEDG1B-0	EDG1B-0 Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
	UVBUS17	UV on Bus 17 Tagging Event		1.0	
	UVBUS18	UV on Bus 18 Tagging Event		1.0	
53	FI000RR6	Fire in Zone RR (Scenario 6)		0.0	8.76E-08
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	AFMMSAFWPD	Failure of SAFW Pump 1D Train		0.0	
	FADIVA	DIVA Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
	SWCXXSUCTN	TOTAL FAILURE OF COMMON SW/FIRE WATER SUCTION		0.0	
54	FI0TB1-5	Fire in Zone TB-2 (Scenario 5)		0.0	8.71E-08
	ACAZDLOSP1	Failure to Restore Offsite Power Within 1 Hour		0.4	
	ACLOPNOSI2	CORRECTION FACTOR FOR NO SI CONDITION		0.1	
	ACLOPRTALL	Loss of All Off-Site Power Following Reactor Trip		0.0	
	ACTRAINA	Failure of AC Train A (tagging event)		1.0	
	ACTRAINB	Failure of Train B (tagging event)		1.0	
	DGMMASTART	FAILURES OF D/G A TO START		0.0	
	FATB-1-3	TB-1-3 Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	SBO	STATION BLACKOUT SEQUENCE TAGGING EVENT		1.0	

#	Inputs	Description	Rate	Exposure	Probability
55	FIDG1B10	Fire in Zone EDG1B-0		0.0	8.57E-08
	AAAATRANSIN	FLAG - Transient Initiating Event Which Do Not Result in SI Conditions		1.0	
	AFTM0TDAFW	TDAFW Pump Train out-of-service for maintenance		0.0	
	FAEDG1B-0	EDG1B-0 Tag		1.0	
	FSAASUPPOK	FLAG - Fire Suppression successful or N/A		1.0	
	FSHFDCROM2	Ops fail to use alternate AFW / SG instrumentation when Control Room indication los		0.0	
	NOSBO	NO STATION BLACKOUT TAGGING EVENT		1.0	
	UVBUS17	UV on Bus 17 Tagging Event		1.0	
	UVBUS18	UV on Bus 18 Tagging Event		1.0	

Report Summary:

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TABLE 9-15. FIRE INITIATOR IMPORTANCES

Event Name	Probability	F-V	RAW	Description
FI0CR3-1	1.70E-03	1.98E-01	117.12	Fire in Zone CR-3 (Scenario 1 and 2)
FI0TB2-1	1.20E-02	9.64E-02	8.94	Fire in Zone TB-2 (Scenario 1 and 2)
FIBR1A-3	6.90E-03	6.81E-02	10.8	Fire in Zone BR1A (Scenario 3 and 4)
FI0TB1-1	1.40E-03	5.06E-02	37.04	Fire in Zone TB-1 (Scenario1 and 2)
FIBR1B-3	6.90E-03	5.00E-02	8.2	Fire in Zone BR1A (Scenario 3 and 4)
FI00TYW1	1.50E-02	4.79E-02	4.14	Fire in Zone TY-W (Scenario 1)
FI0TB1-5	4.10E-02	4.46E-02	2.04	Fire in Zone TB-2 (Scenario 5)
FI0TB2-3	3.70E-02	4.19E-02	2.09	Fire in Zone TB-2 (Scenario 3)
FI000RC3	5.30E-03	4.00E-02	8.51	Fire in Zone RC-3
FI0CR3-3	3.40E-03	3.90E-02	12.42	Fire in Zone CR-3 (Scenario 3)
FIDG1B10	8.24E-04	3.69E-02	45.7	Fire in Zone EDG1B-0
FI000RR3	8.20E-02	3.01E-02	1.34	Fire in Zone RR (Scenario 3)
FI00ABB1	1.40E-02	3.00E-02	3.11	Fire in Zone ABB (Scenario 1 and 2)
FI00ABO1	3.00E-03	2.76E-02	10.16	Fire in Zone ABO (Scenario 1 and 2)
FI00ABB3	5.90E-03	2.62E-02	5.42	Fire in Zone ABB (Scenario 3 and 4)
FI0SH2-1	1.80E-02	2.34E-02	2.28	Fire in Zone SH-2 (Scenario 1 and 2)
FI00ABM3	1.00E-02	2.20E-02	3.18	Fire in Zone ABM (Scenario 3 or 4)
FI000RR6	3.80E-02	2.10E-02	1.53	Fire in Zone RR (Scenario 6)
FI0TB1-3	3.20E-03	1.63E-02	6.09	Fire in Zone TB-1 (Scenario 3 and 4)
FI00ABM5	6.70E-03	1.21E-02	2.8	Fire in Zone ABM (Scenario 5)
FIIBN1-3	2.20E-02	1.19E-02	1.53	Fire in Zone IBN-1 (Scenario 3)
FIDG1B11	1.60E-02	8.87E-03	1.55	Fire in Zone EDG1B-1 (Scenario 1 and 2)
FI0SH2-3	7.70E-03	7.85E-03	2.01	Fire in Zone SH-2 (Scenario 3)
FI000CT1	1.40E-03	7.80E-03	6.56	Fire in Zone CT-1 (Scenario 1 and 2)
FI000RR1	1.10E-03	5.75E-03	6.22	Fire in Zone RR (Scenario 1 and 2)
FI00TYW2	1.80E-03	4.71E-03	3.61	Fire in Zone TY-W (Scenario 2)
FI0TB1-6	3.40E-02	4.49E-03	1.13	Fire in Zone TB-2 (Scenario 6)
FI00AHR1	2.60E-04	3.52E-03	14.53	Fire in Zone AHR (Scenario 1 and 2)
FI000RR7	4.50E-03	3.37E-03	1.75	Fire in Zone RR (Scenario 7)
FI000RR5	3.40E-02	2.71E-03	1.08	Fire in Zone RR (Scenario 5)
FI00TYE3	1.10E-03	2.63E-03	3.39	Fire in Zone TY-E (Scenario 3)
FI00ABM1	4.60E-04	2.19E-03	5.76	Fire in Zone ABM (Scenario 1 or 2)
FI0RC2-2	5.20E-03	1.87E-03	1.36	Fire in Zone RC-2 (Scenario 2 and 3)
FI00ABO3	2.00E-02	1.58E-03	1.08	Fire in Zone ABO (Scenario 3)
FI000AVT	2.90E-02	1.36E-03	1.05	Fire in Zone AVT
FI0RC2-1	1.70E-02	1.34E-03	1.08	Fire in Zone RC-2 (Scenario 1)
FI00TYW3	1.30E-02	1.01E-03	1.08	Fire in Zone TY-W (Scenario 3)
FI00TYE1	9.70E-03	9.11E-04	1.09	Fire in Zone TY-E (Scenario 1)
FI00TYE2	8.50E-03	6.47E-04	1.08	Fire in Zone TY-E (Scenario 2)
FI000RR4	5.60E-03	6.44E-04	1.11	Fire in Zone RR (Scenario 4)
FI0TB1FP	1.30E-02	6.02E-04	1.05	Fire in Zone TB-1FP
FI0CR3-4	1.20E-03	5.28E-04	1.44	Fire in Zone CR-3 (Scenario 4)
FIIBN1-1	6.50E-04	3.64E-04	1.56	Fire in Zone IBN-1 (Scenario 1 and 2)
FI0CR3-5	2.20E-03	2.44E-04	1.11	Fire in Zone CR-3 (Scenario 5)
FI00ABB5	2.90E-03	2.43E-04	1.08	Fire in Zone ABB (Scenario 5)
FI00BRRM	3.40E-03	1.47E-04	1.04	Fire in Zone BRRM
FI0000H2	2.30E-03	9.96E-05	1.04	Fire in Zone H2
FI0000TO	2.30E-03	9.96E-05	1.04	Fire in Zone TO
FI00ABB6	9.80E-04	6.83E-05	1.07	Fire in Zone ABB (Scenario 6)
FI000SB1	1.30E-03	5.42E-05	1.04	Fire in Zone SB-1
FI000SB2	1.20E-03	5.00E-05	1.04	Fire in Zone SB-2
FIBR1B-1	4.70E-05	3.01E-05	1.64	Fire in Zone BR1B (Scenario 1 and 2)
FI00AHR3	1.10E-04	2.32E-05	1.21	Fire in Zone AHR (Scenario 3)
FI00IBS3	5.50E-04	1.68E-05	1.03	Fire in Zone IBS-3
FI0SB1HS	5.40E-04	1.65E-05	1.03	Fire in Zone SB-1HS
FI0SH1-1	5.50E-05	1.15E-05	1.21	Fire in Zone SH-1 (Scenario 1 and 2)
FIBR1A-1	3.10E-05	1.06E-05	1.34	Fire in Zone BR1A (Scenario 1 and 2)
FI00IBN4	2.20E-04	6.72E-06	1.03	Fire in Zone IBN-4

TABLE 9-16. HUMAN ERROR IMPORTANCES

Event Name	Probability	F-V	RAW	Description
FSHFDCROM2	5.00E-03	1.31E-01	27.02	Ops fail to use alternate AFW / SG instrumentation when Control Room Indication lost
FSHFDDCPWR	1.00E-02	3.58E-02	4.55	Failure to align TSC DC supply to Battery B for TDAFW pump per Attachment 8 of ER-FIRE
AFHFDSAFWX	5.19E-03	3.02E-02	6.79	OPERATORS FAIL TO CORRECTLY ALIGN SAFW
FSHFDPORVS	1.00E-02	2.24E-02	3.22	Operators/I&C fail to perform ER-FIRE.1 Attachment 9 (PORV 430 local operation)
AFHFDCITYW	1.00E-02	2.23E-02	3.2	Operators fail to use city fire water for SAFW per ER-AFW 1
FSHFDAFWXX	1.00E-02	2.17E-02	3.15	HCO fails to locally open MOV 3996 and MOV 3505A per Attach 3 of ER-FIRE
RCHFDPLOCA	5.00E-02	1.75E-02	1.33	Operators Fail To Close PORV Block Valve (515/516) To Terminate LOCA W/in 3 Min
AFHFDALTTD	6.70E-03	1.51E-02	3.24	OPERATORS FAIL TO PROVIDE COOLING TO TDAFW LUBE OIL FROM DIESEL FIRE PUMP
FSHFDREC03	1.00E-01	1.51E-02	1.14	Failure to find alternative cooldown paths (TDAFW steam lines)
FSHFDCROM1	5.00E-03	9.30E-03	2.85	Ops fail to use alternate natural circ instrumentation when Control Room Indication lost
RCHFDRHRSB	5.00E-03	8.74E-03	2.74	Ops Fails to Rapidly Depressurize to RHR (or Use AFW Long-Term)
DGHFDCITYW	1.00E-02	6.87E-03	1.68	Operators fail to connect city water to DG cooling per ER-DG
AFHFDBLOWD	5.00E-03	6.49E-03	2.29	Operators fail to isolate SG blowdown manually
CVHFDSUCTN	2.40E-02	6.48E-03	1.26	Operators Fail to Manually Open Suction Line Upon Loss of IA
HVHFDSAFWB	1.00E-02	5.87E-03	1.56	Operators fail to recover cooling to SAFW room for long-term protection of pumps
SWHFDSTART	5.00E-03	5.50E-03	2.09	OPERATORS FAIL TO START SW PUMP
FSHFDDGAXY	1.00E-02	5.11E-03	1.51	CRF fails to strip Bus 18 loads and manually close breaker for DG A per Attachment 1 to ER-FIRE
FSHFDDGAXZ	1.00E-02	4.88E-03	1.48	CO fails to strip Bus 14 loads and manually close breaker for DG A/SW A per Attachment to ER-FIRE
FSHFD850XX	1.00E-02	4.46E-03	1.44	OPERATORS FAIL TO ISOLATE 850A/B LOCALLY AFTER HOT SHORT
RCHFDCD0SS	3.70E-02	4.38E-03	1.11	Operator Fails to Cooldown to RHR After SI Fails (INJECTION OR RECIRC) - SSLOCA
RCHFD00RCP	1.61E-02	4.32E-03	1.26	Operators Fail to Trip RCPs After Loss of Support Systems
FSHFDPWRAX	1.00E-01	4.28E-03	1.04	FAILURE TO RECOVER LOSS OF AC TRAIN A DUE TO FIRE ISSUES
FSHFDOVDFP	1.00E-02	3.80E-03	1.38	FAILURE TO RECOVER DIESEL FIRE PUMP AFTER AUTO INITIATION FAILS
FSHFDARVXX	1.00E-02	2.81E-03	1.28	Failure to depressurize SG A using ARV 3411
FSHFDUVLOG	1.00E-02	2.74E-03	1.27	Operators Fail to Recover Lockout of Bus UV Logic for DG Breaker
FSHFDDGAXX	1.00E-02	2.55E-03	1.25	STA fails to start DG A per Attachment 2 to ER-FIRE.1
FSHFDCROM3	5.00E-03	2.48E-03	1.49	Ops fail to use alternate Pzr instrumentation when Control Room Indication lost
FSHFDSTADG	1.00E-02	1.61E-03	1.16	STA fails to start DG from control room per Attach 2 to ER-FIRE.2
ACAZRECOFF	1.00E-01	1.46E-03	1.01	Failure to recover offsite power circuit 767 after grid failure
RRHFD850AB	1.00E-01	1.11E-03	1.01	OPERATORS FAIL TO MANUALLY OPEN MOV 850A/B/C WHEN ELECTRICAL FAILURE OCCURS
CVHFDPMPST	7.00E-03	1.10E-03	1.16	OPERATORS FAIL TO MANUALLY LOAD CHARGING PUMP
RCHFD01RCP	1.00E+00	1.10E-03	1	OPERATORS FAIL TO RESTORE RCP SEAL COOLING WITHIN ONE HOUR
ACHFDOFFXX	1.00E-01	7.33E-04	1.01	Operators fail to reconnect to offsite power following UV on sister bus on same train
CVHFD01BAF	1.00E-03	5.74E-04	1.57	Operators fail to start SI/Charging pumps for inventory makeup to reach CSD
IFHFDACPWR	1.00E-02	5.49E-04	1.05	Failure to align TSC diesel to operate shroud fans
RCHFD00MRI	1.00E-02	4.23E-04	1.04	OPERATORS FAIL TO MANUALLY INSERT RODS
SRHFDRECRC	1.30E-03	3.39E-04	1.26	OPERATORS FAIL TO SHIFT SI SYSTEM TO RECIRCULATION
FSHFDSAFWX	1.00E-01	3.38E-04	1	Operators fail to complete water solid SG operation post fire
MSHFDMSIVX	1.00E-01	3.38E-04	1	Operators Fails to Close MSIV
CVHFD00371	1.30E-02	2.66E-04	1.02	OPERATORS FAIL TO MANUALLY ISOLATE AOV 371 (LETDOWN LINE)
RRHFDRECRC-S	1.20E-03	2.51E-04	1.21	OPERATOR FAILS TO CORRECTLY SHIFT THE RHR SYSTEM TO RECIRCULATION AND ISOL CS
FSHFDDGBXX	1.00E-02	2.02E-04	1.02	STA fails to start DG B and SW Pump per ER-FIRE.4
RCHFDHEATR	3.10E-04	1.49E-04	1.48	OPERATORS FAIL TO LOAD PRESSURIZER HEATERS FOLLOWING A LOOP OR SI SIGNAL
MFHFDMF100	1.20E-02	6.84E-05	1.01	Operator Fails To Reestablish Main Feedwater Flow
FSHFDRPORV	1.00E-02	3.94E-05	1	Operator fails to de-energize PORV control circuit
RRHFDRECRC-M	5.30E-03	2.41E-05	1	OPERATOR FAILS TO CORRECTLY SHIFT THE RHR SYSTEM TO RECIRCULATION AND ISOL CS
RCHFDSCRAM	1.00E-02	1.54E-05	1	Operators Fail to Trip Rod Drive MG Sets During ATWS
FSHFD03996	1.00E-01	4.03E-06	1	OPERATORS FAIL TO RECOVER TDAFW MOV 3996 FOLLOWING HOT SHORT
AFHFDSTART	1.00E-01	3.02E-06	1	Operators fail to manually start AFW pump with no auto start signal
FSHFDAFW1A	1.00E-01	3.02E-06	1	Failure to locally start and control AFW Pump 1A

TABLE 9-17. TEST AND MAINTENANCE IMPORTANCES

Event Name	Probability	F-V	RAW	Description
AFTM0TDAFW	2.08E-02	1.50E-01	8.08	TDAFW Pump Train out-of-service for maintenance
RHTM00000B	1.25E-02	4.03E-02	4.18	TRAIN B OOS FOR MAINTENANCE
AFTMMAFSGB	2.78E-02	3.99E-02	2.4	MOTOR DRIVEN AFW TRAIN B TO B S/G O.O S DUE TO T/M
DGTM00001A	2.51E-02	3 27E-02	2.27	DIESEL GENERATOR KDG01A UNAVAILABLE DUE TO TESTING OR MAINTENANCE
AFHFLTDAFW	3.00E-03	2.79E-02	10.26	Failure to restore TDAFW pump train to service post test/maintenance
AFTMTDAFWB	2.22E-02	1.39E-02	1.61	TDAFW Pump Train injection line to S/G B out-of-service for maintenance
CVTMCHPMPA	7.25E-02	1.18E-02	1.15	TEST OR MAINTENANCE RENCERS CHARGING PUMP A UNAVAILABLE
AFTMTDAFWA	2.22E-02	1.17E-02	1.52	TDAFW Pump Train injection line to S/G A out-of-service for maintenance
DGTM00001B	2.51E-02	1.14E-02	1.44	DIESEL GENERATOR KDG01B UNAVAILABLE DUE TO TESTING OR MAINTENANCE
CCHFL0780B	3.00E-03	9.63E-03	4.2	CCW THROTTLING VALVE 780B MISPOSITIONED
AFHFL0AFWB	3.00E-03	7.92E-03	3.63	Failure to restore AFW Motor-Driven Pump Train 1B to service post test/maint
AFTMSAFSGB	3.26E-02	7.42E-03	1.22	SAFW TRAIN D TO S/G B O.O S. DUE TO T/M
AFHFLSAFWB	3.00E-03	7.29E-03	3.42	Failure to restore SAFW Pump Train 1D to service post test/maint
AFTMSAFSGA	3.26E-02	6.70E-03	1.2	SAFW TRAIN C TO S/G A O.O.S. DUE TO T/M
AFTMMAFSGA	2.78E-02	6.63E-03	1.23	MOTOR DRIVEN AFW TRAIN A TO A S/G O.O S DUE TO T/M
SITMTRAINA	1.60E-02	4.00E-03	1.25	SI TRAIN A DISCHARGE VALVES UNAVAILABLE DUE TO TEST OR MAINTENANCE
SITM0PSI1A	1.60E-02	3.99E-03	1.25	PSI01A UNAVAILABLE DUE TO TEST OR MAINTENANCE
RHTM00000A	1.25E-02	3.68E-03	1.29	TRAIN A OOS FOR MAINTENANCE
AFHFLSAFWA	3.00E-03	2.10E-03	1.7	Failure to restore SAFW Pump Train 1C to service post test/maint
AFHFLS5738	3.00E-03	1.59E-03	1.53	OPERATOR LEAVES SWITCH 1S1/5738 IN THE DEF. OR AUX. POSITION
MSHFLARV-A	3.00E-03	1.32E-03	1.44	LATENT HUMAN ERROR DISABLES ARV 3411
AFHFL0AFWA	3.00E-03	1.22E-03	1.41	Failure to restore AFW Motor-Driven Pump Train 1A to service post test/maint
AFHFLS5737	3.00E-03	8.98E-04	1.3	OPERATOR LEAVES SWITCH 1S1/5737 IN THE DEF. OR AUX. POSITION
CCHFL0780A	3.00E-03	8.71E-04	1.29	CCW THROTTLING VALVE 780A MISPOSITIONED
SIHFLPSI1A	3.00E-03	7.40E-04	1.25	OPERATORS FAIL TO RESTORE PSI01A EQUIPMENT AFTER TEST OR MAINTENANCE
MSTM003411	1.25E-03	5.22E-04	1.42	ARV 3411 IN TEST OR MAINTENANCE
CSHFL0896B	3.00E-03	5.05E-04	1.17	MOTOR OPERATED VALVE 896B IS LEFT UNAVAILABLE AFTER TESTING OR MAINTENANCE
SIHFL0857B	3.00E-03	5.05E-04	1.17	LATENT HUMAN FAILURE OF MOV 857B
SWTMPUMP1C	1.00E-01	2.71E-04	1	SW Pump C in maintenance
AFTMSAFWAB	4.33E-03	2.20E-04	1.05	SAFW cross-connect line out-of-service for maintenance
HVHFL_SAFW	3.00E-03	1.31E-04	1.04	OPERATOR FAILS TO DISCOVER ROOM HEATING FAILURE IN SAFW ROOM
SITMTRAINB	1.60E-02	7.13E-05	1	SI TRAIN B DISCHARGE VALVES UNAVAILABLE DUE TO TEST OR MAINTENANCE
HVTMACF05B	1.28E-03	6.95E-05	1.05	CONTROL ROD SHROUD FAN B IN TEST OR MAINTENANCE
SITM0PSI1B	1.60E-02	6.15E-05	1	PSI01B UNAVAILABLE DUE TO TEST OR MAINTENANCE
HVTMSAFW_B	5.24E-02	5.60E-05	1	B SAFW ROOM HVAC STRING IN MAINTENANCE
RCHFLC429B	3.00E-03	4.77E-05	1.02	BISTABLE PC-429B MISCALIBRATED
RCHFLC430B	3.00E-03	4.77E-05	1.02	ALARM BISTABLE PC-430B MISCALIBRATED
RCHFLPT429	3.00E-03	4.77E-05	1.02	PRESSURE TRANSMITTER PT-429 MISCALIBRATED
RCHFLPT430	3.00E-03	4.77E-05	1.02	PRESSURE TRANSMITTER PT-430 MISCALIBRATED
SWTMPUMP1B	1.00E-01	4.62E-05	1	SW Pump B in maintenance
MSTM003410	1.07E-03	3.13E-05	1.03	ARV 3410 IN TEST OR MAINTENANCE
CCTM000HXB	5.04E-03	1.42E-05	1	CCW HEAT EXCHANGER B IS UNAVAILABLE DUE TO TESTING OR MAINTENANCE
CSHFL0896A	3.00E-03	1.33E-05	1	MOTOR OPERATED VALVE 896A IS LEFT UNAVAILABLE AFTER TESTING OR MAINTENANCE
SIHFL857AC	3.00E-03	1.33E-05	1	LATENT HUMAN FAILURE OF MOV 857A OR 857C
RHHFL0000B	3.00E-03	9.59E-06	1	LATENT HUMAN FAILURE OF RHR TRAIN B
HVTMSAFW_A	5.24E-02	6.38E-06	1	A SAFW ROOM HVAC STRING IN MAINTENANCE
SIHFLPSI1C	3.00E-03	6.18E-06	1	OPERATORS FAIL TO RESTORE PSI01C EQUIPMENT AFTER TEST OR MAINTENANCE
SITM00871A	1.52E-02	3.56E-06	1	MOV 871A OR CHECK VALVE 870A UNAVAILABLE DUE TO MAINTENANCE
SIHFL0871A	3.00E-03	3 09E-06	1	LATEN HUMAN FAILURE OF MOV 871A

TABLE 9-18. MODELING ASSUMPTION IMPORTANCES

Event Name	Probability	F-V	RAW	Description
FSHFDCR-3-X	3.00E-02	2.34E-01	8.57	Fire Brigade fail to manually suppress fire in Control Room
FACR-MCB	1.00E+00	2.34E-01	1	CR-MCB Tag
FSASPROP01	1.00E-01	1.70E-01	2.53	Fire propagates beyond initial source
FADIVA	1.00E+00	1.47E-01	1	DIVA Tag
FATB-2-2	1.00E+00	9.46E-02	1	TB-2-2 Tag
FSHFDBR1A3	3.00E-02	5.56E-02	2.8	Fire Brigade fail to manually suppress fire in Battery Zone BR1A-3
FABR1A	1.00E+00	5.56E-02	1	BR1A Tag
FALOSP-R	1.00E+00	5.52E-02	1	LOSP-R Tag
FATB-1-3	1.00E+00	4.46E-02	1	TB-1-3 Tag
FATB-1-1	1.00E+00	4.35E-02	1	TB-1-1 Tag
FATB-2-3	1.00E+00	4.19E-02	1	TB-2-3 Tag
FARC-3	1.00E+00	4.00E-02	1	RC-3 Tag
FAEDG1B-0	1.00E+00	3.69E-02	1	EDG1B-0 Tag
FSHFDRROOM	3.00E-02	3.40E-02	2.1	Fire Brigade fail to manually extinguish fire in relay room
FARRX	1.00E+00	3.40E-02	1	RR Tag
FSHFDBR1B3	3.00E-02	3.21E-02	2.04	Fire Brigade fail to manually suppress fire in Battery Zone BR1B-3
FABR1B	1.00E+00	3.21E-02	1	BR1B Tag
FASH-2-R	1.00E+00	2.70E-02	1	SH-2-R Tag
FAABO	1.00E+00	2.61E-02	1	ABO Tag
FADIVB	1.00E+00	2.58E-02	1	DIVB Tag
ACHSF00014	1.00E-01	1.97E-02	1.18	Hot short causes 480 VAC Bus 14 feeder circuit breaker 52/14 (BUS14/18B) to transfer open
FSHFDAUXBB	3.00E-02	1.92E-02	1.62	Fire Brigade fail to manually extinguish fire in Aux Bldg Basement
FAABB-3	1.00E+00	1.92E-02	1	ABB-3 Tag
ACHSF00016	1.00E-01	1.22E-02	1.11	Hot short causes 480 VAC Bus 16 feeder circuit breaker 52/16 (BUS16/11B) to transfer open
FARXTRIP	1.00E+00	1.00E-02	1	RXTRIP Tag
ACHSF00017	1.00E-01	8.92E-03	1.08	Hot short causes 480 VAC Bus 17 feeder circuit breaker 52/17 (BUS17/25B) to transfer open
MSHSF05738	1.00E-01	6.46E-03	1.06	Hot short causes AOV 5738 to fail to close
FSHFDCABTN	3.00E-02	5.46E-03	1.18	Fire Brigade fail to manually extinguish fire in cable tunnel
FACTX	1.00E+00	5.46E-03	1	CT Tag
FALOMFW	1.00E+00	5.28E-03	1	LOMFW Tag
ACHSF00015	1.00E-01	5.20E-03	1.05	Hot short causes 480 VAC Bus 15 feeder circuit breaker 52/15 (BUS15/01B) to transfer open
FSHFDAUXBM	3.00E-02	4.93E-03	1.16	Fire Brigade fail to manually extinguish fire in Aux Bldg Intermediate Level
FAABM	1.00E+00	4.93E-03	1	ABM Tag
FSHFDSH2-1	3.00E-02	4.22E-03	1.14	Fire Brigade fails to manually suppress fire in Screenhouse Zone SH-2-1
FASH-2	1.00E+00	4.22E-03	1	SH-2 Tag
ACWPFMCC1H	1.50E-01	3.84E-03	1.02	Cable wrap failure causes 480 VAC MCCH feeder circuit breaker 52/MCCH (MCCC/05MM) to transfer open
DCWPFC3ACX	1.50E-01	3.82E-03	1.02	Cable wrap failure causes disconnect switch DCPDPCB03A/03 to transfer open (to MCC H)
CVWPFPCH1A	1.50E-01	3.62E-03	1.02	Cable wrap failure causes charging pump PCH01A to fail to run

TABLE 9-18. MODELING ASSUMPTION IMPORTANCES

FSHFDCRAHR	3.00E-02	3.43E-03	1.11	Fire Brigade fail to manually extinguish fire in Air Handling Room
FAAHR	1.00E+00	3.43E-03	1	AHR Tag
FARR-UV	1.00E+00	3.37E-03	1	RR-UV Tag
FSAZDALTTD	1.00E+00	2.94E-03	1	OPERATORS FAIL TO PROVIDE COOLING TO TDAFW LUBE OIL FROM DIESEL FIRE PUMP - FIRE
ACHSF012AY	1.00E-01	2.25E-03	1.02	Hot short causes 4160 VAC circ breaker 52/12AY (supply to bus 12A from transf 12A) to transfer open
RHHSF0850A	1.00E-01	2.23E-03	1.02	Hot short causes MOV 850A to transfer open (injection)
RHHSF0850B	1.00E-01	2.23E-03	1.02	Hot short causes MOV 850B to transfer open
FSHFDTBLDI	3.00E-02	1.79E-03	1.06	Fire Brigade fail to manually extinguish fire in Turbine Bldg Intermediate Level
FATB-2-1	1.00E+00	1.79E-03	1	TB-2-1 Tag
FSHFDRC2-2	3.00E-02	1.70E-03	1.05	Failure to manually suppress fire in CNMT Zone RC-2-2
FARC-2	1.00E+00	1.70E-03	1	RC-2 Tag
MSHSF05737	1.00E-01	1.35E-03	1.01	Hot short causes AOV 5737 to fail to close
DCWPFC3AUN	1.50E-01	1.23E-03	1.01	Cable wrap failure causes DC fuse FUDCPDPCB03A/UN to fail open (to Aux Bldg DC dist panel 1A)
FAEDG1B-1	1.00E+00	1.10E-03	1	EDG1B-1-1 Tag
FALOSP	1.00E+00	9.11E-04	1	LOSP Tag
AFHSF9704A	1.00E-01	7.14E-04	1.01	Hot short causes MOV 9704A to transfer closed
FAABB-2	1.00E+00	2.43E-04	1	ABB-2 Tag
SWHSFK4615	1.00E-01	9.81E-05	1	Hot short causes SW header isolation MOV 4615 to transfer closed
FAIBN-1	1.00E+00	9.07E-05	1	IBN-1 Tag
FSHFDIBLDG	3.00E-02	9.07E-05	1	Fire Brigade fail to manually extinguish fire in Intermediate Bldg
FAABB-1	1.00E+00	6.83E-05	1	ABB-1 Tag
RCHSF00430	1.00E-01	2.41E-05	1	PORV 430 spuriously opens due to hot short
DCWPFC3ACN	1.50E-01	2.31E-05	1	Cable wrap failure causes DC fuse FUDCPDPCB03A/CN to fail open (to MCC H)
RCHSF0431C	1.00E-01	1.54E-05	1	PORV 431C spuriously opens due to hot short
ACHSF00013	1.00E-01	1.18E-05	1	Hot short causes 480 VAC Bus 13 feeder circuit breaker 52/13 (BUS13/10B) to transfer open
SWHSFK4670	1.00E-01	1.18E-05	1	Hot short causes SW header isolation MOV 4670 to transfer closed
FASH-1	1.00E+00	1.15E-05	1	SH-1 Tag
FSHFDSHBAS	3.00E-02	1.15E-05	1	Fire Brigade fail to manually extinguish fire in Screenhouse Basement
SIHSF1815A	1.00E-01	7.00E-06	1	Hot short causes MOV 1815A to transfer closed
AFHSF03996	1.00E-01	4.03E-06	1	Hot short causes MOV 3996 to transfer closed
ACHSFEG1A1	1.00E-01	3.90E-06	1	DC hot short causes DG A supply breaker to Bus 14 closed relay 18CX1/EG1A1 to transfer to energized
SIHSF0871B	1.00E-01	3.50E-06	1	Hot short causes MOV 871B to transfer closed

TABLE 9-19. SYSTEM IMPORTANCES

SYSTEM	F-V	RAW	Description
FSW	0.587	5180	Fire Service Water
AC	0.524	6830	AC Power
AFW	0.371	2790	Auxiliary Feedwater
CCW	0.3	41.9	Component Cooling Water
DG	0.269	215	Diesel Generator
SAFW	0.141	55.4	Standby Auxiliary Feedwater
RC	0.138	311	Reactor Coolant
RHR	0.072	128	Residual Heat Removal
SW	0.051	443	Service Water
MS	0.036	25.4	Main Steam
CVCS	0.024	11.5	Chemical Volume & Control
ESFAS	0.021	35.6	Engineered Safeguards Features Actuation
SI	0.013	6.83	Safety Injection
DC	0.012	1900	125-VDC Power
HVAC	0.0072	41.9	Heating, Ventilation, & Air-Conditioning
MF	0.0057	8.32	Main Feedwater
IB	0.0036	74.9	120-VAC Instrument Bus
UV	0.003	15.1	Undervoltage
IA	0.0012	1.79	Instrument Air

TABLE 9-20. COMPONENT IMPORTANCES

Event Name	Probability	F-V	RAW	Description
AFMM0TDAFW	1.27E-02	1.21E-01	10.42	Failure of TDAFW pump train components
DGDGFTSCXX	3.00E-02	1.09E-01	4.52	TSC Diesel Generator fails to run
RCRZT00430	5.00E-03	9.76E-02	20.42	PORV PCV-430 Fails To Reseat After Steam Relief
RCMVD00516N	9.67E-01	9.76E-02	1	Motor-Operated Valve 516 Is Not Closed Due To PORV Leakage
AFMMSAFWPD	2.30E-02	5.75E-02	3.44	Failure of SAFW Pump 1D Train
SWCXXSUCTN	1.00E-04	4.29E-02	427.12	TOTAL FAILURE OF COMMON SW/FIRE WATER SUCTION
FSXXXTR803	2.40E-02	3.40E-02	2.38	Relay Room Halon System S08 Inoperable
DGDGF0001A	3.00E-02	2.87E-02	1.93	DIESEL GENERATOR KDG01A FAILS TO RUN
RCRZT0431C	5.00E-03	2.26E-02	5.49	PORV PCV-431C Fails To Reseat After Steam Relief
RCMVD00515N	9.67E-01	2.26E-02	1	Motor-Operated Valve 515 Is Not Closed Due to PORV Leakage
AFCCAFWSTR	1.42E-04	1.92E-02	135.8	COMMON CAUSE FAILURE OF ALL 3 AFW PUMPS (PAF01A, PAF01B, PAF03) TO START
FSXXXTR746	2.40E-02	1.90E-02	1.77	Sprinkler S01 Inoperable (Aux Bldg Basement Cable Trays - SI Pump)
FSDGAPFP01	5.00E-03	1.83E-02	4.63	DIESEL-DRIVEN FIRE SERVICE WATER PUMP (PFP01) FAILS TO START (STANDBY)
DGDGATSCXX	4.88E-03	1.73E-02	4.52	TSC Diesel Generator fails to START
DGMMASTART	4.94E-03	1.51E-02	4.03	FAILURES OF D/G A TO START
AFMMSAFWPC	2.34E-02	1.51E-02	1.63	Failure of SAFW Pump 1C train
CCMM00738B	4.65E-03	1.50E-02	4.21	MOV 738B FAILS TO OPEN
DGDGF0001B	3.00E-02	1.45E-02	1.47	DIESEL GENERATOR KDG01B FAILS TO RUN
ACMMMCC01D	5.07E-05	1.37E-02	268.93	480 VAC Motor Control Center MCCD Faults
AFMMSGBINJ	5.01E-03	1.35E-02	3.69	Failure of AFW injection line to S/G B
MSMMN2BOTA	2.87E-02	1.25E-02	1.42	NITROGEN BOTTLES FAIL TO SUPPLY ARV 3411
DGMMBRKR14	3.93E-03	1.04E-02	3.64	FAILURES OF DG A SUPPLY BREAKER TO BUS 14 TO CLOSE
TLCCFBRKRF	1.30E-05	1.03E-02	781.47	Electrical Scram Failure Probability (Breakers Only)
AFMMMDFP1B	3.85E-03	1.03E-02	3.66	Failure of AFW Motor-Driven AFW Pump Train B
FSXXXTR768	2.40E-02	9.77E-03	1.4	Spray S24 Inoperable (Turbine Condenser Pit)
FSXXXTR769	2.40E-02	9.77E-03	1.4	Spray S25 Inoperable (Generator Hydrogen Seal)
FSXXXTR770	2.40E-02	9.77E-03	1.4	Sprinkler S26 Inoperable (Turbine Island)
FSXXXTR771	2.40E-02	9.77E-03	1.4	Spray S27 Inoperable (Main Turbine Oil Reservoir)
ESPTDPT478	9.69E-03	8.93E-03	1.91	SG B LOW PRESSURE TRANSMITTER PT-478 FAILS TO RESPOND ON DEMAND
RHMMAC01BA	2.56E-03	8.18E-03	4.19	RHR PUMP B (PAC01B) FAILS TO START
DGCC000RUN	2.34E-03	8.06E-03	4.43	DIESEL GENERATORS FAIL TO RUN (COMMON CAUSE)
MSRVP03411	1.39E-02	6.47E-03	1.46	AIR-OPERATED VALVE 3411 FAILS TO OPEN (ARV A)
TLCCFMATWS	1.80E-06	6.22E-03	3.27E+03	Mechanical Scram Failure Probability
HVCCDGOPEN	1.99E-05	5.67E-03	1.56	FAN UNIT DAMPER FOR DG FAILS TO OPEN (COMMON CAUSE)
DGMM0FUELA	6.14E-03	5.57E-03	1.9	FAILURES OF THE FUEL SUPPLY TO D/G A
DGCC0START	3.60E-04	5.24E-03	15.57	DIESEL GENERATORS FAIL TO START (COMMON CAUSE)
DGMM0AAF04	3.85E-03	4.44E-03	2.15	FAILURES OF THE FUEL SUPPLY TO D/G A
FSXXXTR750	2.40E-02	4.37E-03	1.18	Cable Tunnel Spray S05 Inoperable
ESLCDLT472	2.53E-02	4.35E-03	1.17	Logic circuit failure in LT-472 loop
AFCCAFWRUN	3.16E-05	3.97E-03	126.26	COMMON CAUSE FAILURE OF ALL 3 AFW PUMPS (PAF01A, PAF01B, PAF03) TO RUN
ESLCDLT462	2.53E-02	3.73E-03	1.14	Logic circuit failure in LT-462 loop
DGMMBSTART	4.94E-03	3.53E-03	1.71	FAILURES OF D/G B TO START
DGCWINTAKE	3.75E-01	3.20E-03	1.01	CW INTAKE HEATERS ENERGIZED (OCT 1 TO MAY 1)
ESLCDLT471	2.53E-02	2.86E-03	1.11	Logic circuit failure in LT-471 loop
FSXXXTR761	2.40E-02	2.80E-03	1.11	Sray S06 Inoperable (Air Handling Room Cable Trays)
MSCCARVAIR	1.39E-03	2.79E-03	3	COMMON CAUSE FAILURE OF AIR OPERATED ARVS
ACMMMCC01C	5.07E-05	2.64E-03	52.94	480 VAC Motor Control Center MCCC Faults
DGMM0FUELB	6.14E-03	2.57E-03	1.42	FAILURES OF FUEL TO D/G B
RHCCPUMPAB	4.12E-04	2.41E-03	6.84	COMMON CAUSE FAILURE OF RHR PUMPS A AND B TO START
MFLTD00472	1.39E-02	2.27E-03	1.16	Level transmitter LT-472 fails to respond
ACCBD0PHBG	3.85E-03	2.20E-03	1.57	480 VAC CIRCUIT BREAKER 52/PHBG TO PRZR BACKUP HEATERS FAILS TO CLOSE
AFMMSGAINJ	5.01E-03	2.12E-03	1.42	Failure of AFW injection line to S/G A
MFLTD00462	1.39E-02	2.01E-03	1.14	Level transmitter LT-462 fails to respond
IBMMBUS01C	3.36E-05	2.00E-03	60.44	120 VAC Instrument Bus C (IBPDPCBCB) Bus Faults
AFMMXXCSTS	4.76E-04	1.95E-03	5.1	Failure of Condensate Storage Tanks
CCCC738A/B	3.37E-04	1.94E-03	6.76	COMMON CAUSE FAILURE OF MOV'S 738A AND 738B TO OPEN
MSMMN2BOTB	2.87E-02	1.91E-03	1.06	NITROGEN BOTTLES FAIL TO SUPPLY ARV 3410
RRCC850A/B	3.08E-04	1.77E-03	6.74	MOVS 850A/B FAIL TO OPEN <COMMON CAUSE EVENT>
CRMVZ0896B	9.53E-03	1.76E-03	1.18	MOTOR OPERATED VALVE 896B FAILS TO CLOSE ON DEMAND (RECIRCULATION)
DGMMBRKR16	3.93E-03	1.67E-03	1.42	FAILURES OF DG B SUPPLY BREAKER TO BUS 16 TO CLOSE
DGCCPMA2AB	1.18E-04	1.66E-03	15.08	FUEL OIL PUMPS PDG02A/02B FAIL TO START (COMMON CAUSE)
ESPTDPT431	9.69E-03	1.64E-03	1.17	PRESSURIZER LOW PRESSURE TRANSMITTER PT-431 FAILS TO RESPOND ON DEMAND
DCMMAB01BD	1.60E-04	1.62E-03	11.13	Failure of Circuit E168 (To Bus 16 - Normal)
AFMMMDFP1A	3.85E-03	1.60E-03	1.41	Failure of AFW Motor-Driven AFW Pump Train A
MSAVX05738	2.91E-03	1.54E-03	1.53	AOV 5738 Fails to Close
MSXVK3570E	2.00E-04	1.47E-03	8.37	Manual valve 3570E transfers closed
MFLTD00471	1.39E-02	1.45E-03	1.1	Level transmitter LT-471 fails to respond
CCMM00738A	4.65E-03	1.43E-03	1.31	MOV 738A FAILS TO OPEN
UVPXF12V14	5.38E-04	1.38E-03	3.57	12 VDC POWER SUPPLY TO BUS 14 UV CONTROL LOGIC OUTPUT FAILS
SIMPFSI01A	5.59E-03	1.38E-03	1.25	PSI01A FAILS TO RUN
DCMMMAIN1A	3.56E-05	1.30E-03	37.54	Failure of Circuit E14 (To Main DC Distribution Panel 1A)
IBMMDISTCCJ	2.04E-04	1.21E-03	6.95	120 VAC Distribution Panel C (IBPDPCBC) Faults

TABLE 9-20. COMPONENT IMPORTANCES

FSDGFPFP01	4.00E-04	1.20E-03	3.99	DIESEL DRIVEN FIRE SERVICE WATER PUMP (PFP01) FAILS TO RUN
AFCCDMOVNB	2.51E-04	1.15E-03	5.58	Common cause failure of MOVs 9701A and 9701B to throttle flow
UVPXF12V18	5.38E-04	1.15E-03	3.15	12 VDC POWER SUPPLY TO BUS 18 UV CONTROL LOGIC OUTPUT FAILS
RRCVP0697B	3.69E-04	1.14E-03	4.1	CHECK VALVE 697B FAILS TO OPEN [RECIRC]
ACB2FBUS16	1.88E-05	1.06E-03	57.22	Local Faults On 480 VAC Bus 16
RRMM00850B	3.08E-03	9.97E-04	1.32	MOV 850A FAILS TO OPEN (RECIRCULATION)
CCMMPUMP_B	3.13E-04	9.69E-04	4.09	CCW PUMP TRAIN B FAILS TO RUN
AFCCDMOVNA	2.51E-04	9.55E-04	4.8	Common cause failure of MOVs 4007 and 4008 to throttle flow
HVCCDG0RUN	1.88E-05	9.44E-04	14.66	FAN UNIT FOR DG FAILS TO RUN (COMMON CAUSE)
MSAVX05737	2.91E-03	8.71E-04	1.3	AOV 5737 Fails to Close
RRPTHPC629	4.91E-03	8.63E-04	1.17	PRESSURE TRANSMITTER PIC-629 FAILS HIGH
MSRVP03410	1.39E-02	8.29E-04	1.06	ARV 3410 FAILS TO OPEN (STANDBY)
IASVX05738	1.64E-03	8.24E-04	1.5	Solenoid Valve 5738S for AOV 5738 Fails to Deenergize
SIMMINJECA	3.27E-03	8.10E-04	1.25	VALVE FAILURES IN SI PUMP A INJECTION LINE TO LOOP B COLD LEG
RRMM00850A	3.08E-03	8.07E-04	1.26	MOV 850A FAILS TO OPEN (RECIRCULATION)
AFMMSGTURB	1.59E-03	7.83E-04	1.49	Failure of TDAFW injection line to S/G B
AFCCPDISCA	6.36E-06	7.27E-04	115.07	Common cause failure of check valves 4009, 4010, and 3998 to open
AFCCPSGINA	6.36E-06	7.27E-04	115.07	Common cause failure of check valves 4000C, 4000D, 4003, and 4004 to open
RHMMAC01AA	2.56E-03	7.15E-04	1.28	RHR PUMP A (PAC01A) FAILS TO START
FSXXXTR755	2.40E-02	7.08E-04	1.03	Sprinkler S13 Inoperable (Diesel Generator (DG) Room B)
AFXVK9702D	9.38E-03	6.99E-04	1.07	Manual valve 9702D transfers closed
DCMMMAIN1B	3.56E-05	6.19E-04	18.4	Failure of Circuit E76 (To Main DC Distribution Panel B)
FSXVN09184	3.47E-04	6.05E-04	2.74	MANUAL VALVE 9184 FAILS TO OPEN ON DEMAND
AFMMSGTURA	1.59E-03	5.94E-04	1.37	Failure of TDAFW injection line to S/G A
ACMMSST016	8.40E-05	5.76E-04	7.85	Transformer PXABSS016 Faults
RCMVD00516	3.26E-02	5.71E-04	1.02	Motor-Operated Valve 516 Is Closed Due To PORV Leakage
RRXVK00716	1.86E-04	5.66E-04	4.04	MANUAL VALVE 716 TRANSFERS CLOSED [RECIRC]
RRXVK0694B	1.86E-04	5.66E-04	4.04	MANUAL VALVE 694B TRANSFERS CLOSED [RECIRC]
RRXVK0696B	1.86E-04	5.66E-04	4.04	MANUAL VALVE 696B TRANSFERS CLOSED [RECIRC]
RRXVK0709B	1.86E-04	5.66E-04	4.04	MANUAL VALVE 709B TRANSFERS CLOSED [RECIRC]
RHXVK00716	1.84E-04	5.60E-04	4.04	MANUAL VALVE 716 TRANSFERS CLOSED [INJECTION]
RHXVK0694B	1.84E-04	5.60E-04	4.04	MANUAL VALVE 694B TRANSFERS CLOSED [INJECTION]
RHXVK0696B	1.84E-04	5.60E-04	4.04	MANUAL VALVE 696B TRANSFERS CLOSED [INJECTION]
ACCBD2BTBB	3.85E-03	5.32E-04	1.14	4160 VAC Bus 11B Bus 12B Tie Breaker 52/BTB-B (BUS11B/21) Fails To Close
ACCBD5211B	3.85E-03	5.32E-04	1.14	4160 VAC Bus 11B Feeder Circuit Breaker 52/11B (BUS11B/22) Fails to Open
DGMMBRKR17	3.85E-03	5.29E-04	1.14	FAILURES OF DG B SUPPLY BREAKER TO BUS 17 TO CLOSE
RRMVP0857B	3.08E-03	5.18E-04	1.17	MOV 857B FAILS TO OPEN
SICCMPSI1Y	8.38E-04	4.73E-04	1.56	PSI01A, PSI01B & PSI01C FAIL TO RUN DURING INJECTION DUE TO COMMON CAUSE
RRHXFAC02B	1.55E-04	4.72E-04	4.04	HEAT EXCHANGER EAC02B COOLING CAP. FAILS [RECIRC]
DGCCPMF2AB	1.78E-04	4.70E-04	3.64	FUEL OIL PUMPS PDG02A/02B FAIL TO RUN (COMMON CAUSE)
IASVX05737	1.64E-03	4.64E-04	1.28	Solenoid Valve 5737S for AOV 5737 Fails to Deenergize
RHMMAC01BF	1.49E-04	4.53E-04	4.04	RHR PUMP B (PAC01B) FAILS TO RUN
DGCCCV5920	3.58E-05	4.49E-04	13.54	COMMON CAUSE FAILURE OF FUEL OIL FOOT VALVES 5919 AND 5920 TO CLOSE
DGCCCV5956	3.58E-05	4.49E-04	13.54	COMMON CAUSE FAILURE OF FUEL OIL CHECK VALVES 5955 AND 5956 TO CLOSE
DCMMAUX00B	3.56E-05	4.35E-04	13.22	Failure of Circuit E128 (To Auxiliary Building DC Distribution Panel B)
FSPXDAFWLP	1.14E-02	4.30E-04	1.04	AFW local indicating panel fails
FSPXDIBELP	1.14E-02	4.30E-04	1.04	IBELIP Panel fails
SIMPSSI01A	1.76E-03	4.27E-04	1.24	PSI01A FAILS TO START
AFXVK04015	1.19E-04	4.25E-04	4.56	Manual valve 4015 transfers closed
FSXXXTR748	2.40E-02	4.11E-04	1.02	Sprinkler S03 Inoperable (Aux Bldg Intermediate Level at cable Tunnel Entrance)
FSXXXTR749	2.40E-02	4.11E-04	1.02	Sprinkler S04 Inoperable (Aux Bldg Intermediate Level Cable Trays - East)
DCMMAUX00A	3.56E-05	4.03E-04	12.33	Failure of Circuit E53 (To Auxiliary Building DC Distribution Panel A)
RRCVP0710B	1.25E-04	3.79E-04	4.02	CHECK VALVE 710B FAILS TO OPEN [RECIRC]
MSCCCSGBLO	5.56E-04	3.75E-04	1.67	Common Cause Failure of Steam Generator Blowdown AOVs to Close
AFCVP04014	1.06E-04	3.73E-04	4.53	Check valve 4014 fails to open
RCMVP00515	2.40E-03	3.46E-04	1.14	MOTOR-OPERATED VALVE 515 FAILS TO OPEN
SRHFDRECRC	1.30E-03	3.39E-04	1.26	OPERATORS FAIL TO SHIFT SI SYSTEM TO RECIRCULATION
DGPVK5905A	1.28E-03	3.33E-04	1.26	PRESSURE CONTROL VALVE 5905A TRANSFERS CLOSED
ESPTDPT449	9.69E-03	3.21E-04	1.03	PRESSURIZER LOW PRESSURE TRANSMITTER PT-449 FAILS TO RESPOND
DCMMSH01AB	1.60E-04	3.15E-04	2.97	Failure of Circuit E160 (To Bus 18 - Normal)
CCXVK0741B	9.72E-05	2.94E-04	4.02	MANUAL VALVE 741B TRANSFERS CLOSED
CCXVK0780B	9.72E-05	2.94E-04	4.02	MANUAL VALVE 780B TRANSFERS CLOSED
CVCVP00357	1.17E-03	2.88E-04	1.25	Check valve 357 fails to open
SICCMPSI1X	5.46E-04	2.81E-04	1.52	PSI01A, PSI01B & PSI01C FAIL TO START FOR INJECTION DUE TO COMMON CAUSE
FSXXXTR766	2.40E-02	2.78E-04	1.01	Spray S22 Inoperable (Transformer #12A)
FSXXXTR767	2.40E-02	2.78E-04	1.01	Spray S23 Inoperable (Transformer #12B)
ACLCD83TSC	9.34E-05	2.77E-04	3.96	Failure of Automatic Transfer Switch to load TSC DG (no power requirements for switch)
CVAVX00371	8.60E-02	2.62E-04	1	AOV 371 FAILS TO CLOSE
IBMMBUS01A	3.36E-05	2.57E-04	8.64	120 VAC Instrument Bus A (IBPDPCBAR) Bus Faults
AFMMSGBSAF	2.40E-03	2.52E-04	1.1	Failure of SAFW injection line to S/G B
DCMMAB01BB	3.56E-05	2.41E-04	7.78	Failure of Circuit E167 (To MCC D)
ACCBR012BX	3.19E-05	2.40E-04	8.5	4160 VAC Circuit Breaker 52/12BX (Normal Supply To Bus 12B) Transfers Open
ACB2FBUS14	1.88E-05	2.39E-04	13.69	Local Fault On 480 VAC Bus 14

TABLE 9-20. COMPONENT IMPORTANCES

DCCC0BATTD	1.19E-06	2.30E-04	194.05	Batteries A/B No Output on Demand <Common Cause>
HFDCORREC2	1.10E+00	2.29E-04	12.5	DUAL HFD CORRECTION FACTOR
FSFDFNFS30	1.74E-04	2.19E-04	2.26	Water filter NFS30 plugged
HFDCORREC1	1.10E+00	2.16E-04	12.5	DUAL HFD CORRECTION FACTOR
RCMVP00516	2.40E-03	2.11E-04	1.09	MOTOR-OPERATED VALVE 516 FAILS TO OPEN
ESPTDPT429	9.69E-03	2.07E-04	1.02	PRESSURIZER LOW PRESSURE TRANSMITTER PT-429 FAILS TO RESPOND ON DEMAND
DGSVP5933A	8.10E-04	2.06E-04	1.25	SOLENOID VALVE 5933A FAILS TO OPEN (STANDBY)
UVPXF12V16	5.38E-04	2.02E-04	1.38	12 VDC POWER SUPPLY TO BUS 16 UV CONTROL LOGIC OUTPUT FAILS
SWMM0SWPDR	7.50E-05	1.88E-04	3.51	FAILURES OF SW PUMP D TO RUN
SRCCMPSI1Y	8.38E-04	1.86E-04	1.22	PSI01A, PSI01B & PSI01C FAIL TO RUN FOR RECIRC. DUE TO COMMON CAUSE
DCMM0BATTB	4.75E-05	1.83E-04	4.87	Failure of Battery B To Battery B Main DC Fuse Cabinet
RCMM000515	1.50E-03	1.83E-04	1.12	ELECTRICAL FAILURES PREVENT MOVING MOV-515
UVREE0X114	7.65E-05	1.76E-04	3.3	Relay 27X1/14 fails to energize
UVREEBX114	7.65E-05	1.76E-04	3.3	Relay 27BX1/14 fails to energize
DCBDFFUSEB	5.78E-07	1.75E-04	301.97	Battery B Main DC Fuse Cabinet (DCPDPCB02B) Local Fault
DCMMAB01AD	1.60E-04	1.70E-04	2.06	Failure of Circuit E63 (To Bus 14 - Normal)
RHMVR0850A	2.14E-05	1.61E-04	8.54	MOTOR-OP VALVE 850A TRANSFERS OPEN [INJECTION]
RHMVR0850B	2.14E-05	1.61E-04	8.54	MOTOR-OP VALVE 850B TRANSFERS OPEN [INJECTION]
DCMMTBDIST	3.56E-05	1.60E-04	5.5	Failure of Circuit E74 (To Turbine Building DC Distribution Panel)
RRXVK0851B	5.47E-04	1.60E-04	1.29	DE-POWERED MOV 851B TRANSFERS CLOSED [RECIRC]
DCMMTB01BN	3.56E-05	1.54E-04	5.33	Failure of Circuit E191 (To TDAFW Pump DC Oil Pump)
CVMMPCH1AF	6.58E-04	1.54E-04	1.23	CHARGING PUMP PCH01A FAILS TO RUN
AFLTD2022B	1.41E-04	1.53E-04	2.09	Condensate Storage Tank B level transmitter LT-2022B fails to respond
RHMVQ0852B	2.27E-03	1.52E-04	1.07	MOV 852B FAILS TO OPEN
DGCCCV5919	1.36E-05	1.51E-04	12.07	FOOT VALVES 5919/5920 FAIL TO OPEN (COMMON CAUSE)
DGCCCV5955	1.36E-05	1.51E-04	12.07	CHECK VALVES 5955/5956 FAIL TO OPEN (COMMON CAUSE)
DGCCCV5961	1.36E-05	1.51E-04	12.07	CHECK VALVES 5961/5962 FAIL TO OPEN (COMMON CAUSE)
CVMMPCH1AA	1.08E-03	1.51E-04	1.14	CHARGING PUMP PCH01A FAILS TO START
RHHXPAC02B	4.97E-05	1.46E-04	3.93	HEAT EXCHANGER EAC02B PLUGS (INJECTION)
RRHXPAC02B	4.97E-05	1.46E-04	3.93	HEAT EXCHANGER EAC02B PLUGS [RECIRC]
MSXVK03507	3.92E-04	1.46E-04	1.37	ARV 3411 ISOLATION MANUAL VALVE 03507 TRANSFERS CLOSED
SICVP0867A	6.32E-04	1.45E-04	1.23	CHECK VALVE 867A FAILS TO OPEN
CRCCM0896X	6.91E-04	1.42E-04	1.21	COMMON CAUSE FAILURE OF MOVS 896A AND 896B TO CLOSE (RECIRC)
IBMMINV01A	6.90E-04	1.42E-04	1.21	Instrument Bus A (IBPDPCBAR) Inverter INVTA Circuit Faults
ESLCDY2002	9.34E-05	1.41E-04	2.51	Failure of I/E converter FY-2002
DGCCFDP048	6.38E-05	1.39E-04	3.18	DG FUEL OIL STRAINERS NDG04/08 PLUG (COMMON CAUSE)
DGCCFDP090	6.38E-05	1.39E-04	3.18	FOOT VALVE 5919/5920 STRAINERS PLUG (COMMON CAUSE)
FSPSD0RK90	3.78E-03	1.39E-04	1.04	PRESSURE SWITCH RK-90 FAILS TO RESPOND (PFP01 FAILS TO START)
SWMVP9629B	1.42E-02	1.37E-04	1.01	Motor operated valve 9629B fails to open
HVCCDGSTRT	6.91E-05	1.31E-04	1.04	FAN UNIT FOR DG FAILS TO START (COMMON CAUSE)
RHCC697A/B	4.42E-05	1.27E-04	3.86	CHECK VALVES 697A, 697B FAIL TO OPEN <COMMON CAUSE EVENT>
ACMMMCC01H	5.07E-05	1.25E-04	3.47	480 VAC Motor Control Center MCCH Faults
DGMMBRKR18	3.85E-03	1.14E-04	1.03	FAILURES OF DG A SUPPLY BREAKER TO BUS 18 TO CLOSE
AFMVP9703B	3.16E-03	1.13E-04	1.04	Motor operated valve 9703B fails to open
AFFID2015A	4.34E-05	1.12E-04	3.58	TDAFW flow indicator FI-2015A (IBELIP) fails to respond
AFFTD2015A	4.34E-05	1.12E-04	3.58	FT-2015A fails to respond
SWMMAFPMPB	7.77E-05	1.12E-04	2.44	FAILURE OF SERVICE WATER COMPONENTS FOR MDAFW PUMP PAF01B
RRXVK0851A	5.47E-04	1.07E-04	1.19	DE-POWERED MOV 851A TRANSFERS CLOSED [RECIRC]
MFLID0460A	5.14E-05	1.06E-04	3.07	LI-460A (IBELIP) fails to respond
MFLTD0460A	5.14E-05	1.06E-04	3.07	LT-460A fails to respond on demand
AFMMSGASAF	1.37E-03	1.03E-04	1.07	Failure of SAFW injection line to S/G A
RCMM000516	1.50E-03	1.03E-04	1.07	ELECTRICAL FAILURES PREVENT MOVING MOV-516
IBMMDIST0EJ	2.04E-04	9.98E-05	1.49	120 VAC Distribution Panel E (IBPDPCBE) Faults
DCMM0BATTA	4.75E-05	9.52E-05	3.01	Failure of Battery A (BTRYA) To Battery A Main DC Fuse Cabinet
RCMVD00515	3.26E-02	9.46E-05	1	Motor-Operated Valve 515 Is Closed Due to PORV Leakage
SWXVK04623	4.06E-04	9.22E-05	1.23	Manual Service Water Valve 4623 Transfers Closed
SWMMTDAFWP	1.01E-04	8.95E-05	1.89	FAILURE OF MAIN SERVICE WATER LINE TO TDAFW PUMP
FSFDFNFS44	1.74E-04	8.91E-05	1.51	Failure of filter NFS44
DCCSRTSCON	3.38E-05	8.90E-05	3.63	Failure of TSC Battery Disconnect
DCMMCB03AC	3.56E-05	8.27E-05	3.33	Failure of Circuit E22 (To MCC H)
DCMMDG01AC	3.56E-05	8.27E-05	3.33	Failure of Circuit E19 (To D/G A - Normal)
DCMMDGPNLA	3.56E-05	8.27E-05	3.33	Failure Of Circuit E20 (To D/G A DC Distribution Panel A)
DCMMSH01BF	6.38E-03	8.21E-05	1.01	Failure of Circuit E159 (To Bus 18 - Emergency)
SILCDSI01C	1.28E-02	7.66E-05	1.01	LOGIC CIRCUIT FAILURE SHOWS WRONG POSITION OF 52/PSI01C2 (BUS 14)
FSXXXTR757	2.40E-02	7.61E-05	1	Sprinkler S15 Inoperable (Intermediate Building East Cable Trays)
SWXVK04640	4.06E-04	7.51E-05	1.19	Manual Valve 4640 From SW Supply Header B Transfers Closed
AFCCSSAFWA	3.55E-05	7.12E-05	3.01	Common cause failure of SAFW Pumps 1C and 1D to start
RHCCPUMPBA	1.64E-05	7.03E-05	5.29	COMMON CAUSE FAILURE OF RHR PUMPS A AND B TO RUN
ESLCDLT461	2.53E-02	6.99E-05	1	Logic circuit failure in LT-461 loop
DCMMAB01AE	6.38E-03	6.52E-05	1.01	Failure of Circuit E169 (To Bus 16 - Emergency)
DCMMSCRN1A	3.56E-05	6.09E-05	2.71	Failure of Circuit E30 (To Screen House DC Distribution Panel A)
FSFDFNFS29	1.74E-04	5.77E-05	1.33	Water filter NFS29 fails
CCPPJ_COMM	1.33E-05	5.42E-05	5.09	PIPE RUPTURE IN THE COMMON CCW PIPING

TABLE 9-20. COMPONENT IMPORTANCES

CCTKJSURGE	1.33E-05	5.42E-05	5.09	CCW SURGE TANK RUPTURE
RRTKG0SEAL	1.32E-04	5.41E-05	1.41	RHR PUMP SEAL FAILURE FAILS BOTH PUMPS (LONG TERM)
CRMVZ0896A	9.53E-03	5.37E-05	1.01	MOTOR OPERATED VALVE 896A FAILS TO CLOSE ON DEMAND (RECIRCULATION)
AFCCSMDAFW	3.55E-05	5.35E-05	2.51	Common cause failure of AFW Pumps 1A and 1B (PAF01A and PAF01B) to start
ACCBRC3501	3.19E-05	5.19E-05	2.63	Breaker IBPDPCBC/09 transfers open (to Fox 2 rack)
SWMVP04013	1.42E-02	5.13E-05	1	Motor operated valve 4013 fails to open
RRCCM0857M	3.08E-04	4.95E-05	1.16	MOVS 857A, 857B AND 857C FAIL TO OPEN DUE TO COMMON CAUSE
RHXVK00715	1.09E-03	4.95E-05	1.05	MANUAL VALVE 715 TRANSFERS CLOSED [INJECTION]
CCMMCCWP1C	9.75E-03	4.84E-05	1	Failure of PSI01C cooling components
CCMMPUMP_A	3.13E-04	4.51E-05	1.14	CCW PUMP A TRAIN FAILS TO RUN
AFFTDFT2002	4.34E-05	4.45E-05	2.03	Flow transmitter FT-2002 fails to respond
AFCCFSAFWA	2.74E-05	4.42E-05	2.61	Common cause failure of SAFW Pumps 1C and 1D to run
IBMMINV01C	6.90E-04	4.41E-05	1.06	Instrument Bus C (IBPDPCBC) Inverter INVTB Circuit Faults
FSFDFNFP01	2.89E-05	4.37E-05	2.51	DIESEL-DRIVEN FIRE SERVICE WATER PUMP INTAKE STRAINER(NFP01) PLUGS
ESPTDPT479	9.69E-03	4.22E-05	1	SG B LOW PRESSURE TRANSMITTER PT-479 FAILS TO RESPOND ON DEMAND
ESLTDLT428	5.14E-05	4.02E-05	1.78	Level transmitter LT-428 fails to respond
MFLTD00461	1.39E-02	3.85E-05	1	Level transmitter LT-461 fails to respond
IBMMDIST0AJ	2.04E-04	3.84E-05	1.19	120 VAC Distribution Panel A (IBPDPCBA) Faults
UVPXF12V17	5.38E-04	3.59E-05	1.07	12 VDC POWER SUPPLY TO BUS 17 UV CONTROL LOGIC OUTPUT FAILS
ACMMMCC01M	5.07E-05	3.55E-05	1.7	480 VAC Motor Control Center MCCM Faults
AFPPJFAILX	1.33E-05	3.39E-05	3.56	Failure of AFW pump suction line (pipe rupture)
RHCVP0697B	7.37E-04	3.34E-05	1.05	CHECK VALVE 697B FAILS TO OPEN [INJECTION]
RHCVP0853B	7.37E-04	3.34E-05	1.05	CHECK VALVE 853B FAILS TO OPEN
CSMM00RWST	6.64E-06	3.30E-05	5.97	MOV 896A OR 896B TRANSFERS CLOSED (FAILS CS AND SI FROM RWST)
SIXVK0888A	1.69E-04	3.29E-05	1.19	MANUAL VALVE 888A TRANSFERS CLOSED
SIXVK0890A	1.69E-04	3.29E-05	1.19	MANUAL VALVE 890A TRANSFERS CLOSED
SRCCMPSI1X	2.64E-04	3.14E-05	1.12	PSI01A, PSI01B & PSI01C FAIL TO START FOR RECIRC. DUE TO COMMON CAUSE
ACMMSST017	8.40E-05	3.11E-05	1.37	Transformer PXSHSS017 Faults
ESLCDLT463	2.53E-02	3.07E-05	1	Logic circuit failure in LT-463 loop
ACMMSST014	8.40E-05	3.03E-05	1.36	480 VAC Bus 14 Transformer PXABSS014 Faults
SIMPFSI01C	5.59E-03	2.98E-05	1.01	PSI01C FAILS TO RUN
CCMMCCWP1B	9.75E-03	2.94E-05	1	Failure of PSI01B cooling components
DCBTDTSCBT	1.19E-05	2.92E-05	3.45	Failure of TSC Battery
HVMMADF01A	3.99E-03	2.60E-05	1.01	ADF01A FAILS TO START AND RUN
HVMMADF01B	3.99E-03	2.60E-05	1.01	ADF01B FAILS TO START AND RUN
SWMMSWXTIE	8.11E-04	2.43E-05	1.03	Failure of Service Water Header A to Service Water Header B Crosstie
ESPXF2022B	3.36E-05	2.42E-05	1.72	Failure of loop power supply LY-2022B
ESPXFLQ428	3.36E-05	2.42E-05	1.72	Failure of loop power supply LQ-428
SWMVP9629A	1.42E-02	2.38E-05	1	Motor operated valve 9629A fails to open
ACCBRC2649	3.19E-05	2.29E-05	1.72	AC BREAKER IBPDPCBC/02 (CIRCUIT C2649) TRANSFERS OPEN
ACCBRC3595	3.19E-05	2.29E-05	1.72	AC BREAKER IBPDPCBC/06 (CIRCUIT C3595) TRANSFERS OPEN
DCBTF0001B	2.25E-05	2.28E-05	2.01	Battery B (BTRYB) No Output (Hourly)
AFCCFMDAFW	2.74E-05	2.27E-05	1.83	Common cause failure of AFW Pumps 1A and 1B to run
RRXVK00714	1.86E-04	2.22E-05	1.12	MANUAL VALVE 714 TRANSFERS CLOSED [RECIRC]
RRXVK0694A	1.86E-04	2.22E-05	1.12	MANUAL VALVE 694A TRANSFERS CLOSED [RECIRC]
RRXVK0696A	1.86E-04	2.22E-05	1.12	MANUAL VALVE 696A TRANSFERS CLOSED [RECIRC]
RRXVK0709A	1.86E-04	2.22E-05	1.12	MANUAL VALVE 709A TRANSFERS CLOSED [RECIRC]
RHXVK00714	1.84E-04	2.20E-05	1.12	MANUAL VALVE 714 TRANSFERS CLOSED [INJECTION]
RHXVK0694A	1.84E-04	2.20E-05	1.12	MANUAL VALVE 694A TRANSFERS CLOSED [INJECTION]
RHXVK0696A	1.84E-04	2.20E-05	1.12	MANUAL VALVE 696A TRANSFERS CLOSED [INJECTION]
SRMPFSI01C	5.59E-03	2.17E-05	1	PSI01C FAILS TO RUN
DGPVK5906A	1.28E-03	2.10E-05	1.02	PRESSURE CONTROL VALVE 5906A TRANSFERS CLOSED
AFMVP9703A	3.16E-03	2.01E-05	1.01	Motor operated valve 9703A fails to open
ESLCDY2001	9.34E-05	1.98E-05	1.21	Failure of I/E converter FY-2001
RCRZP00430	1.07E-03	1.94E-05	1.02	PORV PCV-430 FAILS TO OPEN
SWMMAFTURB	8.86E-06	1.90E-05	3.15	FAILURE OF SERVICE WATER COMPONENTS FOR TDAFW PUMP
HVMM000DGA	9.51E-06	1.86E-05	2.96	DG A VENTILATION FAILURES
RRHXFAC02A	1.55E-04	1.86E-05	1.12	HEAT EXCHANGER EAC02A COOLING CAPACITY FAILS [RECIRC]
CCCCPUMP/R	8.35E-06	1.84E-05	3.2	COMMON CAUSE FAILURE OF CCW PUMPS TO RUN
AFLTD2022A	1.41E-04	1.79E-05	1.13	Condensate Storage Tank A level transmitter LT-2022A fails to respond
RHMMAC01AF	1.49E-04	1.78E-05	1.12	RHR PUMP A (PAC01A) FAILS TO RUN
RHCC710A/B	7.44E-06	1.64E-05	3.2	CHECK VALVES 710A, 710B FAIL TO OPEN <COMMON CAUSE EVENT>
SWMMAFPMPA	7.77E-05	1.64E-05	1.21	FAILURE OF SERVICE WATER COMPONENTS FOR MDAFW PUMP PAF01A
SICVP0889A	1.06E-04	1.57E-05	1.15	CHECK VALVE 889A FAILS TO OPEN
IAXVK7067L	1.28E-03	1.51E-05	1.01	MANUAL VALVE 7067L TRANSFERS CLOSED
RRCVP0710A	1.25E-04	1.50E-05	1.12	CHECK VALVE 710A FAILS TO OPEN [RECIRC]
ESLID2022B	2.40E-05	1.49E-05	1.62	Failure of MCB indicator LI-2022A
ESLIDLI428	2.40E-05	1.49E-05	1.62	Failure of MCB indicator LI-428
DCMMAB01AB	3.56E-05	1.48E-05	1.42	Failure of Circuit E61 (To MCC C)
RRCVC00854	1.43E-04	1.45E-05	1.1	CHECK VALVE 854 FAILS TO CLOSE
RRXVK00715	5.47E-04	1.37E-05	1.03	MANUAL VALVE 715 TRANSFERS CLOSED [RECIRC]
RRMVP0857A	3.08E-03	1.36E-05	1	MOV 857A FAILS TO OPEN
RRMVP0857C	3.08E-03	1.36E-05	1	MOV 857C FAILS TO OPEN

TABLE 9-20. COMPONENT IMPORTANCES

SWMM0SWPAS	8.53E-04	1.30E-05	1.02	FAILURES OF SW PUMP A TO START
RCXVK00510	1.08E-03	1.28E-05	1.01	MANUAL VALVE 510 TO PRESSURE TRANSMITTER PT-430 TRANSFERS CLOSED
RCXVK00533	1.08E-03	1.28E-05	1.01	MANUAL VALVE 533 TO PRESSURE TRANSMITTER PT-429 TRANSFERS CLOSED
RCXVK12236	1.08E-03	1.28E-05	1.01	MANUAL VALVE 12236 TO PRESSURE TRANSMITTER PT-429 TRANSFERS CLOSED
RCXVK12237	1.08E-03	1.28E-05	1.01	MANUAL VALVE 12237 TO PRESSURE TRANSMITTER PT-430 TRANSFERS CLOSED
RCXVK12425	1.08E-03	1.28E-05	1.01	MANUAL VALVE 12425 TO PRESSURE TRANSMITTER PT-430 TRANSFERS CLOSED
AFCCPCSTCV	6.36E-06	1.27E-05	3	Common cause failure of check valves 4014, 4016, and 4017 to open
RCMM0OSRVS	2.80E-04	1.22E-05	1.04	Either Pressurizer Safety Valve Fails to Open
DCBDFFUSEA	5.78E-07	1.19E-05	21.58	Battery A Main DC Fuse Cabinet (DCPDPCB02A) Local Fault
DCBDFMAINA	5.78E-07	1.19E-05	21.58	Main DC Distribution Panel A (DCPDPCB03A) Local Fault
FSXVK05141	1.63E-05	1.18E-05	1.72	MANUAL VALVE 5141 TRANSFERS CLOSED
CCXVK0741A	9.72E-05	1.16E-05	1.12	MANUAL VALVE 741A TRANSFERS CLOSED
CCXVK0780A	9.72E-05	1.16E-05	1.12	MANUAL VALVE 780A TRANSFERS CLOSED
FSXXXTR758	2.40E-02	1.15E-05	1	Spray S17 Inoperable (Screenhouse Basement Cable Trays)
SWMM0SWPAR	7.50E-05	1.14E-05	1.15	FAILURES OF SERVICE WATER PUMP A TO RUN
CVCCMPFABC	8.49E-05	1.08E-05	1.13	COMMON CAUSE FAILURE OF THE CHARGING PUMPS TO RUN
SWCCPSWMVA	9.87E-04	1.08E-05	1.01	Common cause failure of MOVs 4013, 4027, and 4028 to open
ESPTDPT430	9.69E-03	1.06E-05	1	PRESSURIZER LOW PRESSURE TRANSMITTER PT-430 FAILS TO RESPOND ON DEMAND
UVMMUV200X	2.58E-06	1.05E-05	5.08	Failure of balancing type current limiting fuses
SIMMINJECB	3.64E-03	1.03E-05	1	VALVE FAILURES IN SI PUMP B INJECTION LINE TO LOOP A COLD LEG
MSAVX03517	5.76E-03	1.02E-05	1	MSIV 3517 Fails to Close
ESPXDPQ478	3.36E-05	9.06E-06	1.27	Failure of loop power supply PQ-478
DGSVP5934A	8.10E-04	8.82E-06	1.01	SOLENOID VALVE 5934A FAILS TO OPEN (STANDBY)
ACCBRC2648	3.19E-05	8.61E-06	1.27	AC BREAKER IBPDPCBC/01 (CIRCUIT C2648) TRANSFERS OPEN
MFLTD00463	1.39E-02	8.40E-06	1	Level transmitter LT-463 fails to respond
ESFID2022A	2.40E-05	8.27E-06	1.34	Failure of MCB indicator FI-2022A
SIMPFSI01B	5.59E-03	8.11E-06	1	PSI01B FAILS TO RUN
SRMPFSI01B	5.59E-03	8.11E-06	1	PSI01B FAILS TO RUN
HVMFFACF5B	1.88E-04	7.74E-06	1.04	CONTROL ROD SHROUD FAN B FAILS TO RUN
CCMMRRPMPB	4.27E-06	7.43E-06	2.74	MANUAL VALVES FOR RHR PUMP B TRANSFER CLOSED
SRMMINJECB	3.64E-03	6.75E-06	1	VALVE FAILURES IN SI PUMP B INJECTION LINE TO LOOP A COLD LEG (RECIRC)
RCRZP0431C	1.07E-03	6.66E-06	1.01	PORV PCV-431C FAILS TO OPEN
RRMVK0704A	1.16E-03	6.23E-06	1.01	MOV 704A TRANSFERS CLOSED (RECIRCULATION)
RRMVK0704B	1.16E-03	6.23E-06	1.01	MOV 704B TRANSFERS CLOSED (RECIRCULATION)
RHMVK0704A	1.15E-03	6.16E-06	1.01	MOV 704A TRANSFERS CLOSED (INJECTION)
RHMVK0704B	1.15E-03	6.16E-06	1.01	MOV 704B TRANSFERS CLOSED (INJECTION)
MSXVK03506	3.92E-04	5.35E-06	1.01	ARV 3410 ISOLATION MANUAL VALVE 03506 TRANSFERS CLOSED
UVREK0X317	1.51E-04	5.02E-06	1.03	BUS 17 UNDERVOLTAGE RELAY 27X3/17 TRANSFERS TO ENERGIZED
UVREK0X516	1.51E-04	5.02E-06	1.03	BUS 16 UNDERVOLTAGE RELAY 27X5/16 TRANSFERS TO ENERGIZED
UVREKBX317	1.51E-04	5.02E-06	1.03	BUS 17 UNDERVOLTAGE RELAY 27BX3/17 TRANSFERS TO ENERGIZED
UVREKBX516	1.51E-04	5.02E-06	1.03	BUS 16 UNDERVOLTAGE RELAY 27BX5/16 TRANSFERS TO ENERGIZED
IBMMDIST0D	2.04E-04	4.77E-06	1.02	120 VAC Distribution Panel D (IBPDPCBD) Faults
DCMMCHG01B	3.72E-04	4.73E-06	1.01	Failure of Battery Charger B (BYCB)
DCMMCHG1B1	3.72E-04	4.73E-06	1.01	Failure of Battery Charger B1 (BYCB1)
ACB2FBUS17	1.88E-05	4.45E-06	1.24	Local Fault on 480 VAC Bus 17
DCMMAB01BE	6.38E-03	4.39E-06	1	Failure of Circuit E64 (To Bus 14 - Emergency)
AFFTDF2001	4.34E-05	4.37E-06	1.1	Failure of FT-2001 to respond
RCMMTRC04A	6.86E-04	4.25E-06	1.01	FAILURE OF NITROGEN SUPPLY TO PCV-430
RCMMTRC04B	6.86E-04	4.25E-06	1.01	FAILURE OF NITROGEN SUPPLY TO PCV-431C
SICCM0867X	3.79E-05	4.20E-06	1.11	COMMON CAUSE FAILURE TO OPEN OF CHECK VALVES 867A & 867B
SICCM0878X	3.79E-05	4.20E-06	1.11	CHECK VALVES 878G AND 878J FAIL TO OPEN DUE TO COMMON CAUSE
DCMMDG01BD	6.21E-03	4.19E-06	1	Failure of Circuit E18 (To D/G A - Emergency)
ESPIDPI478	2.40E-05	4.10E-06	1.17	Failure of MCB indicator PI-478
IASVX00371	4.86E-03	4.07E-06	1	Solenoid Valve 14204S for AOV 371 Fails to Deenergize
RCCC00430P	1.07E-04	4.00E-06	1.04	COMMON CAUSE FAILURE OF PCV-430 AND PCV-431C TO OPEN ON DEMAND
ACCBR0PHBG	3.19E-05	3.87E-06	1.12	480 VAC CIRCUIT BREAKER 52/PHBG TO PRZR BACKUP HEATERS TRANSFERS OPEN
CCXVK00728	2.14E-06	3.71E-06	2.74	MANUAL VALVE 728 TRANSFERS CLOSED
ACMMMCC01L	5.07E-05	3.70E-06	1.07	480 VAC Motor Control Center MCCL Faults
DCBDFAUXDA	5.78E-07	3.59E-06	7.2	Auxiliary Building DC Distribution Panel A (DCPDPAB01A) Local Fault
UVREE0X116	7.65E-05	3.43E-06	1.04	Relay 27X1/16 fails to energize
UVREEBX116	7.65E-05	3.43E-06	1.04	Relay 27BX1/16 fails to energize
SRMMINJECA	3.27E-03	3.37E-06	1	VALVE FAILURES IN SI PUMP A INJECTION LINE TO LOOP B COLD LEG (RECIRC)
SWCCPUMPSS	2.20E-05	3.35E-06	1.15	Common Cause Failure Of Service Water Pumps To Start
RCSWK1P430	5.28E-04	3.28E-06	1.01	HAND SWITCH 1/430 TRANSFERS TO CLOSED POSITION
AFCCPSGINB	6.36E-06	3.27E-06	1.51	Common cause failure of check valves 9705A and 9705B to open
RHHXPAC02A	4.97E-05	3.24E-06	1.07	HEAT EXCHANGER EAC02A PLUGS [INJECTION]
RRHXPAC02A	4.97E-05	3.24E-06	1.07	HEAT EXCHANGER EAC02A PLUGS [RECIRC]
FSCVK05133	6.76E-06	3.22E-06	1.48	CHECK VALVE 5133 TRANSFERS CLOSED
ACCBRC3500	3.19E-05	3.21E-06	1.1	Breaker IBPDPCBE/03 transfers open (to Fox 1 Rack)
RHXVK0709B	1.84E-04	3.04E-06	1.02	MANUAL VALVE 709B TRANSFERS CLOSED [INJECTION]
RHCC852A/B	1.82E-04	3.01E-06	1.02	MOVS 852A, 852B FAIL TO OPEN <COMMON CAUSE EVENT>

FIGURE 9-14. TRUNCATION EVALUATION

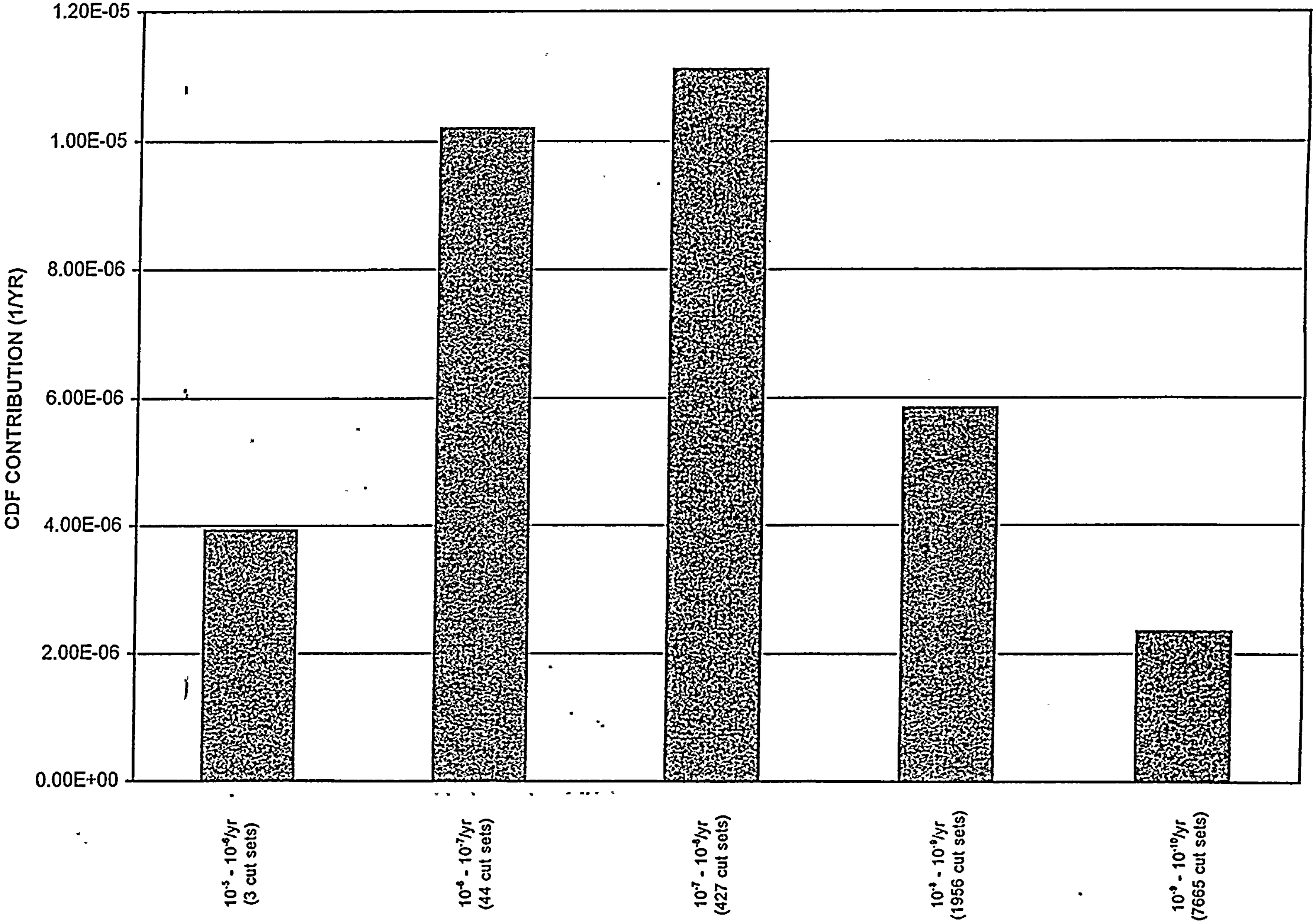


FIGURE 9-15. FIRE INITIATOR IMPORTANCES

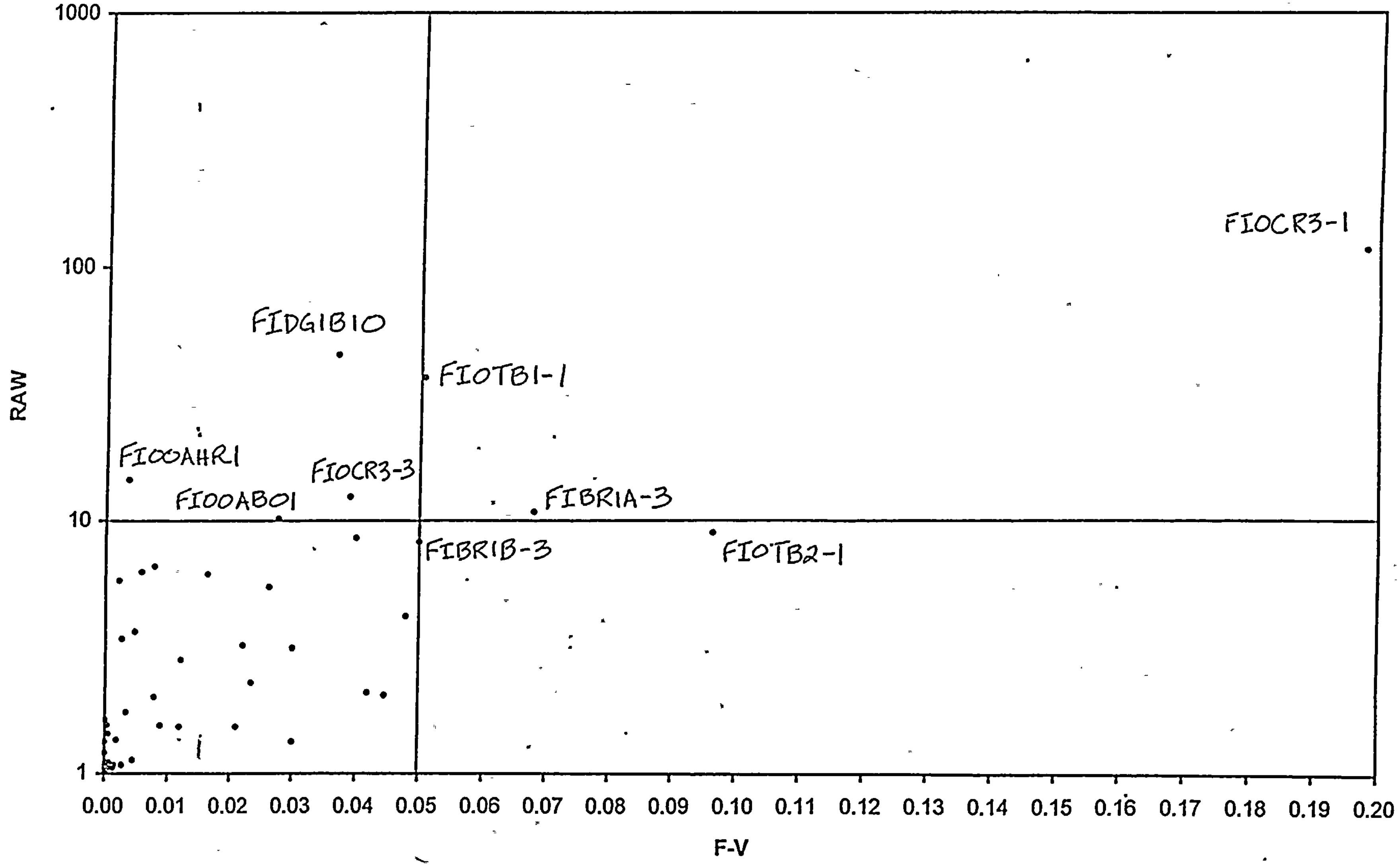


FIGURE 9-16. HUMAN ERROR IMPORTANCES

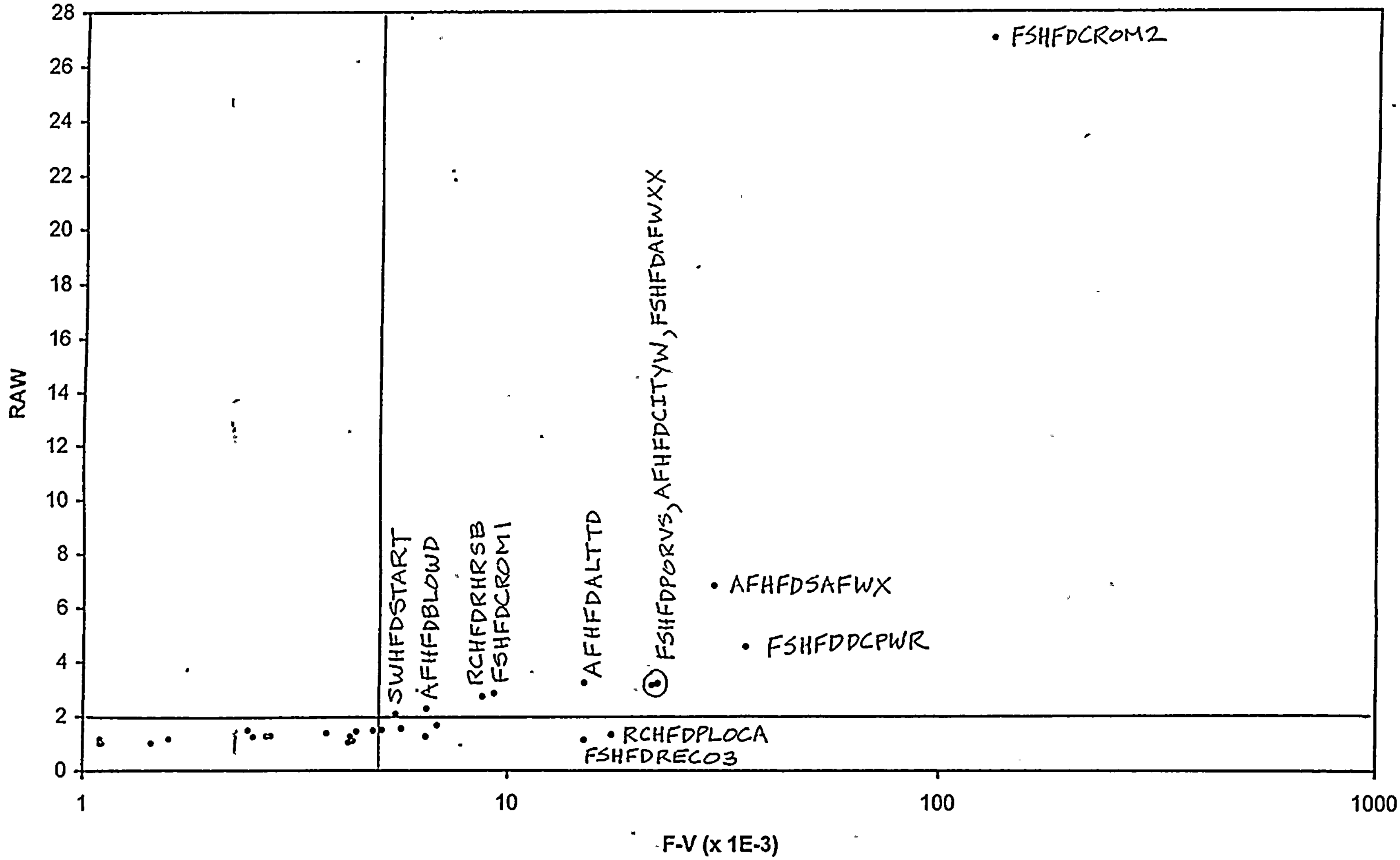


FIGURE 9-17. TEST AND MAINTENANCE IMPORTANCES

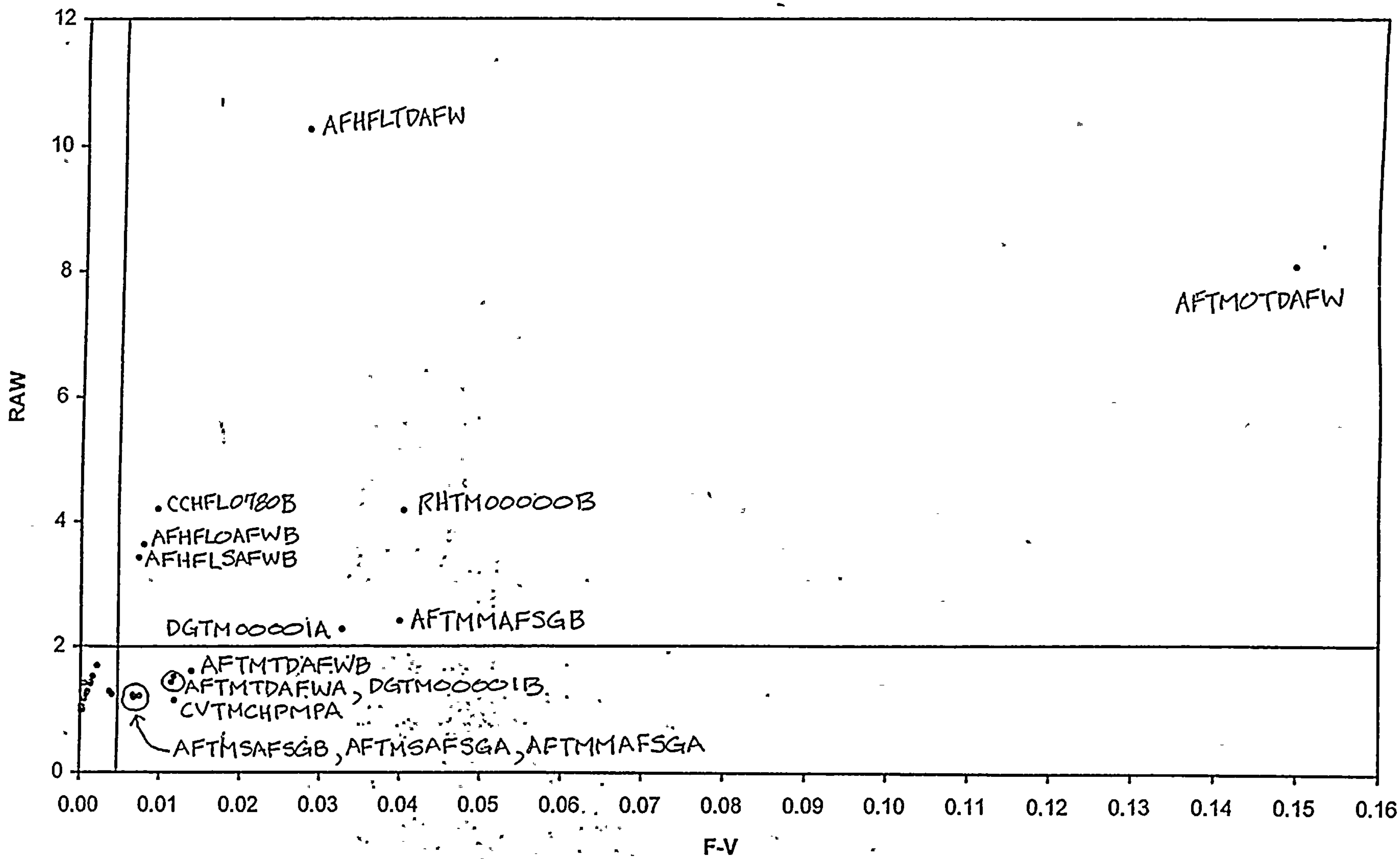


FIGURE 9-18. MODELING ASSUMPTION IMPORTANCES

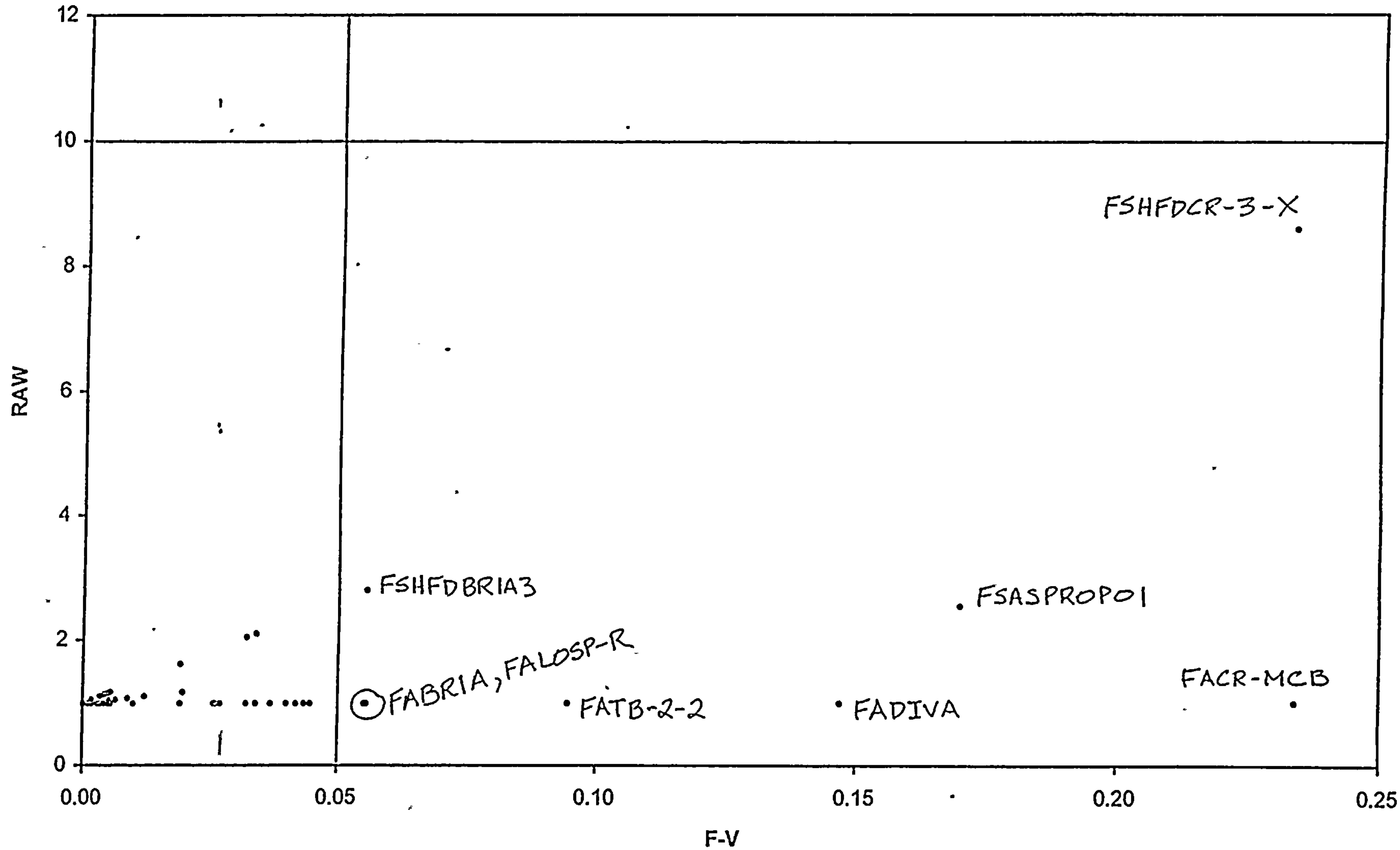


FIGURE 9-19. SYSTEM IMPORTANCES

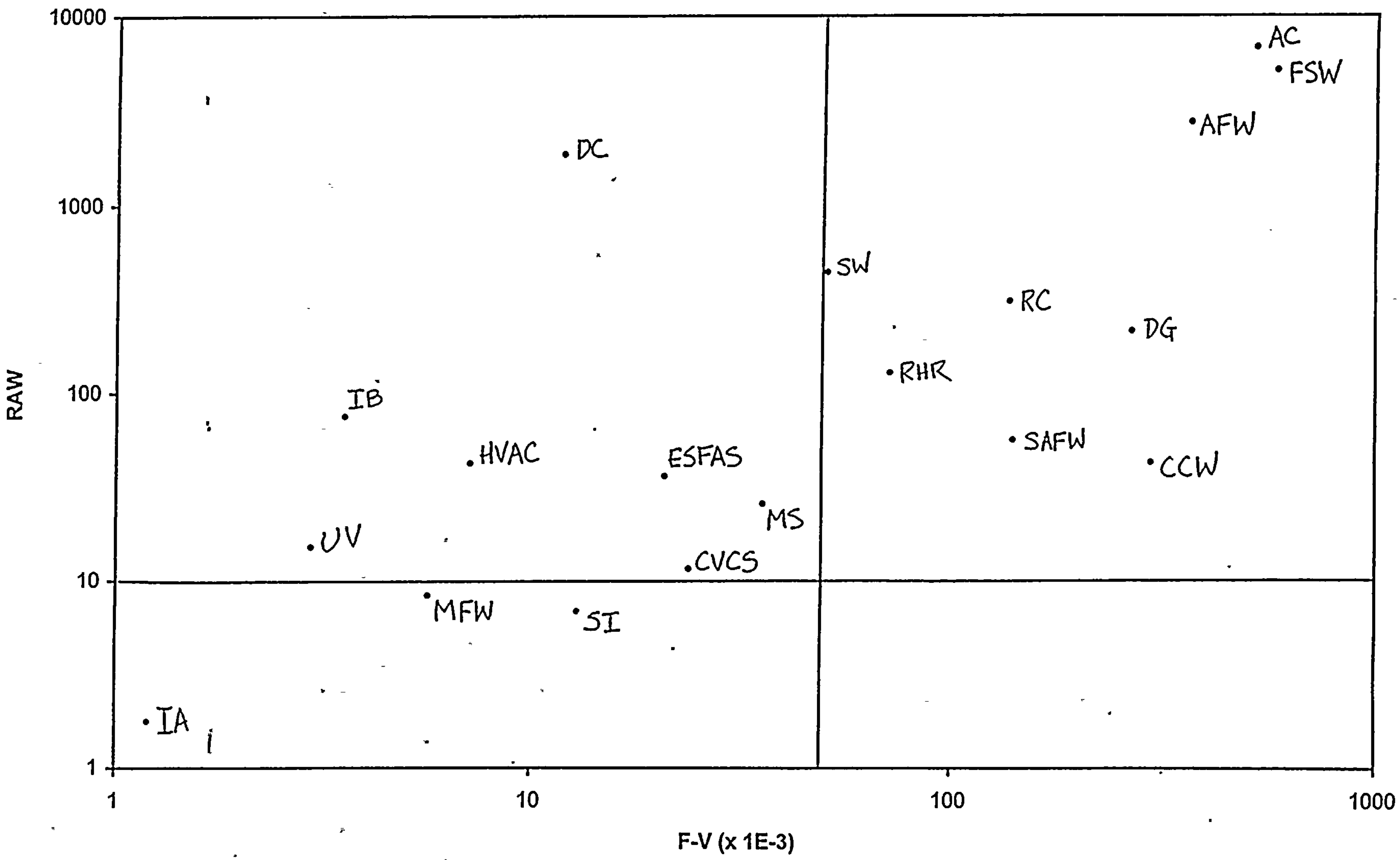
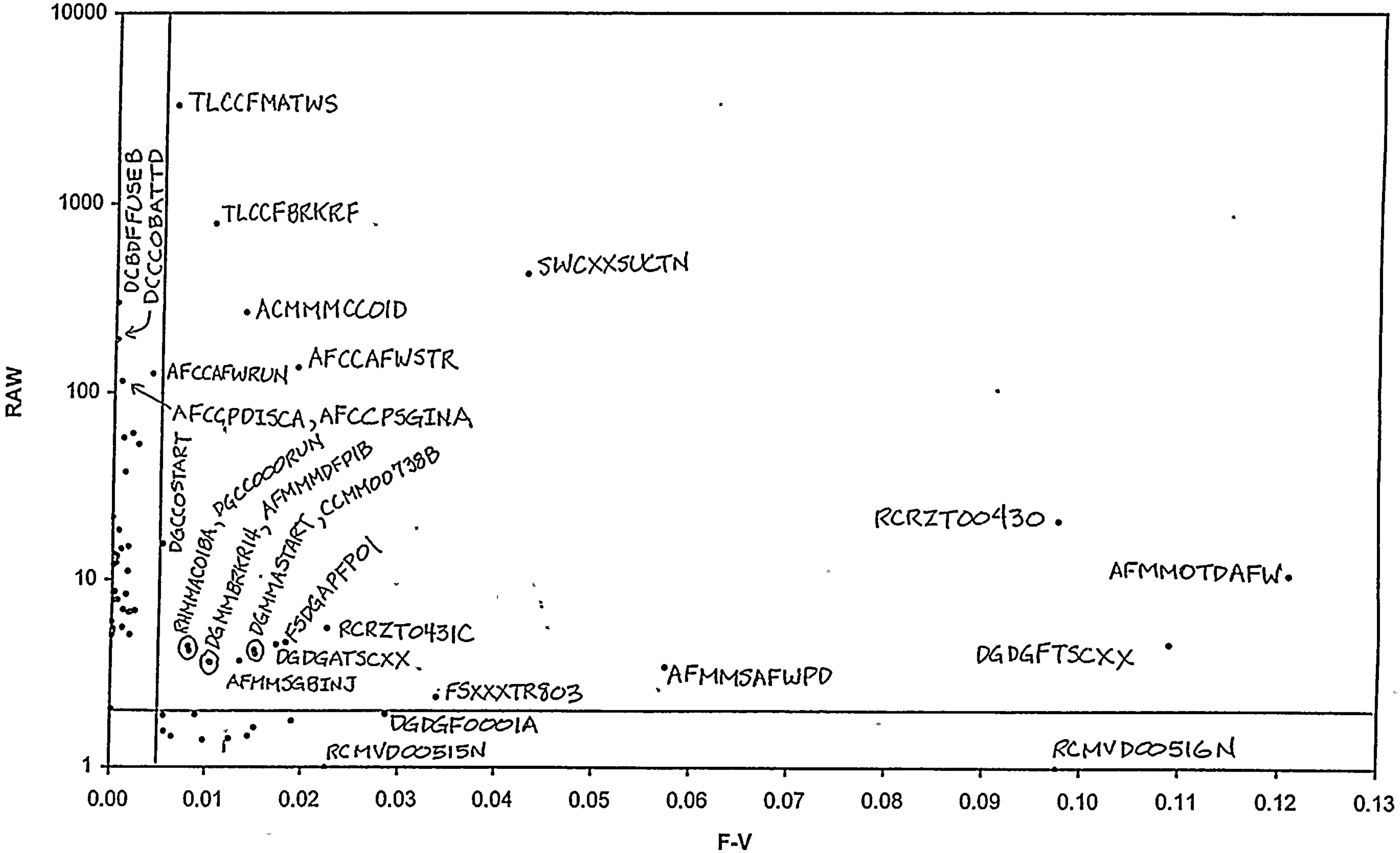


FIGURE 9-20. COMPONENT IMPORTANCES



11.0 SUMMARY AND CONCLUSION

11.6 Internal Fire Summary

The final calculated CDF due to internal fires for Ginna Station is 3.338E-05/yr. Figure 11-4 illustrates how each location contributes to this value. Over 80% of the contribution arises from three locations: (1) Control Building (42.4%), (2) Turbine Building (25.5%), and (3) Auxiliary Building (12.2%). Fires in these locations and significant human errors and systems are described below.

Control Building

The Control Building includes the Control Room, Battery Rooms, Relay Room, and Air Handling Room. Section 9.6.1 discussed the dominant scenarios arising from fires in the Control and Battery Rooms. When all possible Control Room fire scenarios are considered, the total contribution to the fire CDF for the Control Room becomes 23.8%. The largest single contribution (19.8%) arises from ignition of a fire in the Control Room's main control board and any two electrical cabinets that subsequently requires Control Room evacuation due to a significant loss of instrumentation and control. When all possible Battery Room fire scenarios are considered, the total contribution to the fire CDF for the Battery Room becomes 11.8%. The largest single contribution (6.8%) arises from ignition of a fire in Battery Room A. When all possible Relay Room fire scenarios are considered, the total contribution to the fire CDF for the Relay Room becomes 6.4%. The largest single contribution (3.0%) arises from ignition of a fire in any of the Relay Room electrical cabinets, assumed to damage all associated cables and equipment and necessitate Control Room evacuation. The contribution from the Air Handling Room fire scenarios is minimal (0.4%).

Turbine Building

The Turbine Building contains three levels -- Basement, Mezzanine, and Operating Levels. Section 9.6.1.2 discussed the dominant scenarios arising from fires at the Basement and Mezzanine Levels. When all possible Turbine Building fire scenarios are considered, the total contribution to the CDF for the Turbine Building becomes 25.5%, with 13.8% arising from fires on the Mezzanine Level and 11.7% from fires on the Basement Level. There is essentially no contribution from fires on the Operating Level. The largest single contributions arise from ignition of a fire in 4160V Bus 11A/12A or 11B/12B at the Mezzanine Level (9.6%) and ignition of a fire in the vicinity of the power supply cables to 480V Buses 14, 16, 17, or 18 at the Basement Level (5.1%).

Auxiliary Building

The Auxiliary Building contains three levels -- Basement, Mezzanine, and Operating Levels. When all possible Auxiliary Building fire scenarios are considered, the total contribution to the CDF for the Auxiliary Building becomes 12.2%, with 5.7% arising from fires on the Basement Level, 3.6% arising from fires on the Mezzanine Level, and 2.9% from fires on the Operating Level. The largest single contribution from a Basement Level fire (3.0%) arises from ignition of a fire in an electrical cabinet in the vicinity of the Safety Injection (SI) pumps, disabling all three SI pumps. The largest single contribution from a Mezzanine Level fire (2.2%) arises from ignition of a fire in cables which

interface with the Cable Tunnel, all of which are assumed to be vital. The largest single contribution from an Operating Level fire (2.8%) arises from ignition of a fire in components located near Component Cooling Water (CCW) or Reactor Makeup Water (RMW) equipment, disabling both CCW pumps and the RMW equipment.

Human Errors

As discussed in Section 9.6.3.2, the human errors contributing the most to the fire CDF are the following (contributions included in parentheses):

a. Failure to employ alternate AFW/SG instrumentation after Control Room indication has been lost (13.1%)
b. Failure to align TSC DC power supply to Battery B for the TDAFW pump, per the attachments to the ER-FIRE Procedures (3.6%)
c. Failure to correctly align Standby AFW (SAFW) (3.0%)
d. Failure to locally operate PORV 430, per the attachments to the ER-FIRE Procedures (2.2%)
e. Failure to use city fire water for SAFW, per Procedure ER-AFW.1 (2.2%)
f. Failure to locally open discharge MOV 3996 from and steam supply MOV 3505A to the TDAFW Pump, per the attachments to the ER-FIRE Procedures (2.2%).

All but action [d] are directly tied to operation of AFW or SAFW.

Systems

As discussed in Section 9.6.3.5, the systems contributing the most to the fire CDF are: (1) Fire Service Water (FSW) (58.7%), (2) AC Power (52.4%), and (3) AFW (37.1%). Each of these three systems also had the potential to increase the fire CDF by a factor > 2500 if all equipment associated with the system were assumed to be failed (Risk Achievement Worth). Two of these (FSW and AFW) are front-line systems which serve either to mitigate the fire or reduce the likelihood of resulting core damage. The third (AC Power) is a support system which provides required electric power to these and other critical front-line systems.

11.6.1 Unique and Important Safety Features

The internal events PSA identified three attributes that helped to reduce the calculated CDF at Ginna Station:

a. Standby Auxiliary Feedwater (SAFW) System;
b. Limited requirements for ventilation due to "open" building design;
c. Service Water (SW) System design (i.e., common header for all four SW pumps).

As shown in Section 9.6.3.5, both the SAFW and SW systems are considered of high importance with respect to the fire CDF. SAFW serves as a backup to normal AFW to provide decay heat removal, and is located in a separate building. This design attribution was shown to be very important with respect to fire mitigation due to the potential of a fire to fail all three AFW pumps located in the Intermediate Building. SW is a

support system which provides required component cooling to critical front-line systems. Although all four SW pumps are located in a common area of the Screenhouse, no credible fire scenario was identified that would disable more than two SW pumps because: (1) no intervening combustibles are installed between the SW pumps (only the pump motors are present on this floor; no cables are present); (2) the SW pumps are installed with a centerline separation of eight feet; and (3) only one fixed combustible (a diesel-driven fire pump) is installed within 20 feet of the pumps. Furthermore, Ginna Station can shutdown without SW for non-LOCA scenarios and has procedures in place to do so. Basically, the plant can utilize the city water supply to plant hydrants to cool the DGs and provide a suction source to SAFW. The ability to perform these actions was identified as being of high risk-significance. The design of the SW system utilizing a single header was not a significant consideration for fire-related risk.

The lack of a need for ventilation is based on the limited use of compartments or rooms to protect and separate various equipment trains. This, in turn, created fire issues since multiple trains could be affected by the same fire. However, location-specific suppression systems help to reduce the likelihood of a fire growing large enough to affect multiple trains. In the end, no specific vulnerability was discovered with respect to this "open" design.

11.6.2 Vulnerabilities

One of the major objectives of Generic Letter 88-20 (Ref. 7) was to identify potential plant vulnerabilities. Using the definition of vulnerability provided in the internal events PSA (Section 11.0), no items were identified as vulnerable due to the effects of fire. However, the PSA did identify a fire scenario in the DG B Vault (fire zone EDG1B-0), located beneath the DG B Room, in which both trains of AC electric power could be affected. Basically, a worst-case fire could fail the B electrical train (Buses 16 and 17) and fail offsite power and all control power to Bus 18 of the A electrical train (DG A would still remain available). This, in turn, would result in the loss of all SW. While the scenario was not risk-significant due to the low ignition frequency of a fire in this location and the available plant procedures to handle a loss of SW, ACTION Report 99-948 was generated to evaluate the scenario. The result of the ACTION Report was to recommend consideration of procedural changes to instruct plant personnel to manually close the required Bus 18 breakers to prevent leaving the plant in a Station Blackout condition. These procedural changes are being evaluated on the basis of commercial considerations and not as a defined vulnerability. They are expected to be implemented by November 1999.

11.6.3 Changes Made to the Facility

Based on the insights obtained from the internal fire evaluation, no changes have been made to or proposed for Ginna Station.

FIGURE 11-4. CONTRIBUTIONS TO FIRE CDF BY LOCATION